Fire Protection Plan – Letter Report

Oakcrest Project, San Marcos, California

NOVEMBER 2025

Prepared For:

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November 4, 2025 17057

Jason Nailon,
Division Chief / Fire Marshal
San Marcos Fire Department
1 Civic Center Drive,
San Marcos, California 92069

Subject: Fire Protection Plan – Letter Report for the Oakcrest Project, County of San Diego, California

Dear Mr. Nailon:

This Fire Protection Plan (FPP) – Letter Report demonstrates that the Oakcrest Project located along North Twin Oaks Valley Road 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 (San Marcos Municipal Code Chapter 17.64.030) 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), including Chapter 7A (San Marcos Municipal Code Chapter 17.08.010); and 2022 California Residential Code (CRC), including Section 337, as adopted by San Diego County. In addition to the above referenced codes, this FPP Letter Report 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-Letter Report 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- Letter Report, the Oakcrest Project will be referred to as the "Project".

The Project site is located in the City of San Marcos in northern San Diego County, California. This FPP Letter Report 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 the County of San Diego along with Project-specific measures based on the site, its intended use, and its fire environment. The Project site is within the San Marcos Fire Department's (SMFD) jurisdictional area. There are four fire stations that could respond to an incident on the site in under approximately 10 minutes travel time. San Marcos Fire Department (SMFD) Station 1 could reach the site in 3 minutes and 12 seconds, SMFD Station 3 could reach the site within 6 minutes, Escondido Fire Department (EFD) Station 3 could reach the site within 8.5 minutes and Deer Springs Fire Protection District (DSFPD) Station 2 could reach the site within 9 minutes. 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 SMFD Station 1, located at 180 West Mission Road, San Marcos, California, approximately 1.5miles from the Project site. SMFD Station 1 has equipment including one (1) Fire Engine, one (1) fire truck, and one (1) Brush Engine.

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 on May 7, 2025 (see Attachment A, Photograph Log). As determined during the analysis of this site and its fire

environment, the proposed 257 residential lot development Project, in its current undeveloped condition, is considered to include characteristics that, under favorable conditions, have the potential to facilitate fire spread. Under extreme conditions, wildfires burning on the adjacent open space surrounding the Project could burn erratically and aggressively and result in significant ember production. 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, extensive fuel modification areas, improved accessibility to firefighting personnel and equipment, and new structures built to the latest ignition resistant codes. However, it is anticipated that fire has the potential to encroach within the vicinity of the Project site. This FPP Letter Report contemplates wildfire encroachment 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!" 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 Project Description

The Oakcrest Project is a Specific Plan that proposes to develop a suburban neighborhood that provides pedestrian sidewalks, a public trail, and bicycle connectivity to surrounding areas supported by Single-Family and Single-Family Courtyard (SFC) residential dwelling units and including private recreational open space amenities and a 6.22-acre public park. Some of the natural areas outside the limits of grading disturbance will be preserved on site in a conservation open space easement to mitigate impacts and preserve sensitive habitat. A trail connection to the P-Mountain preservation area will be included at the western edge of the project and will be open for public use. The Project's Specific Plan Area includes 145 Single-Family Residential (SFR) units and 112 Single-Family Courtyard (SFC) residential units.

The Project encompasses 136.1 acres and is located west of North Twins Oaks Valley Road, and between Legacy Drive and Del Roy Drive in San Marcos, 92069 (see Figure 1, Vicinity Map and Figure 2, Project Site Plan). Residential lot sizes will be developed between 0.11 acres and 0.28 acres. The Project proposes approximately 52.6 acres of biological open space. The Project site is surrounded by open space to the west, a golf course to the east, and suburban residential development similar to that proposed here, to the north and south. Undeveloped open space surrounding the Project site, primarily consists of shrub/ scrub vegetation (see Figure 3, Vegetation Community Map).

The property is accessible from North Twins Oaks Valley Road , as illustrated in Figure 2. Primary access to the Project site would be from a single point along North Twin Oaks Valley Road. All on-site fire access roads, including driveways, 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 to provide all weather driving capabilities.

2 Environmental Setting

2.1 Location

The Project site is located west of North Twin Oaks Valley Road between Legacy Drive and Del Roy Drive, in the City of San Marcos, California (Project Location; Figure 1). The Project site is located in an area of mixed developed and undeveloped land cover. The property is bounded on the north and south by residential land uses, a golf course to the east, and open space to the west. The existing terrain on the site is sloping down toward the eastern boundary. Elevations at the Project site range from approximately 615 feet above mean sea level (amsl) to 1,110 feet amsl.

The site is located west of North Twins Oaks Valley Road, and south of Deer Brook Drive. The Project site is surrounded by open space to the west, a golf course to the east, and suburban residential development similar to that proposed by the Project to the north and south. Undeveloped open space surrounding the Project site, primarily consists of shrub/ scrub vegetation (see Figure 3, Vegetation Community Map).

The proposed Project includes developing 257 single family residential units on the approximately 136.1 acre Project area. The property has a primary paved road access point from North Twins Oaks Valley Road, and an Emergency Vehicle Access Easement connecting to North Twin Oaks Valley Road, as illustrated in Figure 2.

The Project site is within a Very High Fire Hazard Severity Zone (VHFHSZ), in a Local Responsibility Area (LRA) as designated by CAL FIRE. Because of this designation, the current, and any future homes would be required to be built to the latest ignition resistant building codes found in Chapter 7A of the California Building Code, and any additional restrictions or requirements adopted locally by the San Marcos Fire Department (SMFD), and the 2023 San Diego County Consolidated Fire Code. (see Figure 4, CALFIRE Fire Hazard Severity Zone Map)

There have been numerous wildfires within the vicinity of the Project area including large wildfires that have triggered mandatory, large-scale evacuations. To date, the evacuations have occurred successfully and have followed a conservative approach managed by the Office of Emergency Services, the incident command and law enforcement.

CAL FIRE Fire and Resource Assessment Program (CALFIRE 2024) fire history data[1] indicates 23 wildfires have occurred within a 5-mile vicinity of the Project site; with one recorded wildfire on-site (1970 Un-named Fire, 1,916.6 acres). The most recent wildfire in the Project vicinity was the 2016 Gopher 7 Fire, which burned approximately 34.5 acres. The largest fire within 5 miles of the Project site was the Un-Named Fire in 1943 which burned 40,247.9 acres (see Attachment B, Fire History Map). Based on Project vicinity fire history data, fire return intervals range between zero (multiple fires in the same year) and 14 years, with an average return interval of approximately four years, indicating significant wildfire potential in the region.

[1] https://www.fire.ca.gov/what-we-do/fire-resource-assessment-program/fire-perimeters

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 existing terrain on the site is generally characterized as hilly to gently sloping. Elevations at the project site range from approximately 615 feet above mean sea level (amsl) to 1,110 feet amsl.

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 annual average high temperature for the project area is approximately 80°F, with average highs in the summer and early fall months (July–September). Precipitation typically occurs from November through April with annual rainfall averaging approximately 11 inches[2]. The prevailing wind pattern is from the west (onshore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea) and at night, winds are from the northeast (land), averaging four miles per hour (mph). During the summer season, the diurnal winds may average slightly higher (approximately 10 mph[3]) 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 may be affected by Santa Ana winds from the north and east. The slopes on the Project site have an eastern aspect, and slope down from the west, therefore the Project site will be most affected by onshore winds. These mountains are not generally in alignment with the extreme Santa Ana wind events, and will therefore likely not exacerbate a Santa Ana wind driven fire. The Project site lies in a north/south canyon; if a wildfire were to ignite to the north of the Project, it may be affected by Santa Ana winds which would drive it to the southwest, with fire moving laterally (flanking) towards the Project site.

2 https://weatherspark.com/y/1898/Average-Weather-in-San-Marcos-California-United-States-Year-Round
3 FEMS RAWS Station Data Valley Center Station 045734

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 4, Fire Behavior Modeling. As determined during the site visit, the vegetation communities and land cover types occur on or adjacent to the project site, include grasslands, shrub and scrublands, and developed land uses, (see Figure 3, Vegetation Map). The dominant vegetation types surrounding the Project site is a combination of Southern California Coastal Scrub, Southern California chaparral, California Ruderal Scrub, California Central Valley and Southern Coastal Grassland, California Ruderal Grassland and Meadow, California Coastal Live Oak Woodland and Savanna, as well as Western Warm Temperate Urban Shrubland and Developed Herbaceous.

2.4.1 Vegetation Dynamics

The vegetation described above translates to fuel models used for fire behavior modeling, discussed in Section 4 of this FPP Letter Report. 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/or 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. The FMZ’s will not include any vegetation types or plant species listed in the SMFD Undesirable Plant List (Attachment C). In contrast, conditions outside the fuel modification zones, where the wildfire threat will exist post-development (south of the project site), are classified as medium to heavy fuel loads due to the maturity of the vegetation, which haven’t burned for many decades.

2.5 Examples of Communities Designed Against Wildfire

When communities incorporate the regulatory requirements and wildfire-resistance measures like the ones described above, they can offer a safer landscape that is resistant to WUI fire disasters. Researchers and fire professionals are increasingly emphasizing the importance of not only fire-resilient homes but also fire-resilient neighborhoods, which can be achieved through planned development that is less vulnerable to fire (Moritz & Bustic, 2020; Ewing & Maier, 2016). Wildfire impacts on neighborhoods can be mitigated through the pattern and layout of new developments, the incorporation of community-wide design features and protective measures, and compliance with modern fire-protective building codes (Barrett, 2019; Ewing & Maier, 2016). Data from past wildfire events supports that mitigation induced by modern building codes yields significant benefits to neighboring structures, which can decrease structure-to-structure spread (Baylis & Boomhower, 2021).

Case Study 1: The 2017 Thomas Fire in Santa Barbara and Ventura Counties consumed over 1,000 homes predominately during the high wind events in the first few days of the incident (Kolden & Henson, 2019). The unincorporated area of Montecito is classified as VHFHSZ and has significant fire history inclusive of home loss (Kolden & Henson, 2019). Two decades prior to the Thomas Fire, the Montecito Fire Protection District started to address wildfire vulnerability in the community using place-based reduction strategies (Kolden & Henson, 2019). These strategies focused on recurring structural ignition potential, fire-resistant materials, structural modifications, increasing defensible space, fire scaping, and developing a fire protection code (Kolden & Henson, 2019). As a result, when the Thomas Fire, during Sundowner winds, spread to Montecito the area experienced minimal damage and was largely passed over (Kolden & Henson, 2019). By having mitigation not be isolated to wildland areas or just to homes, but implemented on multiple scales, Montecito was able to effectively protect not just the WUI areas, but the entire community.

Case Study 2: The 2007 Witch Creek fire was one of the most destructive fires in California's history and destroyed thousands of homes in San Diego County (Mutch et al., 2011). However, after the 1990 Paint Fire in Santa Barbara County and the 1991 Oakland Hills Tunnel Fire the San Diego community started efforts to become adaptive to a very high fire hazard environment (Mutch et al., 2011). Developers of five master-planned communities (the Bridges, the Crosby, Cielo, Santa Fe Valley, and 4S Ranch) worked with the Rancho Santa Fe Fire Protection District to build the communities specifically with wildfire in mind (IBHS, 2008). They implemented fire codes, and developed restricted defensible space rules, home hardening measures, and vegetation restrictions; all of which were maintained and enforced by the HOA (Mutch et al., 2011). As a result, when the Witch Creek fire spread to Rancho Santa Fe in the five communities that adopted this approach no homes were lost versus the older communities which were heavily impacted (Mutch et al., 2011).

Additionally, the following communities which feature similar fire protection measures as the Oakcrest Project, have experienced minimal to no fire encroachment as a result of their design:

- Casino Ridge, Yorba Linda (2008 Freeway Complex Fire)[4]
- Serrano Heights, Anaheim Hills (2007 Santiago Fire)[5]

[4] (Orange County Fire Authority, 2008)
[5] (FEMA, n.d.)

- Cielo, Rancho Santa Fe (2007 Witch Creek Fire)[6]
- 4S Ranch, San Diego (2016 brush fire, 2007 Witch Creek Fire)[7]
- Stevenson Ranch Fire, Santa Clarita (2003 Simi Fire)[8]
- Orchard Hills, Irvine (2020 Silverado Fire)

This data supports that master-planned wildfire-resilient communities built to modern standards provide resilient and fire-resistant housing. Design features that comply with Chapter 7A of the California Building Code decrease the wildfire vulnerability of individual buildings (Quarles & Pohl, 2019). When these features are adopted on a community-wide scale, and coupled with fuel modification zones and community-level buffers, the features enhance overall wildfire resilience of the community (IBHS, 2021). This community-wide approach is critical in reducing fire risk because of the importance of preventing structure-to-structure ignition within a neighborhood in order to prevent conflagrations (Moritz & Bustic, 2020).

Analysis of the State Fire Marshal's statistics also indicates that homes built to CBC Chapter 7A standards effectively reduce fire risks for homes built in the WUI. A study that focused on the 2018 Camp Fire found that homes built in 1997 or later fared substantially better than homes built prior to 1997 (Valachovic et al., 2021). Another source indicates that a 2008 or newer home in California is substantially less likely to be destroyed than a 1990 home experiencing identical wildfire exposure, and that that there is strong evidence that these effects are due to state and local building code changes (Baylis & Boomhower, 2021).

New master-planned wildfire-resilient communities in very high fire severity zones are planned, approved and implemented with numerous fire-safety features and measures. These fire safety features and measures contrast with some older built environments impacted by the 2025 fires in Los Angeles County. See Exhibit 1, which evaluates risk factors associated with some older built environments impacted by the 2025 fires in Los Angeles County and distinguishes those risk factors with wildfire resistance measures in a modern, master-planned wildfire-resilient community (Orchard Hills) that did not suffer significant structural damage despite being directly impacted by the 2020 Silverado Fire during an extreme wind event.[9] As shown in Exhibit 1, modern, master-planned wildfire-resilient communities in very high fire hazard severity zones within the County, such as the Oakcrest Project, include key wildfire safety features and measures, such as:

- Chapter 7A ignition resistant construction
- Annually maintained fuel modification zone
- Ember resistant chapter 7A structures
- Modern code compliant roadways
- Multiple ingress/egress points
- Modern code compliant turnarounds
- Modern code compliant roadways
- HOA maintained landscaping

6 (Mutch et al., 2011)
7 (Audencial, 2016)
8 (Murphy 2003)
9 Exhibits 2 and 3 specifically evaluate the 2025 Palisades Fire and Eaton Fire due to the extreme damages from these fires. Exhibits 2 and 3 are also representative of potential risk factors to other older built communities.

- Minimal vegetation between structures
- Irrigated landscaping
- Modern code compliant road widths that allow emergency access

In contrast, some of the older built environments impacted by the 2025 fires lacked many of these safety features and were characterized by higher-risk attributes, such as:

- Non-modern structures that lack ember resistance
- Construction not designed for exterior wildfire exposure or resistance to embers
- No fuel modification zones or lack of fuel modification zone maintenance
- Lack of interior landscaping area maintenance
- Narrow road widths (non-compliant with modern codes)
- Hazardous vegetation between structures

In sum, the Oakcrest Project site is designed and planned as a master-planned, wildfire-resilient community that will be implemented and maintained compliant with regulatory requirements and mitigation under the oversight of SMFD. The Oakcrest Project takes a multi-scaled approach to fire protection through wildfire education, ignition prevention, fuels management, increased response capacity, and ignition-resistant construction. The Oakcrest Project has been designed to ensure adequate water supply to ensure consistency for fire protection purposes. The water supply system, encompassing reservoirs, pressure tanks, elevated tanks, water mains, and other fixed systems, would be installed and maintained according to state and NFPA standards and would be capable of providing the required fire flow. The dual benefit of creating a development that can prevent a fire is that it offers protection to the surrounding communities and the environment. The requirements and recommendations outlined in the FPP have been designed specifically for the proposed construction in VHFHSZ and HFHSZ areas and can significantly reduce the potential threat to off site areas.

Exhibit 1. Planned Wildfire Resilient Community Features

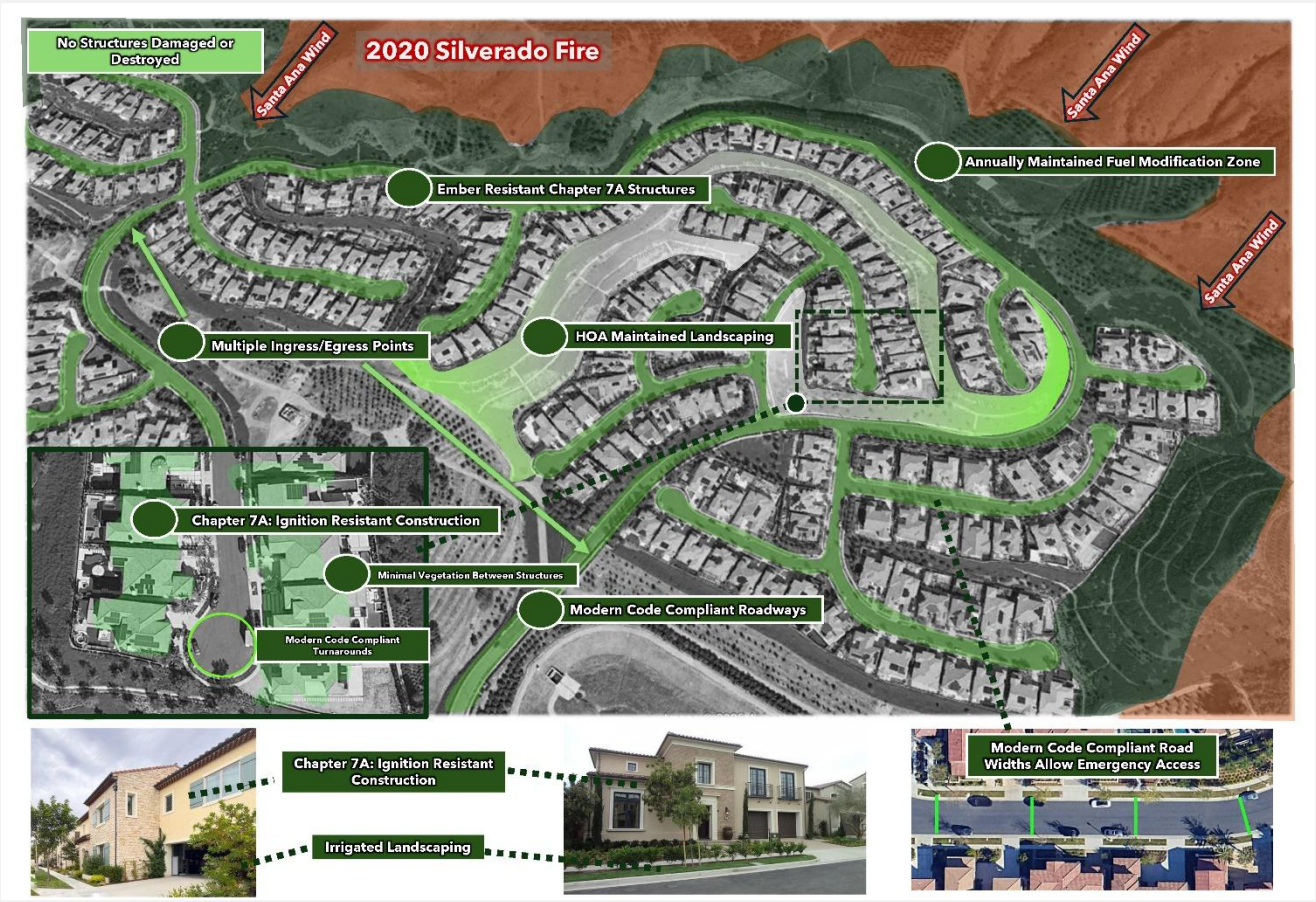

Exhibit 2. Palisades Community Features

Exhibit 3. Eaton Community Features

3 Project Exposure to Wildland Fires

The Project proposes 257 dwelling units on the Project site. The structures along the perimeter of the developed area would be exposed to wildland fires through a direct interface surrounding the Project site and through potential ember cast. Interior structures would be exposed to ember cast. The Project would address this potential threat through application of Chapter 7A of the 2022 California Building Code, or the current building code standards, along with Defensible Space in the form of Fuel Modification Zones, or equivalent.

3.1 Water Supply

Water for the Project would be provided by Vallecitos Water District. On-site firefighting water needs will be met from new fire hydrants located throughout the Project site. On-site fire hydrants must meet the requirements for fire flow as stated in the 2023 SDCCFC Section 507.3, Fire Flow, and to the code specifications of the SMFD, as discussed in Section 3.4, Fire Hydrants.

3.2 Fire Access

Site access, including fire lanes, driveways, and entrance road widths, primary and secondary access, turnarounds, dead end road lengths, signage, surface, and other requirements will comply with roadway standards as identified in the 2023 San Diego County Consolidated Fire Code (SDCCFC) which has adopted and amended the 2022 California Fire Code, California Code of Regulations, Title 24, Part 9 (Municipal Code Chapter 11, Article 2, Division 1; Ordinance No. 2022-04), and the 2022 California Building Code, including Chapter 7A (Municipal Code Chapter 6, Article 3). The Project would be required to meet the current adopted codes at the time of construction. Fire access will be reviewed and approved by SMFD prior to construction.

The Project will be accessible by a primary access point from North Twin Oaks Valley Road that connects to “Street A”, as well as a utility and emergency access easement to the Project, that connects to North Twin Oaks Valley Road via the proposed “Street B” cul-de-sac. North Twin Oaks Valley Road is compliant with the existing code for street width and allows for increased capacity, safety, and evacuation efficiency. If included at buildout, any gated entry into the Project area must comply with Section 503.6 Security Gates, including electric gate openers, listed in accordance with UL 325 and designed, constructed and installed to the requirements of ASTM F2200. The gate will be equipped with a Knox, emergency key-operated switch overriding all command functions and opening the gate and a Knox box, per code.

Driveways and alleyways that are 20 or 24 feet wide shall be marked by way of proper signage or painted curbs to Section 503.3, Marking, standards and must include the words “NO PARKING FIRE LANE”. The wording and placement of all fire lane signs shall be approved by the Fire Department prior to installation.

3.2.1 Driveways

A paved, all-weather driveway is required for proposed structures that are 150 feet or more from a common road and shall meet SDCCFC requirements as follows:

1. A residential driveway constructed of 3½" Portland cement concrete may be installed on any slope up to 20% provided that slopes over 12% have a deep broom finish perpendicular to the direction of travel to enhance traction. The fire code official may allow a surfacing material of 6 inches of compacted decomposed granite on fire apparatus access roads with a slope of 10% or less in areas allowed by the San Diego County Standards for Private Roads.
2. Approved fire apparatus turnaround within 50 feet of the building. The inside radius shall be no less than 28 feet paved or as approved by a fire code official.
3. Driveways serving no more than two residential parcels will be 16 feet wide unobstructed with a fire apparatus turnaround.
4. If not legible from the street, addresses shall be posted at the street entrance to each driveway and shall be visible from both directions of travel at 3 to 4 feet above grade.
5. Driveways exceeding 150 feet in length, but less than 600 feet in length, shall provide a turnout near the midpoint of the driveway. Where the driveway exceeds 600 feet, turnouts shall be provided no more than 400 feet apart.
6. Modification/removal of combustible vegetation is required within 20 feet of each side of an evacuation road, including driveways.

3.2.2 Dead-End Roadways

A Dead-End Roadway is defined in the 2023 SDCCFC as a road that has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

All dead-end roadways must comply with the SDCCFC Sections 503.2.5, Dead ends. Dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved area for turning around emergency apparatus. Approved turnarounds must be a minimum unobstructed radius width of 36 feet paved, 40 feet graded, or as approved by the fire code official. The maximum allowable dead end road length for parcel sizes less than one acre, such as the proposed parcels within the Project area, is 800 linear feet. The length of a dead-end road is measured from the edge of the roadway surface at the intersection where the road begins to the end of the road surface at its farthest point. As measured from the intersections, each Project roadway is within the allowable distance.

The Project includes multiple dead-end roadways that end in a cul-de-sac. The dead-end roadways are at minimum 44 feet in width and terminate with cul-de-sac turnarounds with a minimum of 50-foot radii. The cul-de-sac at the end of “Street B” is longer than the code allowable dead-end length of 800 feet so an emergency vehicle access easement is provided at the end of the cul-de-sac bulb. All other dead-end roadways within the Project site are within the code allowable dead end road length of 800 feet for this Project’s lot sizes, thus the Project meets the dead-end road length requirement.

3.3 Premises Identification

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

1. New and existing buildings shall be provided with approved address identification that shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters.
2. Numbers shall not be spelled out and each character shall be not less than 4 inches high with a minimum 1/2-inch stroke width for single-family residential structures.
3. Where access is by means of a private road or driveway and the building cannot be viewed from public ways, a monument, pole or other sign or means shall be used to identify the structure.
4. Address identification shall be maintained.
5. Streets and roads within the development shall be identified with approved signs and shall be installed at street intersections to the satisfaction of the SMFD and the County Department of Public Works.
6. Streets and roads will have street signs posted on non-combustible, weather resistant street signposts and shall be of an approved size. There will be street signs at the entrance to the development, all intersections, and elsewhere as needed subject to approval of the SMFD Fire Chief.
7. Access roads to private lots to be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction.

Furthermore, any new development which necessitates updated emergency response maps due to new structures, hydrants, roadways, or similar features shall be required to provide map updates in a format compatible with current department mapping services to the SMFD (SDCCFC Amendments, Section 505.5 – Response Map updates).

3.4 Fire Hydrants

The Project at buildout will include the addition of fire hydrants throughout the Project site. The proposed fire hydrants will be supplied by VWD. The proposed fire hydrants will meet the requirements of the San Marcos Municipal Code as described in Section 17.64.130, Fire Hydrant Requirements and 17.64.140, Fire Hydrants. Section 507.5.1 of the California Fire Code applies to the Project, with the addition of subsection 507.1.2, which includes the following requirements:

> 507.5.1.2 Type Required. The Fire Chief shall designate the type and number of fire appliances to be installed and maintained in and upon all buildings and premises in the Jurisdiction. This shall be done according to the relative severity of probable fire, including the rapidity with which it may spread. Such appliances shall be of a type suitable for the probable class of fire associated with such building or premises and shall have approval of the Fire Chief.

The San Marcos Municipal Code also amends and adopts Section 507.5.7, Fire Hydrant and Fire Valve Location, and Appendix C of the California Fire Code, Table C102.1 Required Number and Spacing of Fire Hydrants, including:

1. 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.
2. Fire hydrants and fire department connections shall be identified by a reflective blue or green marker, respectively, with a minimum dimension of 3 inches, in the center of the travel lane adjacent to the water source, or by other methods approved by the fire official.
3. All materials shall be listed and approved by the water purveyor and/or fire code official. The fire code official may require a fire hydrant to have any combination of 4 inch and 2½ inch outlets with National Standard Threads.

3.5 Fire Response

The proposed Project site is located within the City of San Marcos, a designated Local Responsibility Area (SRA), within the SMFD jurisdictional area. In the event of an emergency, the Project site may be assisted by various fire agencies as part of the California Master Mutual Aid Agreement and the California Fire Assistance Agreement (County of San Diego 2022). SMFD, Deer Springs Fire Protection District (DSFPD), and Escondido Fire Department (EFD) are the closest responding fire response agencies to the Project. A mutual aid agreement that exists between the SMFD, DSFPD, and EFD[10], is referred to as a "boundary drop" where the closest and most appropriate emergency vehicles respond regardless of jurisdictional boundaries.

Emergency response for the Project would be provided by SMFD Fire Station 1, located at 180 W Mission Rd, San Marcos. Station 1's apparatus includes a fire engine, a fire truck, and a brush engine. Station 1 is approximately 1.5 miles from the entrance to the Project site with a calculated travel time of approximately 3 minutes and 12 seconds[11]. Therefore, SMFD can respond to the Project site within the County of San Diego Time Response Standards[12] of 5 minutes for urban areas.

There are additional firefighting resources within the vicinity of the Project site, which includes SMFD Station 3, located at 404 Woodland Parkway, San Marcos, EFD Station 3, located at 1808 Nutmeg Street, Escondido, and DSFPD Station 2, located at 1321 Deer Springs Road, San Marcos. SMFD Station 3 is approximately 3 miles away, EFD Station 3 is 4.5 miles away, and DSFPD Station 2 is approximately 4.7 miles from the Project site. SMFD Station 3 has a calculated travel time of 5 minutes and 45 seconds.

Table 1. Closest Responding Fire Stations Summary

Station No.	Location	Maximum Travel Distance	Est. Travel Time*
SMFD Station 1	180 W Mission Rd, San Marcos, California 92069	1.5 miles	3 minutes 12 seconds
SMFD Station 3	404 Woodland Parkway, San Marcos, California 92069	3.0 miles	5 minutes 45 seconds
EFD Station 3	1808 Nutmeg Street, Escondido, California 92026	4.5 miles	8 minutes 18 seconds

10 County of San Diego 2022 OA EOP, Annex B, Appendix 2: Fire Mutual Aid Zones and Dispatch
11 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).
12 County of San Diego General Plan Safety Element Table S-3, Travel Time Standards from the Closest Fire Station

Table 1. Closest Responding Fire Stations Summary

Station No.	Location	Maximum Travel Distance	Est. Travel Time*
DSFPD Station 2	1321 Deer Springs Rd, San Marcos, California 92069	4.7 miles	8 minutes 39 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.

In 2021, the City of San Marcos population of approximately 95,000 residents[13] generated 11,486 total annual calls[14] (Nailon, J. 2021). This results in a call volume of approximately 120 calls per 1,000 people, or a per capita call volume of approximately 0.12.

The Project proposes the development of 257 single family residential lots, which would generate a population of approximately 769 residents based on the average of 2.99 persons per household (U.S. Census Bureau, 2023). The Project would potentially generate approximately 93 calls every year (roughly 8 calls per month or 0.26 call per day), most of which would be expected to be medical-related calls, consistent with typical emergency call statistics (Refer to Table 1 for call volume calculations).

Table 2. Calculated Call Volume Associated with the Oakcrest Project

Emergency Calls per 1,000 (County Data)	Number of Residents	Avg. No. Calls per Year (769/1,000) x120	Avg. No. Calls per Month (92.28/12)
120	769 (estimate)	92.28	7.69

Service level requirements are not expected to be significantly impacted with the increase of approximately 8 calls per month for the local fire response system. For example, SMFD currently responds to roughly 32 calls per day (11,486 calls per year, approximately 957.17 calls per month or 221 calls per week) in its primary service area split amongst 4 stations, so approximately 8 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 Letter Report are intended to aid firefighting personnel and minimize the demand placed on the existing emergency service system.

3.6 Ignition Resistant Building Construction

The Project proposes 257 residential lots. All new structures would be constructed to the most current applicable SDCCFC standards. Due to its location within a Very High Fire Hazard Severity Zone, potential buildings would comply with the enhanced ignition-resistant construction standards of the 2022 CBC (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of

13 https://www.census.gov/quickfacts/fact/table/sanmarcoscitycalifornia/POP010220
14 Nailon, J. 2021. "San Marcos Fire Department Service Calls Volume." Personal communication (phone call) with J. Nailon, Fire Marshal and Dudek. June 2, 2021.

exposure to burning vegetation from wildfires. While these standards will provide a high level of protection to structures in this development and should reduce the potential for ordering evacuations in a wildfire, there is no guarantee that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

There are two primary concerns for structure ignition: 1) radiant and/or convective heat and 2) burning embers (NFPA 1144 2008, Ventura County Fire Protection District 2011, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided the project are required by the SMFD, SDCCFC and state codes, but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2010 Building/Fire Code update), of extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. While the Project would not be considered a shelter-in-place development, these structures would be intended to provide temporary refuge as a contingency to evacuation should evacuation be considered less safe. Hardening each building against a wildfire would require building features as follows:

- Application of Chapter 7A, ignition resistant building requirements
- New Class-A fire-rated roof and associated assembly. With the proposed Class-A fire-rated roof, there will be attic or void spaces above living spaces requiring ventilation to the outside environment. The attic spaces will require either ember-resistant roof vents or a minimum 1/16-inch mesh and shall not exceed 1/8-inch mesh for side ventilation (recommend BrandGuard, O'Hagin, or similar vents).
- Minimum 1-hour rated exterior walls and doors; one layer of 5/8-inch type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, from the foundation to the roof, for all exterior walls of each building.
- Multi-pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2
- National Fire Protection Association (NFPA) 13D Automatic, Interior Fire Sprinkler System to installed for all buildings on the Project site.
- Modern infrastructure, access roads, and water delivery system.

When fire protection is implemented at the parcel level and leverage ignition resistant building materials, infrastructure improvements, increased response capacity, and incorporate landscape design FMZs, the wildfire risk can be reduced not only within the proposed development but in the surrounding environment as well (Newman et al., 2013). This change occurs through the strategic implementation of fire protection measures that result in planned alterations to fuel, increased ignition resistant construction, enhanced fire protection features, higher wildfire risk awareness, and maintenance of fire protection features. When developments are planned accordingly, the fuel availability and fuel continuity decrease, while the probability of fire suppression increases (Fox et al.,

2018). The dual benefit of building a fire-hardened development is that the same features that protect the development from a wildfire also play a significant role in protecting wildlands and surrounding areas from Project-related fires through ignition reduction.

The Oakcrest Project proposes Chapter 7A compliant home hardening measures, automatic fire sprinklers, and Cal Fire approved landscaping in conjunction with the entire interior of the Project site meeting FMZ Zone 0 and 1 requirements, to reduce the likelihood of starting a fire, and preventing on-site ignition or fire spread, in the event of an off-site wildfire encroaching on the Project.

3.7 Fire Protection Systems – Automatic Interior Fire Sprinkler Systems

The Project proposes 257 single family residential lots. The proposed Project includes the installation of an automatic, residential interior fire sprinkler system designed in accordance with the National Fire Protection Association (NFPA) 13-D[15] and SMFD requirements that are consistent with Section R313.3 of the 2022 California Residential Code, Chapter 9 and Section 903 of the 2022 California Fire Code.

All exterior overhangs four feet or more will require sprinkler coverage.

3.8 Fuel Modification Zone Requirements

An important component of the system of fire protection 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 required to be measured outwards from the Project structures; starting the measurements from the rear lot-lines would extend the FMZs and exceed the code requirements.

The Project site will consist of three fuel modification zones that extend across the Project site, as depicted in Figure 5. A typical landscape/fuel modification installation in the County of San Diego consists of a 0-5-foot-wide Zone 0, 5-50-foot-wide, fully irrigated Zone 1 and a 50-150-foot-wide, non-irrigated, thinned Zone 2 measured outward from the structure. The Project exceeds these requirements by providing these setback distances from the rear lot line as opposed to from the structure, which provides additional defensible space, further explained in Section 3.8.1. The following are requirements of Fuel Modification Zones 0, 1, and 2 as identified in the Fire Code:

Landscape Area Requirements – 0 to 5 feet from the structures

- This area shall be constructed of continuous hardscape or limited fire-resistant plantings acceptable to the FAJH.
- Vegetation in this space shall not exceed 6” to 18” in height and irrigation is required.
- This space shall be free of combustible materials.

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

- The use of mulch is prohibited.
- The landscape area will have ongoing maintenance.

Zone 1 Requirements – between 5 and 50 feet from the proposed structure (unless constrained by property lines)

- Zone 1 will consist of primarily irrigated landscape along with a paved development area.
- Zone 1 width shall be provided between native or naturalized vegetation and any structure. The width shall be measured from the exteriors of the structure to the vegetation or property boundary.
- There shall be no habitable structures, structures that are directly attached to habitable structures, or other combustible construction that can mean transmitting fire to habitable structures,
- Structures such as fences, gazebos, walls, palapas, play structures, and non-habitable gazebos with this zone shall be made of non-combustible, one hour-fire rated, or Type IV heavy timber as defined in the CBC.
- Plants within Zone 1 shall be primarily low-growing and less than 4 feet in height with the exception of trees. Plants shall be low-fuel and fire-resistive.
- Trees within Zone 1 shall be located away from structures to a minimum distance of 10 feet as measured from the structure to the drip line of the tree at maturity and spaced horizontally and vertically in accordance with the Landscape Standards of the Land Development Manual.
  - **Note:** Per the Landscape Standards of the Land Development Manual, some tree species are required to be planted a minimum of 30 feet from the structure to their drip lines.
- Canopy of existing trees that extend within 10 feet of and structure shall be pruned to maintain a minimum horizontal and vertical clearance of 10 feet of the structure and/or a chimney outlet.
- Permanent irrigation is required for all planting areas within Zone 1 with the following exceptions:
  - When planting areas only contain species that do not grow taller than 24 inches in height
  - When planting areas contain only native or naturalized species that are not summer-dormant and have a maximum height at plant maturity of less than 24 feet.
- Zone 1 irrigation overspray and runoff shall not be allowed into adjacent areas of native or naturalized vegetation.
- Zone 1 shall be maintained regularly by pruning and thinning plants, controlling weeds, and maintain irrigation systems.

Zone 2 Requirements – between 50 and 150 feet from proposed structure (unless constrained by property lines)

- Plants shall be drought-tolerant and fire resistive species of moderate height.
- Brush and plants shall be limbed up off the ground, so the lowest branches are 1/3 height of bush/tree/plant or up to 6’ off the ground on mature trees.
- 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.

FMZ Requirements for Park Areas

As shown in Figures 5 and 6, Fuel Modification Plans, fuel modification zones in the northeast portion of the Project site will overlap the onsite park. Specific requirements will apply to these areas.

- Trees and shrubs located within the Fuel Modification Zone 1 or Zone 2 of adjacent residential structures shall provide horizontal spacing between shrubs and trees.
    - Space between shrubs:
        - Flat or mild slope (less than 20%): Two times the height of the shrub.
        - Mild to moderate slope (20-40%): Four times the height of the shrub
        - Moderate to steep slope (greater than 40%): Six times the height of the shrub
    - Space between trees:
        - Flat or mild slope (less than 20%): 10 feet.
        - Mild to moderate slope (20-40%): 20 feet.
        - Moderate to steep slope (greater than 40%): 30 feet.

Private property owners and/or the Project's HOA shall be responsible for ensuring long-term funding and ongoing compliance with fuel modification and maintenance requirements within individual lots. The Project's HOA shall form a committee specifically for reviewing and confirming the compliance of landscape plans with the FMZ's described in this report. This requirement shall be included in the HOA CC&R's. All brush management 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 SMFD.

3.8.1 Project FMZ Measurements and Enhancements

The project proposes two options for obtaining compliance with the FMZ requirements listed above. First, the Project proposes FMZs measured from the rear lot lines, see Figure 5 – Fuel Modification Plan from Rear Lot Lines. In this scenario, all project lots would comply with Zone 0 and Zone 1 requirements, and then an additional 150 feet is provided from the rear lot lines. Second, the Project proposes FMZs measured from the structures outwards, see Figure 6 – Fuel Modification Plan from Structures. This second option complies with the exact letter of the code and provides each structure with the required 150 feet of FMZ, while avoiding the potential for increased impacts on the open space to the west potentially incurred through the first option measured from Rear Lot Lines. Both options comply with or exceed the letter of the code.

3.8.1.1 FMZ Measurements – Measured from Rear Lot Lines

As demonstrated in Figure 5, Fuel Modification Plan from Rear Lot Lines, Zone 0 will be provided around all structures. All residential lots adjacent to wildland will comply with the Zone 1 requirements above. The Project exceeds code by then providing Zone 1 for 50 feet beyond the rear lot line of each residential lot. This means that the effective width of Zone 1 will be the requisite 50 feet plus the structure setback, which is at least 15 feet, for a minimum Zone 1 width of 65 feet. Zone 2 is then provided from 51-150 feet beyond the rear lot line extending farther into the open space than if measured from the structure.

As evaluated in Section 4, the flame lengths modeled for a fire from the west are a maximum of 29.2 feet, meaning the Project FMZs measuring than 150 feet are more than 5 times the width of the largest expected flames. This setback prohibits ignition of Project structures by eliminating direct flame impingement and radiant heat to contact and transfer to Project structures.

Where the Project abuts existing development to the north, east, and south, it cannot obtain the full FMZ on site, and relies on off-site equivalencies. The following locations do not achieve the full 150 feet on site:

Zone 1 Impairments:

- The Project site will not achieve a full Zone 1 in one area along the northern boundary of the Project site. Zone 1 is limited by the property line 8 feet from the residential lot lines.
  - The Project is adjacent to residential neighborhoods to the north which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Note that the measurements are drawn from the lot line and not the actual structure siting. Actual structure siting will have a minimum 15-foot rear yard setback which adds to the effective FMZ. Wildland fire is not expected to progress towards the Project from this area to the north due to the non-existence of wildland.

Zone 2 Impairments:

- The Project site will not achieve a full Zone 2 along the eastern boundary, as Zone 2 is limited by the project boundary 20 feet from the rear lot lines.
  - The residential lot lines are set back from the eastern project boundary by 20 feet, and therefore only achieve 20 feet of Zone 1 in addition to the fully compliant Zone 0 and Zone 1 on the residential lots. The paved North Twin Oaks Valley Road is adjacent to the eastern property line, which provides an additional 92 feet of off-site FMZ equivalent. Note that the measurements are drawn from the lot line and not the actual structure. Actual structure siting will have a minimum 15-foot rear yard setback which adds to the effective FMZ. Wildland fire is not expected to progress towards the Project from the east as off-site uses are the roadways and golf course.
- The Project site will not achieve a full Zone 2 in an area to the northwest, as Zone 2 is limited by the property line 42 feet from the rear lot lines.
  - The residential lot lines are setback from the northwestern property line by 42 feet, and therefore only achieves 42 feet of Zone 2 in addition to a fully compliant Zone 0 and Zone 1 on the residential lots. The Project is adjacent to residential neighborhoods to the northwest which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Note that the measurements are drawn from the lot line and not the actual structure. Actual structure siting will have a minimum 15-foot rear yard setback which adds to the effective FMZ. Wildland fire is not expected to progress towards the Project from this area to the north due to the non-existence of wildland.
- The Project site will not achieve a full Zone 2 in an area to the south, as Zone 2 is limited by the property line 50 feet from the residential lot line.

- The residential lot lines are setback from the southern property line by 50 feet, and therefore only achieves 50 feet of Zone 1 in addition to a fully compliant Zone 0 and Zone 1 on the residential lot. The Project is adjacent to residential neighborhoods to the south, of which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Note that the measurements are drawn from the lot line and not the actual structure. Actual structure siting will add to the effective FMZ. Wildland fire is not expected to progress towards the Project from this area to the south due to the non-existence of wildland; off-site land uses are residential.

As discussed further in Section 4, Fire Behavior Modeling, a worst-case Santa Ana wind driven wildfire would produce flame lengths of up to 29 feet. However, that flame length is only expected from wildland areas with unmaintained fuels and not from adjacent residential or golf course land uses. The areas directly adjacent to the wildland do exceed the requirement for 150 feet of defensible space which is 5x the expected flame lengths.

3.8.1.2 FMZ Measurements – Measured from Structures

As demonstrated in Figure 6, Fuel Modification Plan from Structures, Zone 0 will be provided around all structures. All residential lots adjacent to wildland will achieve the Zone 1 requirements above on site between the structures and the project boundary. Zone 2 is then provided from 51-150 feet from the structures extending into the open space and providing the required 150 feet of FMZ. Where the Project abuts existing development to the north, east, and south, it cannot obtain the full 150 feet of FMZ on site and relies on off site equivalencies. The following locations do not achieve the full 150 feet on site:

Zone 1 Impairments:

- The Project site will not achieve a full Zone 1 in one area along the northern boundary of the Project site. Zone 1 is limited by the property line 18 feet from the structures.
  - The Project is adjacent to residential neighborhoods to the north which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Note that the measurements are drawn from the lot line and not the actual structure siting. Actual structure siting will have a minimum 15-foot rear yard setback which adds to the effective FMZ. Wildland fire is not expected to progress towards the Project from this area to the north due to the non-existence of wildland.

Zone 2 Impairments:

- The Project site will not achieve a full Zone 2 along the eastern boundary, as Zone 2 is limited by the project boundary 40 feet or more from the structures.
  - The residential structures are set back from the eastern project boundary by 40 feet, and therefore only achieve 40 feet of Zone 1 in addition to the fully compliant Zone 0 within the residential lots. The paved North Twin Oaks Valley Road is adjacent to the eastern property line, which provides an additional 92 feet of off-site FMZ equivalent. Wildland fire is not expected to progress towards the Project from the east as off-site uses are the roadways and golf course.

- The Project site will not achieve a full Zone 2 in an area to the northwest, as Zone 2 is limited by the property line 60 feet from the structures.
  - The structures are setback from the northwestern property line by 60 feet, and therefore only achieves 10 feet of Zone 2 in addition to a fully compliant Zone 0 and Zone 1. The Project is adjacent to residential neighborhoods to the northwest which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Wildland fire is not expected to progress towards the Project from this area to the north due to the non-existence of wildland.
- The Project site will not achieve a full Zone 2 in an area to the south, as Zone 2 is limited by the property line 65 feet from the structures.
  - The structures are setback from the southern property line by 65 feet, and therefore only achieves 15 feet of Zone 2 in addition to a fully compliant Zone 0 and Zone 1. The Project is adjacent to residential neighborhoods to the south, of which must comply with the same FMZ requirements. Since these land uses will be irrigating and maintaining the vegetation between the properties, these areas may be considered off-site FMZ equivalent to meet the intent of the code. Wildland fire is not expected to progress towards the Project from this area to the south due to the non-existence of wildland; off-site land uses are residential.

As discussed further in Section 4, Fire Behavior Modeling, a worst-case Santa Ana wind driven wildfire would produce flame lengths of up to 29 feet. However, that flame length is only expected from wildland areas with unmaintained fuels and not from adjacent residential or golf course land uses. The areas directly adjacent to the wildland do meet the requirement for 150 feet of defensible space which is 5x the expected flame lengths.

4 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 pre- and post-project slope and fuels conditions. Results are provided below.

4.1 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 four 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 north, west, and northeast, 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 Valley Center RAWS Station (Station 045734). 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

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Time of Day	12:00 - 13:59	12:00 - 13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	20-30%	20-25%
Aspect	South/East	South/East
Fuel Shading	Exposed (< 50% shading)	Exposed (< 50% shading)
Fuel Moisture Correction	1%	1%
Fine Dead Fuel Moisture	3%	2%

Table 4. Fuel Moisture and Wind Speed Inputs

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
1h Moisture	3%	2%
10h Moisture	6%	3%
100h Moisture	8%	6%
Live Herbaceous Moisture	36%	30%
Live Woody Moisture	72%	60%
Sustained 20-foot Wind Speed	19 mph	21 mph sustained,26 mph gusts

Note: Wind speeds are taken from the San Diego County Fire Behavior Modeling Guidelines Table 2: Worst case sustained winds fuel model 4 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 pre-and post-project 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			
GR2	Low Load, Dry Climate Grass	Grassland in the flat area and foothills of the Project site	1 ft
GS2	Moderate load dry climate grass-shrub	Scrubland surrounding Project site	1.5 ft

Table 5. Fuel Model Characteristics

Fuel Model	Description	Location	Fuel Bed Depth (Feet)
SH5	High load dry climate shrub	Chaparral surrounding Project site	4-6 ft
Post-Project Conditions			
NB	Non-burnable	Paved areas and structures within the developed Project site	0 ft
FM8	Zone Irrigated landscapes; Existing weed abatement	Fuel Modification Zones 0 and 1	<1.0 ft
SH1	Thinned shrubs	Fuel Modification Zone 2	1 ft

The results of fire behavior modeling analysis for pre- and post-project conditions are presented in Tables 6 and 7, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 7, BehavePlus Fire Behavior Analysis exhibit.

Table 6. BehavePlus Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])	Spotting Distance[2] (miles)
Scenario 1: Summer onshore wind from the W/SW, 28% slope, 19 mph sustained winds				
GR2	8.0	522	1.3	0.4
GS2	8.0	556	0.7	0.4
SH5	20.3	3,965	0.5	0.7
Scenario 2: Summer onshore wind from the W/SW, 20% slope, 19 mph sustained winds				
GR2	8.3	561	1.4	0.4
GS2	8.5	599	0.8	0.4
SH5	21.0	4,256	1.6	0.7
Scenario 3: Fall offshore Santa Ana wind from the N, 23% slope, 21 mph sustained winds, 26 mph gusts				
GR2	10.1 (11.6)	874 (1,178)	2.0 (2.8)	0.5 (0.6)
GS2	10.8 (12.3)	992 (1,336)	1.1 (1. 5)	0.5 (0.6)
SH5	26.1 (29.2)	6,821 (8,697)	2.3 (2.9)	0.9 (1.2)

Table 7. BehavePlus Fire Behavior Modeling Results – Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])	Spotting Distance[2] (miles)
Scenario 1: Summer onshore wind from the W/SW, 7% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.7	18	0.1	0.1

Table 7. BehavePlus Fire Behavior Modeling Results – Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])	Spotting Distance[2] (miles)
SH1: Zone 2 FMZ	2.8	55	0.2	0.2
NB	N/A	N/A	N/A	N/A
Scenario 2: Summer onshore wind from the W/SW, 23% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.8	20	0.1	0.1
SH1: Zone 2 FMZ	2.9	59	0.2	0.2
NB	N/A	N/A	N/A	N/A
Scenario 3: Fall offshore Santa Ana wind from the N, 30% slope, 21 mph sustained winds, 26 mph gusts				
FM8: Zone 1 FMZ	2.1 (2.4)	28 (38)	0.1 (0.1)	0.2 (0.2)
SH1: Zone 2 FMZ	5.9 (6.7)	267 (354)	0.4 (0.6)	0.3 (0.4)
NB	N/A	N/A	N/A	N/A

Notes:
1 mph = miles per hour
2 Spotting distance from a wind driven surface fire.
3 Values in parentheses represent 26 mph gusts.

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.

4.2 Fire Modeling Summary

As presented in Table 5, wildfire behavior in mature shrubland vegetation, modeled as high load dry climate shrub (SH5) fuel models being fanned by 19 mph sustained, onshore winds (Scenarios 1 and 2) would result in a fire spreading quickly (up to 1.6 mph) with roughly 21-foot flame lengths. Spotting may occur up to 0.7 miles during a fire.

A worst-case fire under Santa Ana winds and low fuel moistures (Scenario 3) is expected to be a rapidly moving fire with spread rates approximately 2.9 mph under gusting winds. Surface flame length values with intense radiant heat could reach approximately 29 feet for high load shrub fuels burning on the Project site. Spotting is projected to occur at 1.2 miles during a fire influenced by offshore Santa Ana wind gusts.

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Typical fuel modification includes establishment of a minimum 50-foot-wide irrigated zone (Zones 0 and 1) and a 100-foot-wide thinned zone (Zone 2) on the periphery of the Project Site, beginning from the rear lot line. The Oakcrest Project is able to achieve the full 150 feet of defensible space surrounding the Project site on the western side of the Project, in all areas adjacent to open space. The eastern side of the Project site is not able to achieve 150 feet of defensible

space on site, but is adjacent to the four lane, paved, North Twin Oaks Valley Road, which acts as off-site fuel modification equivalent, with an irrigated, maintained golf course opposite of the Project to the east. In the areas where 150 feet of defensible space is not met in the northern and southern areas of the Project site, as indicated in Figure 2 the residential lots abut residential communities, which are required to uphold the same defensible space requirements as the Project and therefore may serve as off site equivalency through the adjacent neighborhoods irrigated and maintained landscaping.

For modeling the on site post-FMZ treatment condition, the fuel model assignment high load shrub vegetation was re-classified according to the specific fuel's management (e.g., irrigated, fire resistive landscaping vs. 50% thinned native brush) treatment. In areas where on-site Zone 1 fuel modification will occur, flame lengths are modeled to be reduced to roughly 2.4 feet during Santa Ana conditions.

4.3 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. Potential for wildfire encroaching on, or showering embers on the site is possible, however, 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 Oakcrest 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 ignition resistance 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 wildfires will occur in the designated open space areas adjacent to portions of the property site.

5 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 City of San Marcos and the County of San Diego have guidelines on safe and efficient evacuations and repopulation procedures, as well as emergency operations information in their emergency plans.

SMFD is responsible for the development of the City of San Marcos Emergency Plan, which shall provide for the effective mobilization of all of the resources of the City, both public and private, to meet any condition constituting a Local Emergency, State of Emergency, or State of War Emergency; and shall provide for the organization, powers and duties, services, and staff of the emergency organization (San Marcos Municipal Code 2025). The SMFD also implements concepts and protocols practiced throughout San Diego County. Annex Q, Evacuation, of the 2023 County's Operational Area (OA) EOP establishes a framework for implementing well-coordinated evacuations. The City of San Marcos, like most California emergency operations agencies, has adopted evacuation procedures in accordance with the State of California's Standardized Emergency Management System (SEMS) and the National Incident Command System (NIMS). Large-scale evacuations are complex, multi-jurisdictional efforts that require coordination between many agencies and organizations. Emergency services and other public safety organizations play key roles in ensuring that an evacuation is effective, efficient, and safe

The OA EOP and the California Master Mutual Aid Agreement set forth basic protocols which dictate who is responsible for an evacuation effort and how regional resources will be requested and coordinated. The following overview contains information from the San Diego County Evacuation Annex and is consistent with the County's EOP. First responders are responsible for determining initial protective actions before Emergency Operations Centers (EOCs) and emergency management personnel have an opportunity to convene and gain situational awareness. Initial protective actions are shared/communicated to local EOCs and necessary support agencies as soon as possible to ensure an effective, coordinated evacuation.

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 – 0718. A complete map of all evacuation zones in the County can be accessed at:

https://protect.genasys.com/search?z=9.899667592984022&latlon=32.996448595850694%2C-116.9395988122277.

The City of San Marcos and County of San Diego utilize 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.

Law enforcement may also implement the use of contra-flow lanes during an evacuation to enhance the flow of traffic. Contra-flow lanes are a temporary arrangement where traffic on a road is transferred from its usual side to share the other half of the carriageway with traffic moving in the opposite direction, which would increase vehicle capacity in one direction. Contra-flow lanes can be used to eliminate bottlenecks in communities with road geometries that prevent efficient evacuations or to facilitate traffic flow out of a major urban area. Among the considerations in planning emergency contra-flow are whether sufficient traffic control officers are available, potential negative impact on responding fire apparatus, access management, merging, exiting, safety concerns, and labor requirements.

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.

Project occupants are encouraged to get involved with the San Marcos Fire Department (SMFD) to receive education regarding preparation for wildfires and to stay informed/connected to fire officials. The SMFD has created an Emergency Preparedness informational sheet to assist citizens in disaster readiness. The City of San Marcos created a 2024 Community Wildfire Protection Plan and Evacuation Map that identifies various evacuation strategies including a Primary, Alternate, Contingency and Emergency option. This method of planning is known as P.A.C.E. and accounts for the various unknowns that may arise in the course of an emergency. The Primary routes of evacuation should be towards Interstate-15, or State Route 78 in order to leave the region as quickly as possible by heading away from a potential worst-case scenario from the northeast. Alternate routes include Twin Oaks Valley Road, San Marcos Boulevard, and Rancho Santa Fe Road, which can similarly lead out of the region. Various other alternatives are identified in the San Marcos CWPP and Evacuation Route map such as utilizing local streets including Via Vera Cruz, Discovery Street, Barham Drive, Bent Avenue, Mission Road, and Palomar Airport Road. Additional emergency evacuation routes may be identified by law enforcement during an active emergency.

Occupants of the Oakcrest Project can receive emergency notifications through Alert San Diego, the SD Emergency App, the Genasys Protect App, and City of San Marcos website, local radio station and social media platforms[16].

- **Alert San Diego:** http://www.readysandiego.org/AlertSanDiego/
- **SD Emergency App:** https://www.alertsandiego.org/en-us/preparedness/SDEmergencyApp.html

[16] https://www.san-marcos.net/home/showpublisheddocument/15481/636205162115900000

- **Genasys Protect App:** https://genasys.com/genasys-protect-app/
- **San Marcos Website:** https://www.san-marcos.net/
- **San Marcos X:** https://x.com/sanmarcoscity
- **San Marcos Facebook:** https://www.facebook.com/sanmarcoscity
- **San Marcos Radio:** 1610 AM

6 Conclusion

This FPP Letter Report for the Oakcrest Project evaluates the fire risk of the Specific Plan proposing 257 single family dwelling units. As described, CAL FIRE has designated the Project Area as a Very High Fire Hazard Severity Zone, therefore defensible space and compliance with the 2022 California Building Code Chapter 7A are required. Defensible space measures will be provided around all structures throughout the proposed development, and include two options for meeting fuel modification zone compliance, both of which meet or exceed the letter of the code. 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 is considered to represent a low to moderate wildfire risk to its occupants based on its fire protection design features and its ability to provide for evacuations and contingency on-site shelter in place. Master-planned wildfire-resilient communities such as the Project built to modern standards provide resilient and fire-resistant housing. The Project's compliance with Chapter 7A of the California Building Code decreases the wildfire vulnerability of individual buildings, while defensible space between structures and open space prevents wildfire from contacting the Project through limiting burnable fuel.

It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not be exposed to wildfire or embers. Precautions and minimizing actions identified in this report are designed to reduce the likelihood that fire will impinge upon the Project's assets or threaten its visitors. Additionally, there are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the fuel modification requirements provided in this FPP will reduce the Project site's vulnerability to wildfire and help to limit the spread of fire from the Project site to surrounding areas. 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 site fire safety through maintaining the landscape and structural design components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation. The Project is not to be considered a shelter-in-place development. However, the fire agencies and/or law enforcement officials may, during an emergency, as they would for any new development providing the layers of fire protection as the Project, determine that it is safer to temporarily refuge occupants on the Project site. When an evacuation is ordered, it will occur according to pre-established evacuation decision points or as soon as notice to evacuate is received, which may vary depending on many environmental and other factors. Fire is a dynamic and somewhat unpredictable occurrence, and it is important for anyone living at the WUI to educate themselves on practices that will improve safety.

Any person or entity furnished with this report and/or who reviews it agrees that the advance written consent of Dudek be sought and furnished to such person or entity prior to the review, reliance or authorization as to any matters that are the subject of the reports by any person or entity (whether through act or omission as set forth in the report), other than Dudek's direct client. In such case, obtaining Dudek's consent shall not be subject to any fee or charge (other than reasonable copy costs, where applicable).

Dudek expressly disavows, does not assume any responsibility for, nor will be liable for any claims, losses, or damages associated with any matters that are the subject of this or other reports it prepares or contributes to

respecting this project, however characterized (including without limitation as sounding in tort, breach of contract, misrepresentation by act or omission, failure to adhere to applicable standards of professionalism, statutory liability, etc.), whether in law or equity, whether known or unknown, and whether actual or contingent, excepting only Dudek's direct client, as to which the limitation of liability provisions in the contract between Dudek and its client shall govern.

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

Respectfully,

_____	09/25/2025	Austin Ott, Dudek, Fire Protection Planner
Prepared by (Signature)	**Date**	**Printed Name, Title**
_____	_____	_____
Project Applicant (Signature)	**Date**	**Printed Name, Title**

Att: *Figure 1 – Project Location*
Figure 2 – Proposed Site Plan
Figure 3 – Vegetation Communities and Land Covers
Figure 4 – Fire Hazard Severity Zones
Figure 5 – Fuel Modification Plan from Rear Lot Lines
Figure 6 – Fuel Modification Plan from Structures
Figure 7 – Fire Behavior Map
A – Photograph Log
B – Fire History Map
C – Undesirable Plant List

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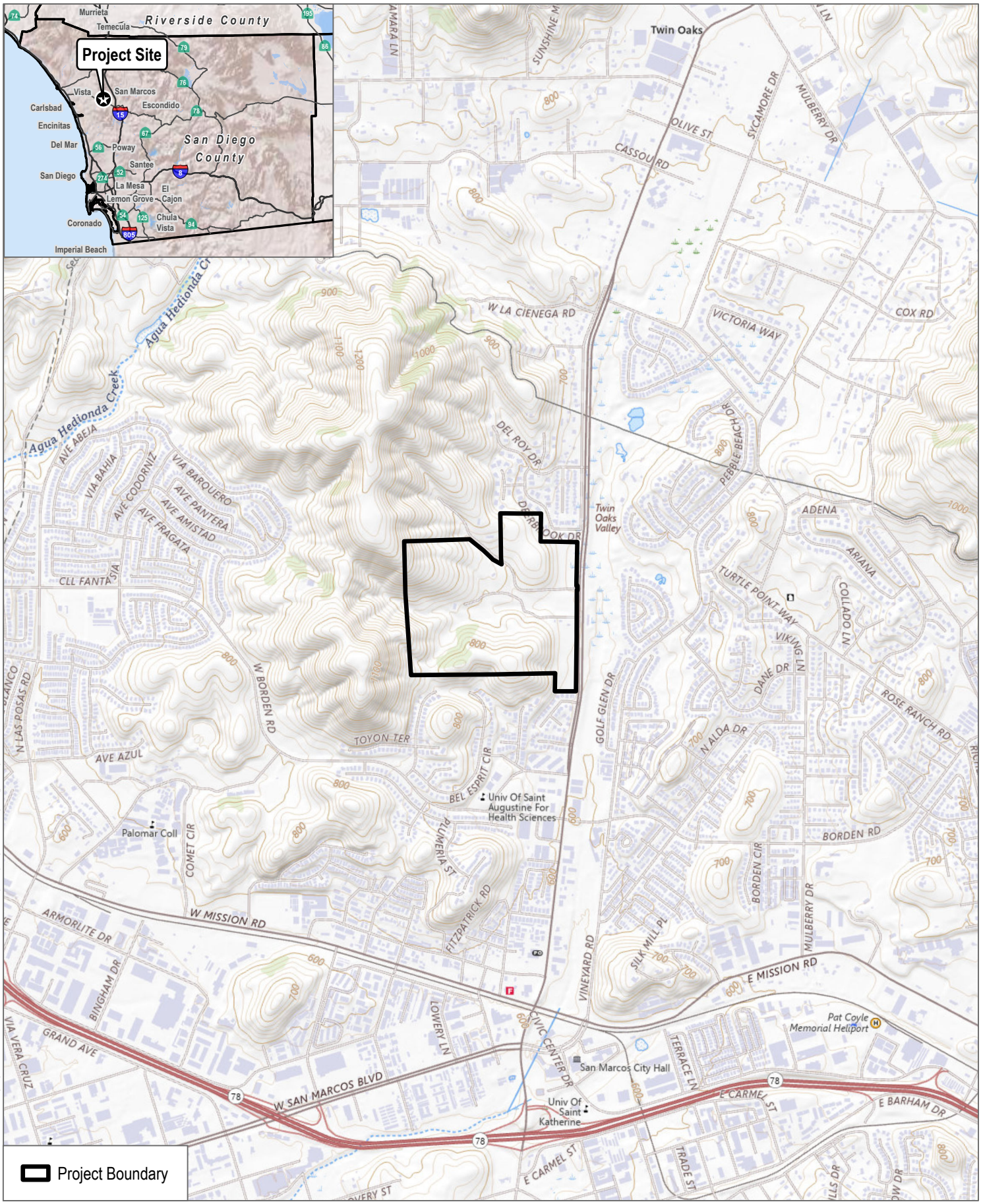
Figure 1 Project Location



SOURCE: USGS National Map 2025

DUDEK

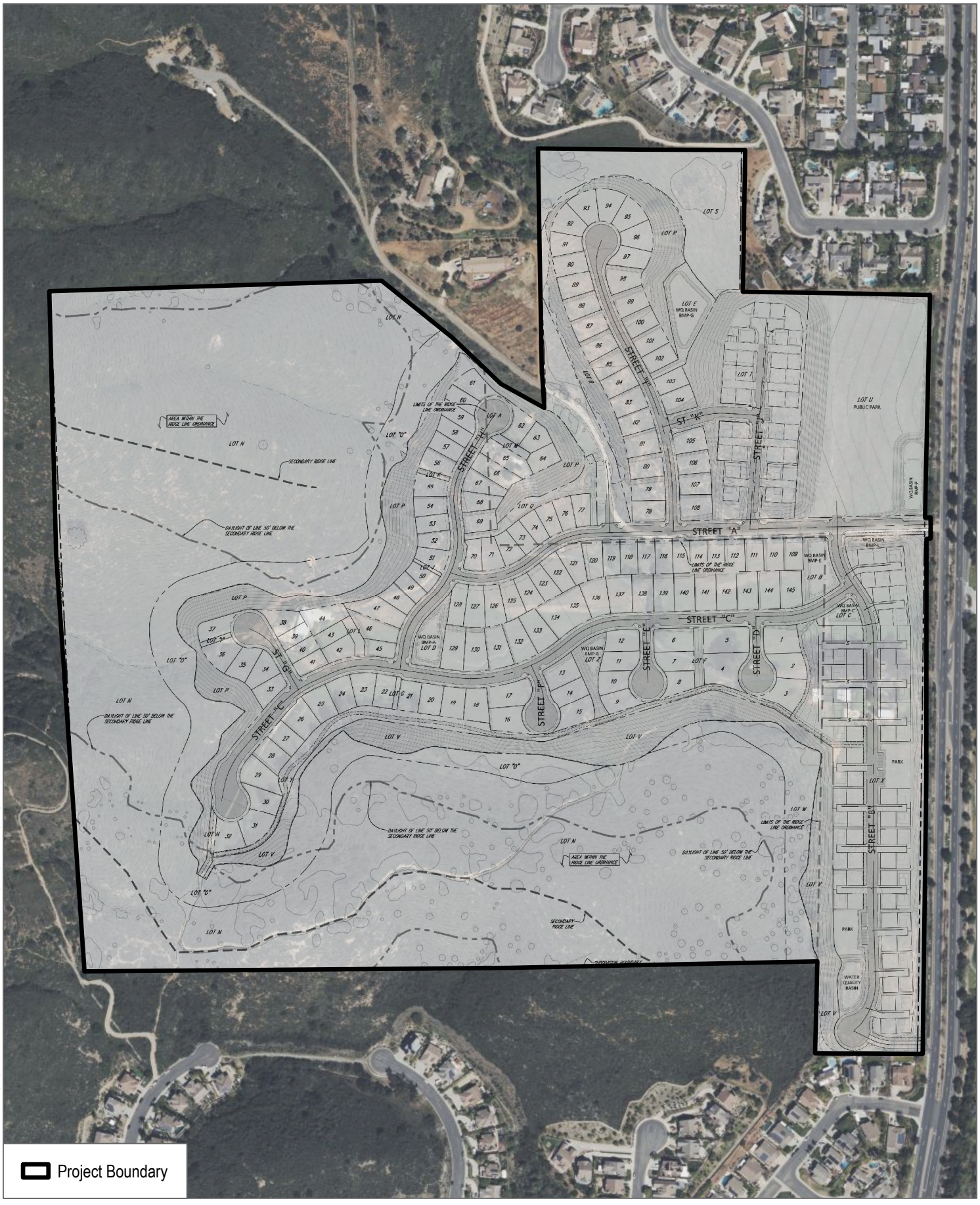
0 1,000 2,000 Feet

FIGURE 1

Project Location

Oakcrest Twin Oaks Fire Protection Plan

Figure 2 Proposed Site Plan



SOURCE: D.F. Adler Designs 2025

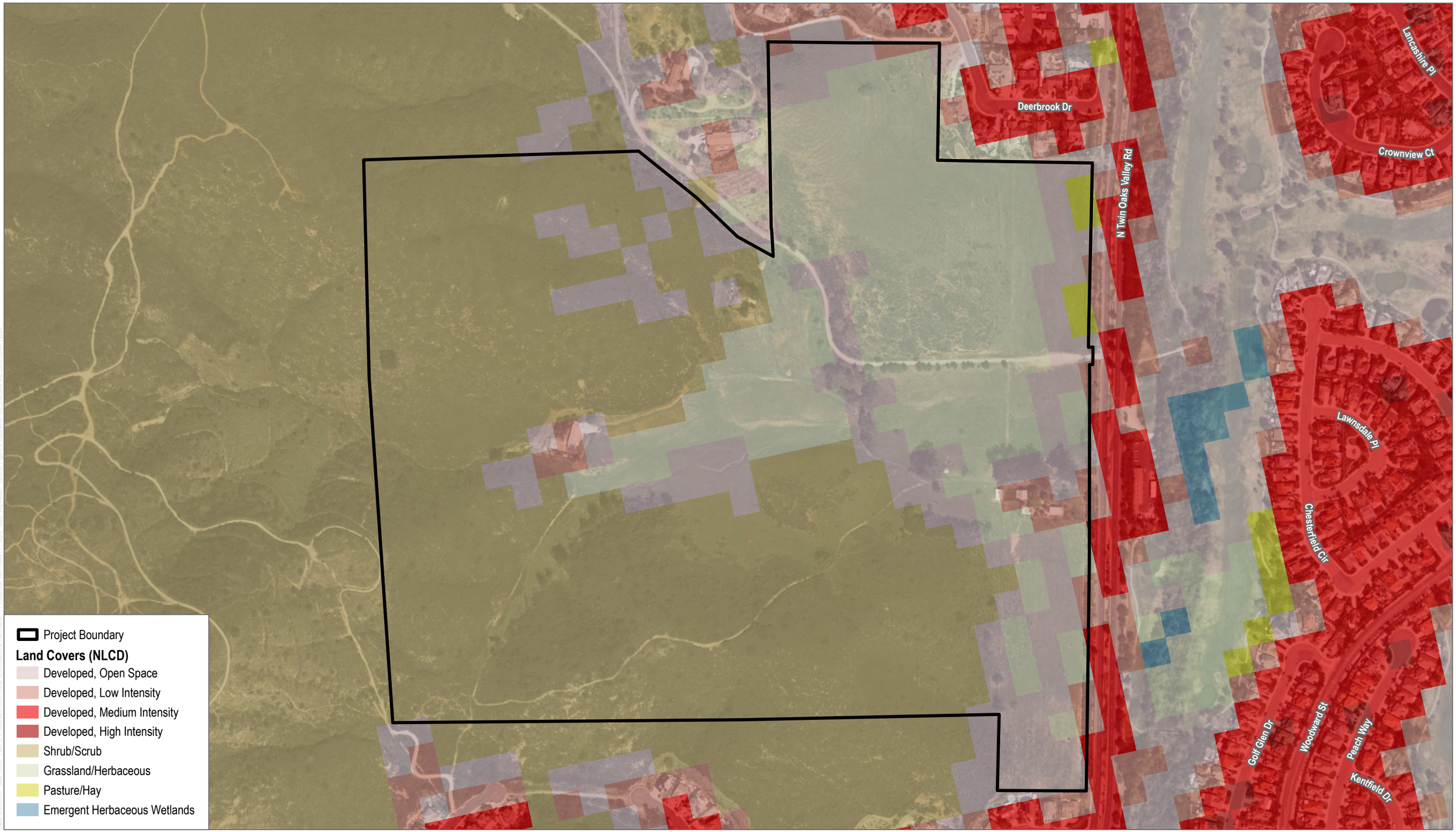
FIGURE 2

Proposed Site Plan

945 Pacific Vista Way Fire Protection Plan

DUDEK

Figure 3 Vegetation Communities and Land Covers



SOURCE: Bing Imagery 2024; OpenStreetMaps 2019; NLCD 2023

DUDEK

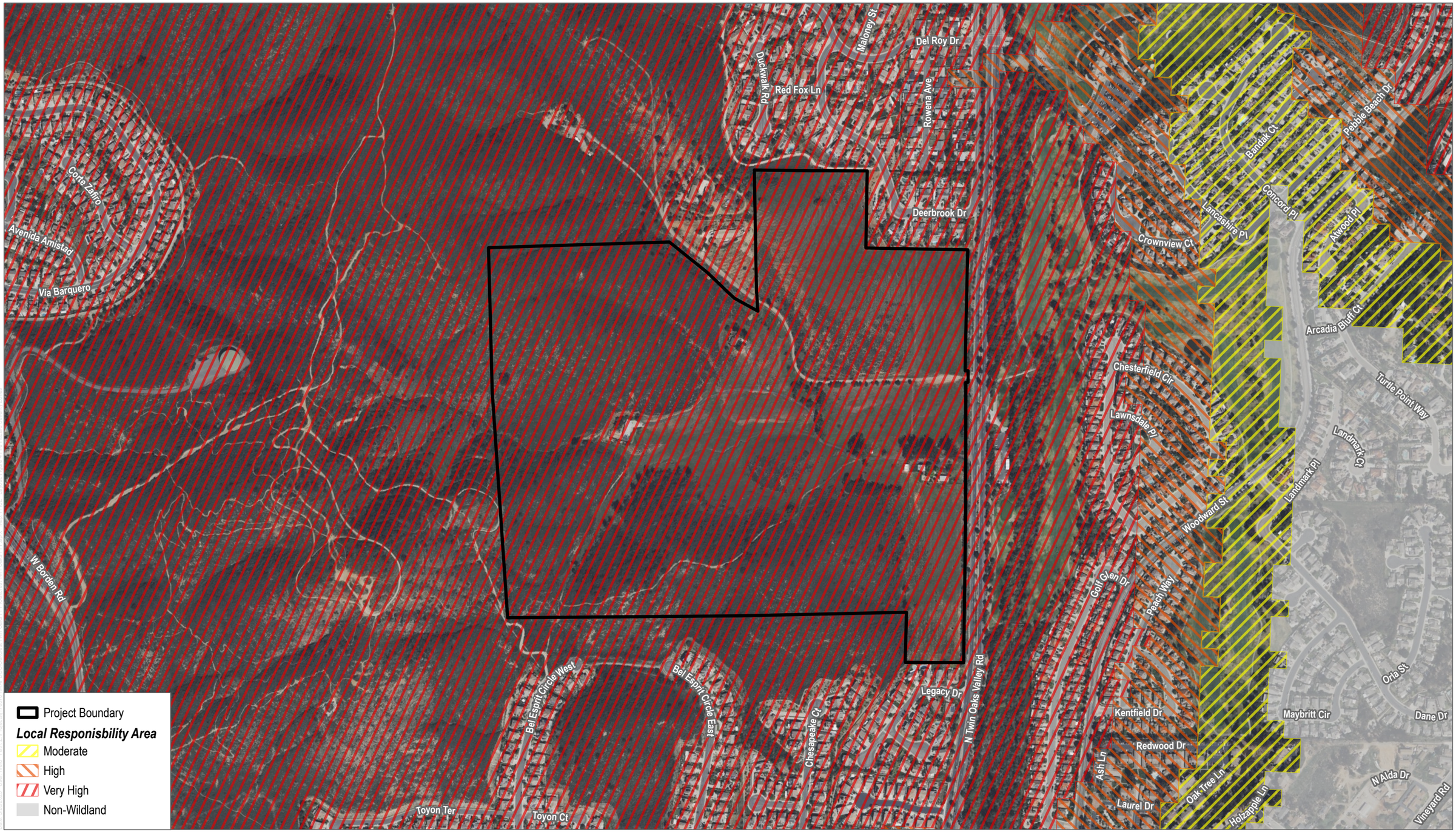
0 165 330 Feet

FIGURE 3

Vegetation Communities and Land Covers

Oakcrest Twin Oaks Fire Protection Plan

Figure 4 Fire Hazard Severity Zones



SOURCE: Bing Maps Imagery 2024; CalFire 2025

DUDEK

0 250 500 Feet

FIGURE 4

Fire Hazard Severity Zones

Oakcrest Twin Oaks Fire Protection Plan

Figure 5 Fuel Modification Plan - Rear Lot Lines

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

DUDEK

0 70 140 Feet

FIGURE 5-1

Fuel Modification Plan - Rear Lot Lines

Oakcrest Twin Oaks Fire Protection Plan

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

FIGURE 5-2

Fuel Modification Plan - Rear Lot Lines

Oakcrest Twin Oaks Fire Protection Plan

DUDEK

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

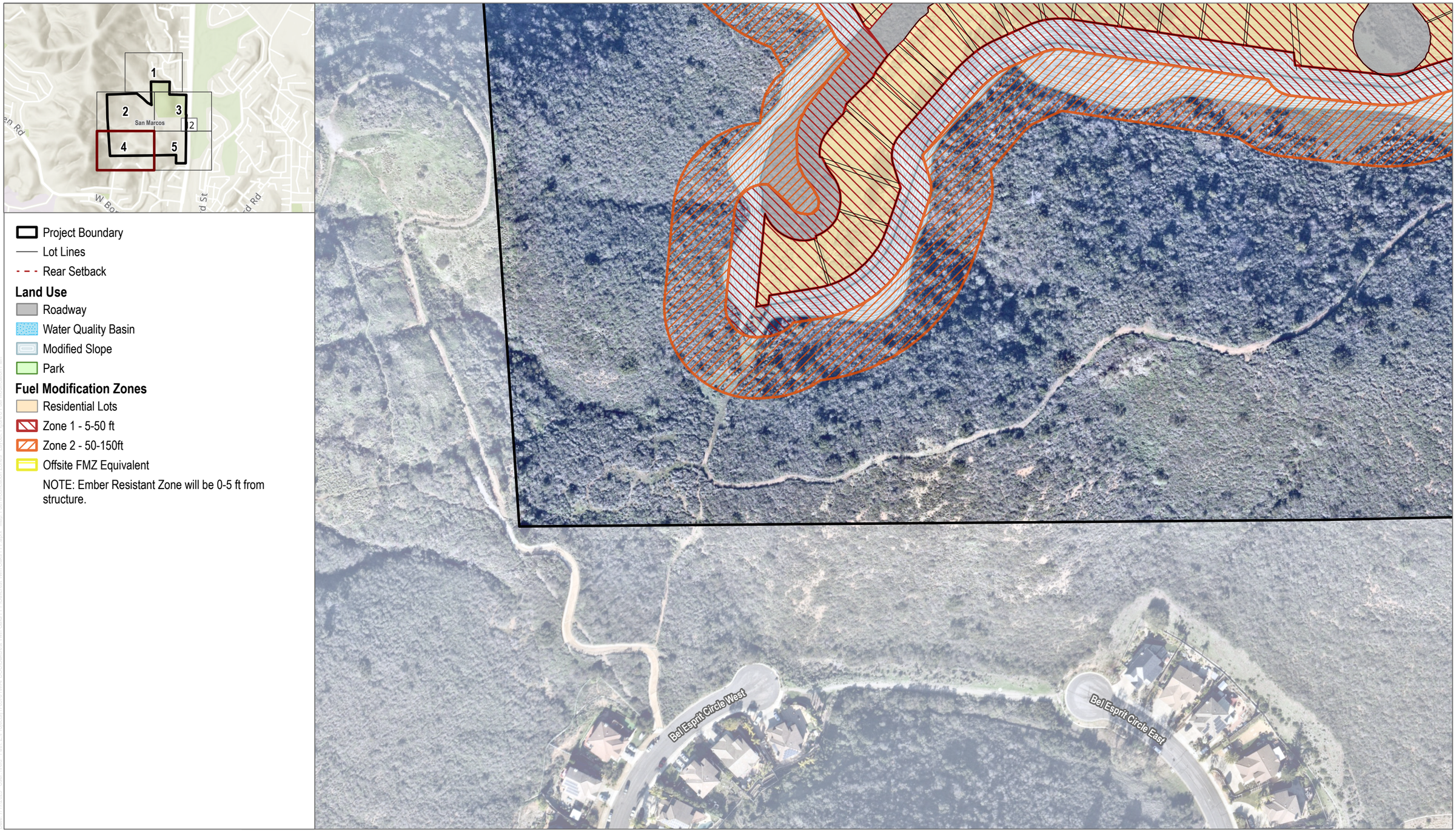
DUDEK

0 70 140 Feet

FIGURE 5-3

Fuel Modification Plan - Rear Lot Lines

Oakcrest Twin Oaks Fire Protection Plan



SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

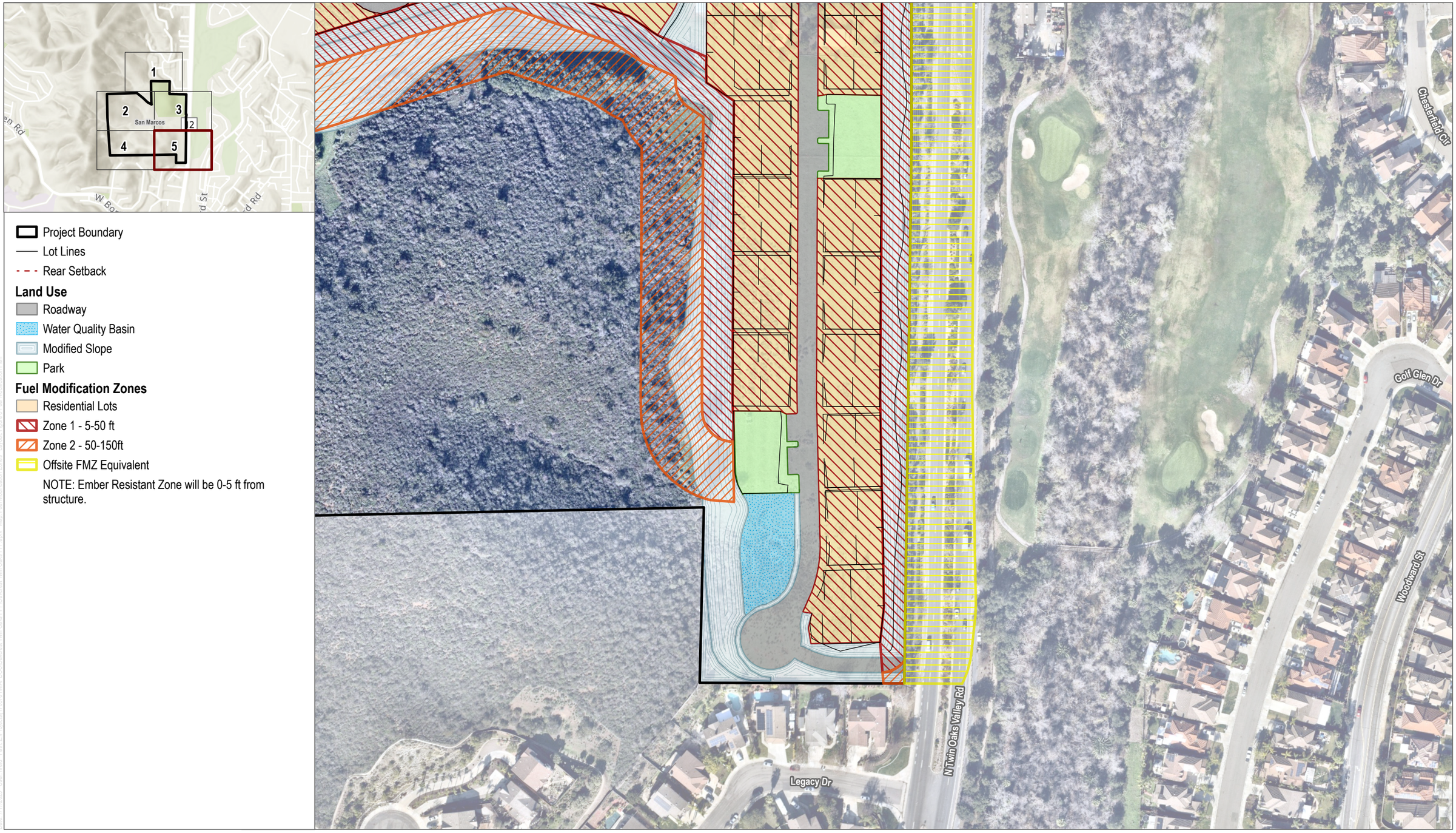
DUDEK

0 70 140 Feet

FIGURE 5-4

Fuel Modification Plan - Rear Lot Lines

Oakcrest Twin Oaks Fire Protection Plan



SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

DUDEK

0 70 140 Feet

FIGURE 5-5

Fuel Modification Plan - Rear Lot Lines

Oakcrest Twin Oaks Fire Protection Plan

Figure 6 Fuel Modification Plan from Structures

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

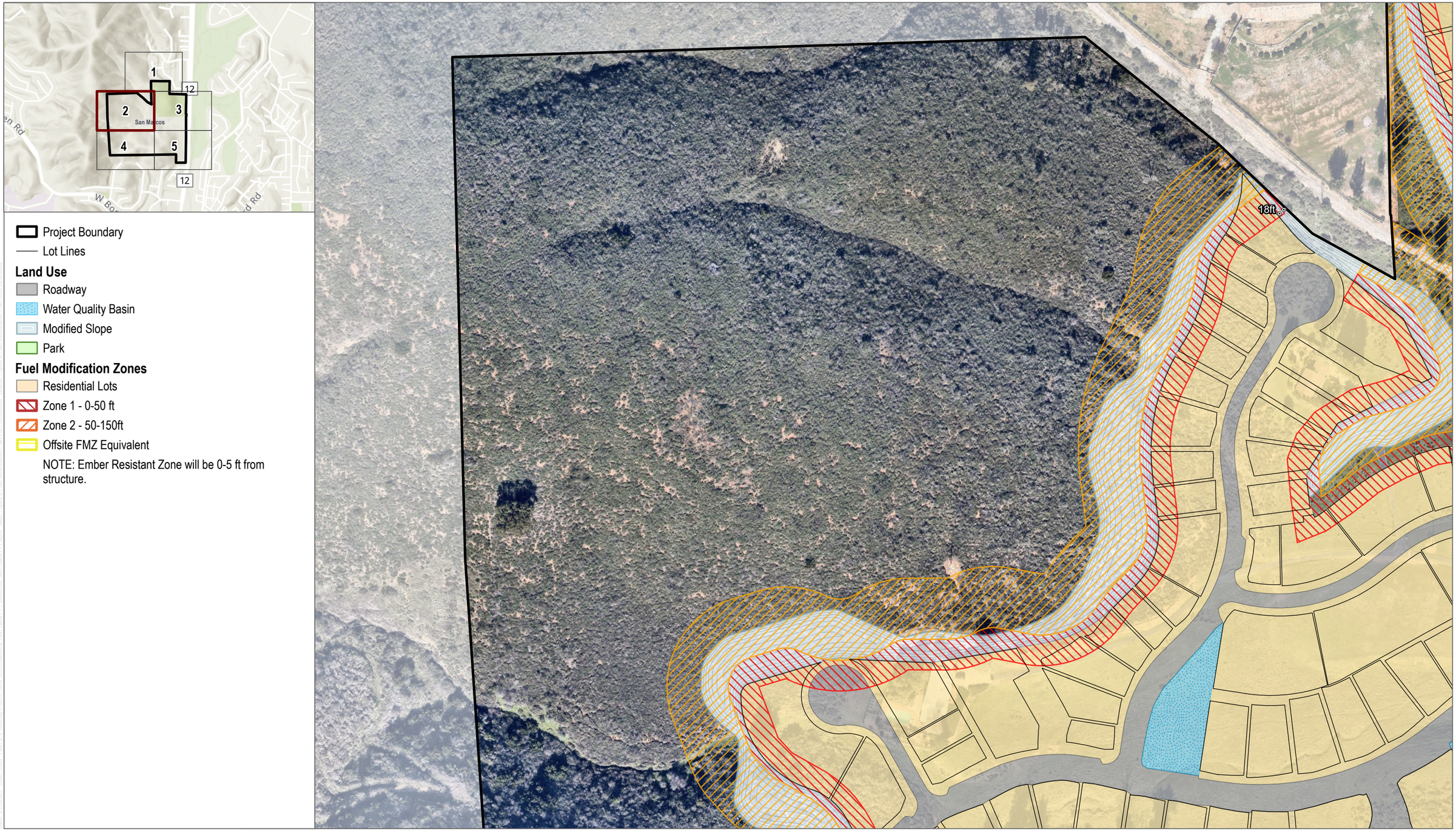
DUDEK

0 70 140 Feet

FIGURE 6-1

Fuel Modification Plan from Structures

Oakcrest Twin Oaks Fire Protection Plan



SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

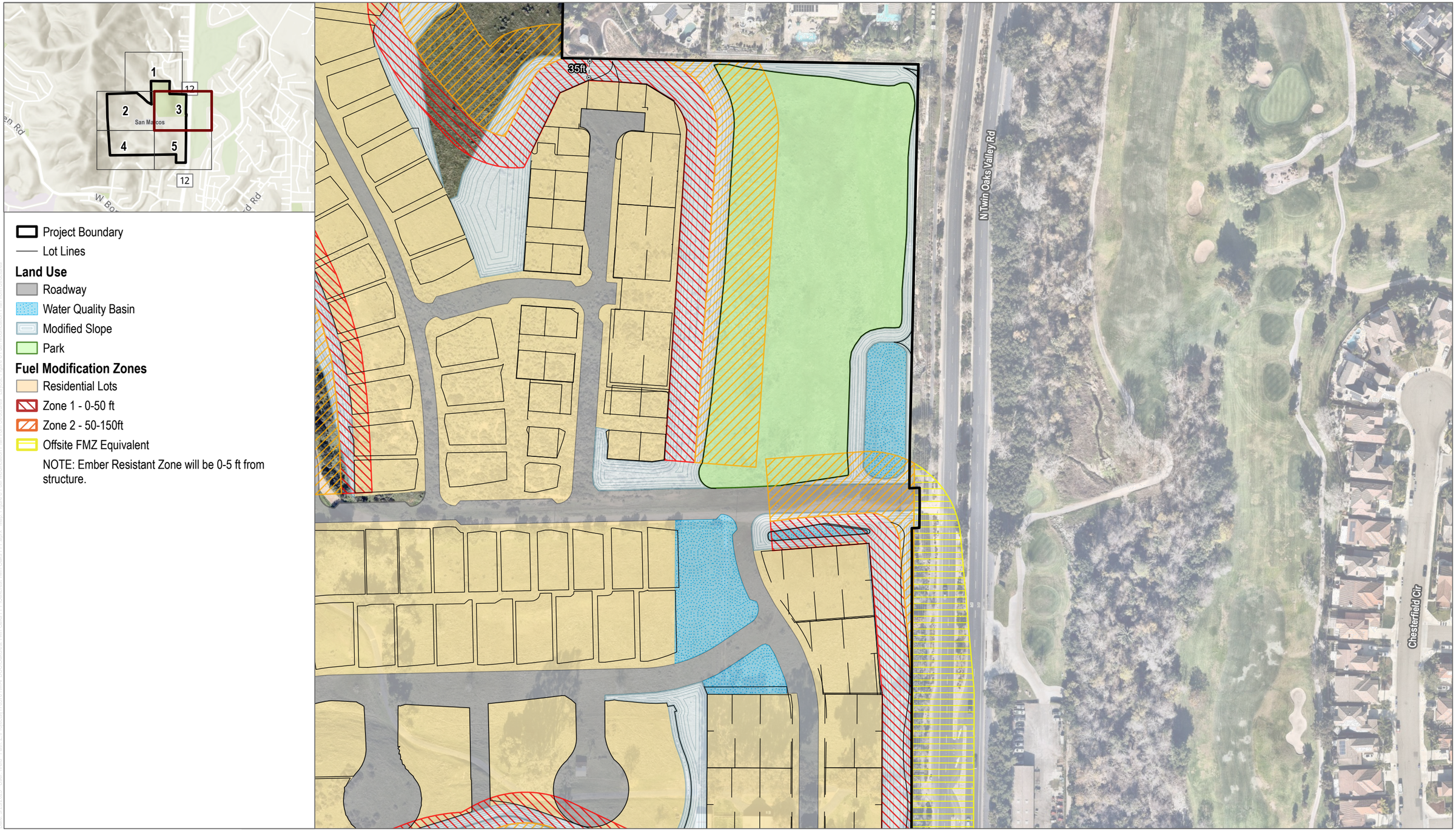
DUDEK

0 70 140 Feet

FIGURE 6-2

Fuel Modification Plan from Structures

Oakcrest Twin Oaks Fire Protection Plan



SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

DUDEK

FIGURE 6-3

Fuel Modification Plan from Structures

Oakcrest Twin Oaks Fire Protection Plan

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

DUDEK

0 70 140 Feet

FIGURE 6-4

Fuel Modification Plan from Structures

Oakcrest Twin Oaks Fire Protection Plan

SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

DUDEK

0 70 140 Feet

FIGURE 6-5

Fuel Modification Plan from Structures

Oakcrest Twin Oaks Fire Protection Plan

Figure 7 Fire Behavior Map

Table 6. BehavePlus Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])	Spotting Distance[2] (miles)
Scenario 1: Summer onshore wind from the W/SW, 28% slope, 19 mph sustained winds				
GR2	8.0	522	1.3	0.4
GS2	8.0	556	0.7	0.4
SH5	20.3	3,965	0.5	0.7
Scenario 2: Summer onshore wind from the W/SW, 20% slope, 19 mph sustained winds				
GR2	8.3	561	1.4	0.4
GS2	8.5	599	0.8	0.4
SH5	21.0	4,256	1.6	0.7
Scenario 3: Fall offshore Santa Ana wind from the N, 23% slope, 21 mph sustained winds, 26 mph gusts				
GR2	10.1 (11.6)	874 (1,178)	2.0 (2.8)	0.5 (0.6)
GS2	10.8 (12.3)	992 (1,336)	1.1 (1. 5)	0.5 (0.6)
SH5	26.1 (29.2)	6,821 (8,697)	2.3 (2.9)	0.9 (1.2)

Table 7. BehavePlus Fire Behavior Modeling Results - Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])	Spotting Distance[2] (miles)
Scenario 1: Summer onshore wind from the W/SW, 7% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.7	18	0.1	0.1
SH1: Zone 2 FMZ	2.8	55	0.2	0.2
NB	N/A	N/A	N/A	N/A
Scenario 2: Summer onshore wind from the W/SW, 23% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.8	20	0.1	0.1
SH1: Zone 2 FMZ	2.9	59	0.2	0.2
NB	N/A	N/A	N/A	N/A
Scenario 3: Fall offshore Santa Ana wind from the N, 30% slope, 21 mph sustained winds, 26 mph gusts				
FM8: Zone 1 FMZ	2.1 (2.4)	28 (38)	0.1 (0.1)	0.2 (0.2)
SH1: Zone 2 FMZ	5.9 (6.7)	267 (354)	0.4 (0.6)	0.3 (0.4)
NB	N/A	N/A	N/A	N/A

Notes:

1 mph = miles per hour

2 Spotting distance from a wind driven surface fire.

3 Values in parentheses represent 26 mph gusts.

Table 4. Fuel Moisture and Wind Speed Inputs

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
1h Moisture	3%	2%
10h Moisture	6%	3%
100h Moisture	8%	6%
Live Herbaceous Moisture	36%	30%
Live Woody Moisture	72%	60%
Sustained 20-foot Wind Speed	19 mph	21 mph sustained,26 mph gusts

Note: Wind speeds are taken from the San Diego County Fire Behavior Modeling Guidelines Table 2: Worst case sustained winds fuel model 4 at 50% slope.

FIGURE 7

Fire Behavior Map

Oakcrest Twin Oaks Fire Protection Plan

Attachment A
Photograph Log

Photo Location Map.

Photo 1. Photo Location 1, looking west

Photo 2. Photo Location 1, looking northwest

Photo 3. Photo Location 1, looking north

Photo 4. Photo Location 1, looking northeast

Photo 5. Photo Location 1, looking east

Photo 6. Photo Location 1, looking southeast

Photo 7. Photo Location 1, looking south

Photo 8. Photo Location 1, looking southwest

Photo 9. Photo Location 2, looking north

Photo 10. Photo Location 2, looking west

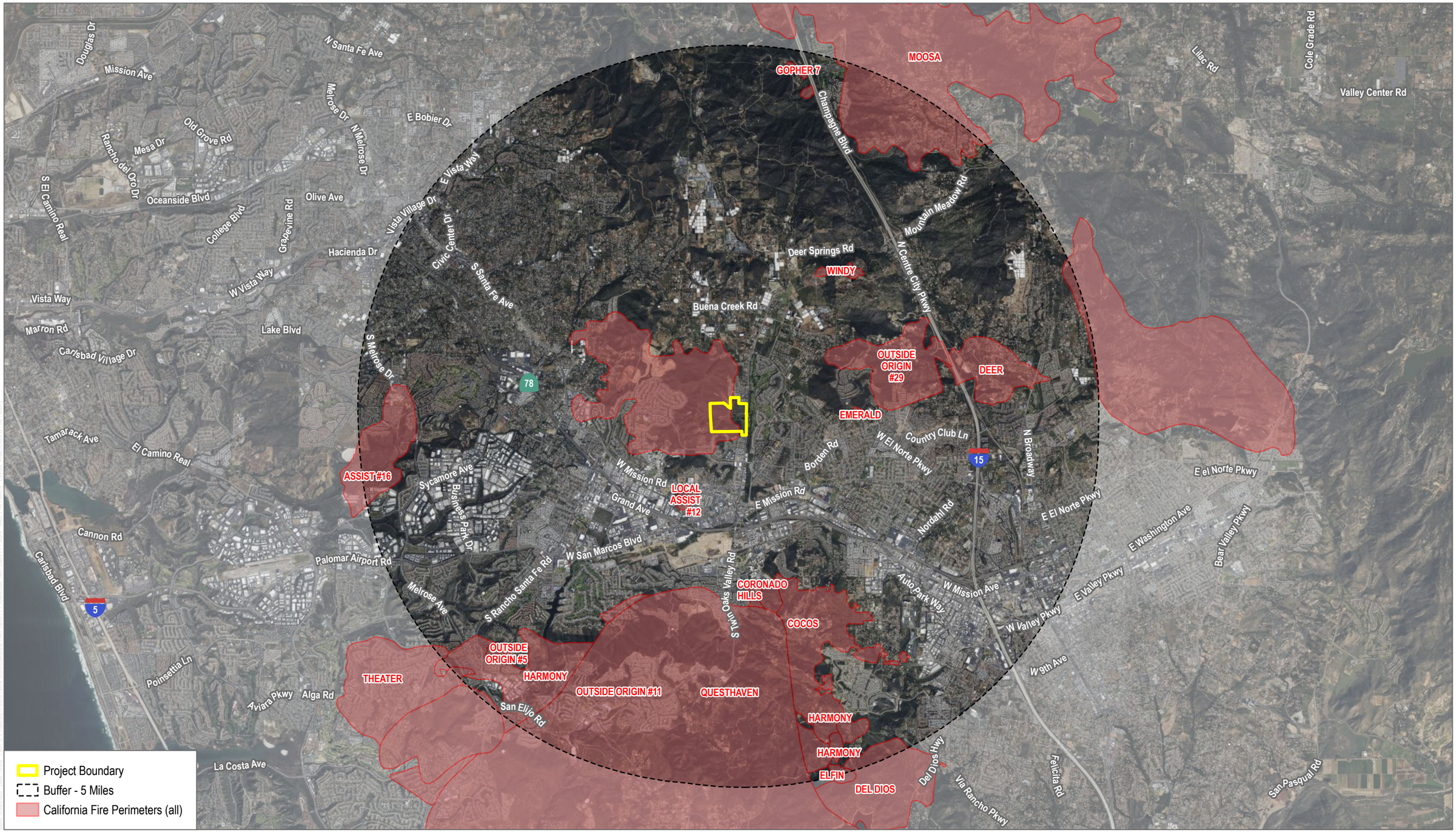
Photo 11. Photo Location 2, looking south

Photo 12. Photo Location 2, looking southwest

INTENTIONALLY LEFT BLANK

Attachment B

Fire History Map



SOURCE: Bing Imagery 2024; OpenStreetMaps; CalFire 2025

DUDEK

0 3,000 6,000 Feet

ATTACHMENT B

Fire History

Oakcrest Twin Oaks Fire Protection Plan

Attachment C

Undesirable Plant List

UNDESIRABLE PLANT SPECIES LIST

Both native and ornamental plants can be highly flammable. Flammable plant material in your landscape can increase the fire risk directly around your home. Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be either physical or chemical. For instance, physical properties would include large amounts of dead material retained within the plant, such as twigs, needles, and leaves; rough or peeling bark; and production of copious amounts of litter. Chemical properties include the presence of volatile substances, such as oils, resins, waxes, and pitch. Plant material with these characteristics should not be planted close to your structures. The following plants have been declared "undesirable" within I50-foot fuel modification zone surrounding all structures. All vegetation is listed alphabetically by botanical name, followed by the common name. The following plants have been declared "undesirable" within I50-foot fuel modification zone surrounding all structures. All vegetation is listed alphabetically by botanical name, followed by the common name.

Natives:

Adenostoma Jasciculatum - Chamise
Adenostoma Sparsifolium - Red Shank
Artemesia califomica - California Sagebrush
Eriogonum Jasciculatum - Common Buckwheat
Heterotheca grandiflora - Telegraphweed
Rhus laurina - Laurel Sumac
Salvia species - Sage (native species)

Ornamentals:

Abies species - Fir Trees
Acacia redolens - Prostrate Acacia*
Agonis juniperina - Juniper Myrtle
Araucaria species - Monkey Puzzle, Bunya-Bunya, Norfolk Island Pine*
Arundo donax - Giant Cane
Bambusa species - Bamboo*
Calocedrus decurrens- Incense Cedar
Cedrus species - Cedars*
Chamaecyparis species - False Cedars
Chamaerops humils - Mediterranean Fan Palm*

Cryptomeria japonica - Japanese Cryptomeria
Cortadera species - Pampas Grass
Cupressocyparis leylandii ~ Leylandii Cypress*
Cupressus species - Cypress*
Cytisus species - Scotch Broom, French Broom
Eucalyptus Species - Eucalyptus*
Juniperus species - Junipers*
Miscanthus species- Silver Grass
Muehlenbergia species - Deer Grass*
Pennisetum setaceum - Fountain grass, including all cultivars and varieties*
Phoenix species - Date Palms*
Pinus species - Pines*
Rosmarinus offcinalis - Rosemary*
Tecoma capensis - Cape Honeysuckle*
Trachycarus fortunei - Windmll Palm*
WashinRtonia species - Fan Palms*

*Except as permitted in the planting lists and San Marcos Fire Department landscape Standards

Note:
1. To view a picture of listed plants, go to www.wikipedia.org and search for the Botanical
Name of the plant.
2. If the owner wishes to retain these plants, they must be adequately maintained (pruning, thinning, irrigation, litter removal, and or weeding) to reduce the potential for spreading a fire through the landscape.

References:
County of Los Angeles Fire Department. Fuel Modification Plan Guidelines. July 2011.
County of San Diego, Department of Planning and Land Use. Water Efficient Landscape Design
Manual. February 2010.

In an effort to protect homes from a future devastating wildland fire, the San Marcos Fire Department has put together this booklet. You will find valuable information pertaining to both desirable and undesirable trees, shrubs, ground covers, vines and palm trees. The goal of this brochure is to educate the public on issues pertaining to landscaping and to keep their homes safe. Please feel free to contact us if you have any questions, comments, or concerns.

Canopy Trees: Broad spreading trees that make good accent trees.			
Grow 25-50 ft. tall and should be spaced 30-40 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Albizia julibrissin	Silk Floss	10	D
Chorisia speciosa	Floss Silk Tree	10	D
Cinnamomum camphora	Camphor	10	E
Erythrinia species	Coral	10	D
Ficus species		10	D
Jacaranda mimosifolia		10	D
Koelreuteria paniculate	Golden Raintree	10	D
Melaleuca linarifolia	Paperbark	10	E
Pinus halepensis	Aleppo Pine	30	E
Platanus acerfolia	Sycamore	10	D
Phoenix canariensis	Canary Island Date Palm	30	E
Podacarpus gracilior	Fern Pine	10	E
Pyrus kawakami	Evergreen Pear	10	E
Quercus species	Oak	10	E
Rhus lancea	African Sumac	10	E
Robinia pseudoacacia	Black Locust	10	D
Schinus species	Pepper Tree	30	E
Spathodea campanulata	African Tulip Tree	10	D
Tipuana tipu	Tipu Tree	10	D
Ulmus parvifolia	Chinese Elm	10	D
Zelkova serrata	Sawleaf Zelkova	10	D

Vertical Growing Trees: Upright character and are good choices for narrow areas.			
Grow up to 30 ft. tall and should be spaced 20-30 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Betula pendula	European White Birch	10	D
Brachychiton populeneus	Bottle Tree	10	D
Callistemon viminalis	Weeping Bottle Brush Tree	30	E
Dracena Drago	Dragon Tree	10	E
Hymenosporum flavum	Sweetshade Tree	10	E
Maytenus boaria	Mayten	10	E
Melaleuca quinquenervia	Paperbark Tree	10	E
Metrosideros tomentosa	New Zealand Christmas Tree	10	E
Tristania conferta	Brisbane Box Tree	10	E

Ornamental Trees: Various canopy heights and widths that serve many uses such as accent trees.			
Grow 15-40 ft. tall and should be spaced 20-25 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Acer palmatum	Japanese Maple	10	D
Agonis flexuosa	Peppermint Tree	10	E
Arbutus unedo	Strawberry Tree	10	E
Avocado species		30	E
Bauhinia species	Orchid tree	10	D
Cassia leptophylla	Gold Medallion Tree	10	D
Cercis candensis	Redbud	10	D
Citrus species		10	E
Cupniopsis anacardiodes	Carrotwood tree	10	E
Geijera parvifolia	Australian Willow	10	E
Lagerstroemia indica	Crape myrtle	10	D
Lagunaria patersonii	Primrose Tree	10	E
Magnolia species		10	E/D
Olea europaea	Olive Tree	10	E
Pistacia chinensis	Chinese Pistache	10	D
Prunus species		10	E/D

Pyrus species	Ornamental Pear	10	E/D
Tabebuia species	Trumpet Tree	10	E/D

Low-Multi Branching Trees: Large shrubs and small tree forms good for under-story screening.			
Grow 10-25 ft. tall and should be spaced 15-20 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Acacia species		30	E
Eriobotrya deflexa	Bronze Loquat	10	E
Feijoa sellowiana	Guava	10	E
Melalueca nesophila	Pink Melalueca	10	E
Myoporum laetum		10	E
Pittosporum undulatum	Victorian Box	10	E
Punica granatum	Pomegranate	10	D
Thevitia thevetiodes	Giant Thevitia	10	E

Tall Skyline Trees: Dramatic Silhouettes against the skyline.			
Grow 40-70 ft. tall and should be spaced 30-40 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Acer macrophyllum	Bigleaf Maple	10	D
Alnus rhombifolia	White Alder tree	10	D
Cedrus species	Cedar tree	30	E
Eucalyptus species		30	E
Fraxinus species	Ash tree	10	D
Grevilla robusta	Silk Oak	10	D
Liriodendron tulipifera	Tulip Tree	10	D
Liquidambar species	Sweet gum	10	D
Pinus canariensis	Canary Island Pine	30	E
Pinus torreyana	Torrey Pine	30	E
Platanus racemosa	Sycamore	10	D
Populus fremonti	Western Cottonwood	10	D
Populus nigri	Lombardy Poplar	10	D

Palm Trees: Vary from single to multiple trunks.			
Grow 20-100 ft. tall and should be spaced 20-40 ft. apart.			
Botanical Name	**Common Name**	**Dripline To Structure (ft.)**	**Evergreen or Deciduous**
Archontophoenix alexandrae	Alexandra Palm	10	E
Archontophoenix cunninghamiana	King Palm	10	E
Brahea armata	Blue Hesper Palm	30	E
Brahea edulis	Guadalupe Palm	30	E
Chamaerops humilis	Mediterranean Fan Palm	30	E
Cycas revoluta	Sago Palm	10	E
Howea forsteriana	Kentia Palm	30	E
Phoenix canariensis	Canary Island Date Palm	30	E
Phoenix dactylifera	Date Palm	30	E
Phoenix reclinata	Senegal Date Palm	30	E
Phoenix roebelenii	Pygmy Date Palm	30	E
Syagrus romanzoffianum	Queen Palm	10	E
Trachycarpus fortunei	Windmill Palm	30	E
Washingtonia filifera	California Fan Palm	30	E
Washingtonia robusta	Mexican Fan Palm	30	E
All other Palm species	Various Palms	30	E

NOTE:

** This booklet is intended to guide the public on what types of trees and shrubs are acceptable to the San Marcos Fire Department. Other trees and shrubs not listed are still acceptable to use upon approval by the San Marcos Fire Department.

** Trees listed as requiring 30' spacing from dripline to structure are considered non-fire resistive trees by the San Marcos Fire Department. Consult a design professional or the San Marcos Fire Department for site specific questions regarding tree placement

** Trees that grow near power lines pose a potential electrical hazard. San Diego Gas & Electric (SDG&E) is required by law to maintain minimum clearances between all vegetation and power lines. No tree should be allowed to grow within 10 feet of electrical conductors. SDG&E provides a suggested species list of trees that are appropriate to grow under or adjacent to power lines. This list, along with other information regarding SDG&E Vegetation Management, can be found at http://sdge.com/safety/treesafety.