
Fire Protection Plan – Letter Report

Ascend Specific Plan Project, San Marcos, California

JUNE 2026

Prepared For:

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June 24, 2026

18664

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

Dear Mr. Nailon:

This Fire Protection Plan (FPP) – Letter Report demonstrates that the Ascend Specific Plan Project located at the intersection of Melrose Drive and Diamond Street will be in compliance with applicable portions of the 2026 San Diego County Consolidated Fire Code (SDCCFC) which has adopted and amended the 2025 California Fire Code (CFC), the San Marcos Municipal Code (SMMC) Chapter 17.64.030, and applicable portions of the 2026 San Diego County Consolidated Wildland Urban Interface Code (SDCCWUIC), which has adopted and amended the 2025 California Wildland Urban Interface Code (CWUIC). The Project will also be consistent with applicable sections of the 2025 California Residential Code (CRC). The Project is within a Very High Fire Hazard Severity Zone in a Local Responsibility Area.

In addition to the above referenced codes, this FPP Letter Report shall be consistent with the County of San Diego's Fire Prevention Fuel Modification Zones and Defensible Space requirements, as adopted by the City of San Marcos. 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 Ascend Specific Plan Project will be referred to as the "Project".

The Project site is located in the City of San Marcos (City) in northern San Diego County (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. Carlsbad Fire Department (CFD) Station 6 could reach the site in 3 minutes and 2 seconds, SMFD Station 2 could reach the site in 3 minutes and 53 seconds, and SMFD Station 4 and Rancho Santa Fe Fire Protection District (RSFFPD) Station 6 could reach the site within 7 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 CFD Station 6, located at 7201 Rancho Santa Fe Road, Carlsbad, California, approximately 1.4 miles from the Project site. CFD Station 6 has equipment including one (1) ALS Fire Engine, one (1) Brush Engine and one (1) ALS Paramedic Ambulance (CFD 2025).

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 September 9, 2025 (see Attachment A, Photograph Log). As determined during the analysis of the site and its fire environment, the proposed 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, including SMFD. 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.

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1 Project Description

The Ascend Specific Plan Project encompasses approximately 16.12 acres and is located northeast of the intersection of Melrose Drive and Diamond Street in the Questhaven/La Costa Meadows neighborhood in the City of San Marcos (City), California (see Figure 1, Project Location and Figure 2, Project Site Plan).

The Ascend Specific Plan would allow for the development of up to 160 residential units. Under the proposed site plan the Project would construct 88 duplex units, and 59 freestanding detached townhome residential units, for a total of 147 residential units. The residential units would be three stories high and up to 40.5 feet in height.

Common area open spaces would be constructed including landscaping and recreation areas and amenities. A private recreation area that includes a pickleball court, pool, covered gathering/entertainment space and restroom would be developed in the northwestern corner of the Project site. A playground and a fenced dog park with seating are also proposed. Private open space would be provided for each unit and could include patios, yards, decks and balconies.

Primary vehicular access to the Project site would be via one signalized driveway on Melrose Drive. The entrance driveway would be ungated and would be 24-feet wide. Internal vehicular movement would be via private drive aisles (24-feet wide) and alleys (20-feet wide). The Project also includes a gated secondary emergency only access driveway on Melrose Drive. The Project design includes sidewalks for pedestrian movement throughout the Project site and to connect to the existing sidewalk on Melrose Drive. 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.

The Project site and adjacent vegetation primarily consists of shrub/ scrub vegetation (see Figure 3, Vegetation Community Map).

2 Environmental Setting

2.1 Location

The Project site is located northeast of the intersection of Melrose Drive and Diamond Street, at APN 223-341-17, in the City of San Marcos, California (Project Location; Figure 1). The property is bounded on the west by Melrose Drive, by residential land uses and open space to the north and by open space to the east and south. The existing terrain on the site is sloping down toward the southwestern boundary, along Melrose Drive.

The site is located northeast of the Melrose Drive, Diamond Street intersection, and primary access to the Project will be located at the existing Melrose Drive, Diamond Street intersection. Secondary access to the Project site will be from a gated roadway that connects to Melrose Drive, to the north of the primary access point, as illustrated in Figure 2, Site Plan. The Project site is surrounded by residential land uses and open space to the north, open space to the east and south, and an industrial neighborhood to the west. Undeveloped open space surrounding the Project site, primarily consists of sage scrub and chaparral vegetation (see Figure 3, Vegetation Community Map). There is

an existing San Diego Gas & Electric (SDG&E) utility tower on the Project site associated with a 150-foot-wide SDG&E easement in the southwestern portion of the site. These easements grant SDG&E access and maintenance of their power transmission lines that transect the project site.

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 currently proposed, and any future structures would be required to be built to the latest ignition resistant building codes found in the 2025 CWUIC, or then current codes, and any additional restrictions or requirements adopted locally by the SMFD, and the 2026 SDCCFC or SDCCWUIC. (see Figure 4, Fire Hazard Severity Zone Map)

There have been numerous wildfires within the vicinity of the Project site 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 data¹ indicates 27 wildfires have occurred within a 5-mile vicinity of the Project site; with one recorded wildfire on-site (1996 Harmony Fire, 9,359.45 acres). The most recent wildfire in the Project vicinity was the 2014 Cocos Fire, which burned approximately 1,994 acres. The 2026 Moree Fire is the most recent vegetation fire, which burned approximately 2 acres, this fire is not pictured on the figure. The largest fire within 5 miles of the Project site was the Witch Fire in 2007 which burned 162,070 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 27 years, with an average return interval of approximately four years, indicating significant wildfire potential in the region.

2.2 Topography

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

The Project site elevations vary from approximately 510 feet AMSL in the northern portion of the site to approximately 415 feet AMSL at the southwest corner adjacent to Melrose Drive..

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 inches². 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

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

² <https://weatherspark.com/y/1898/Average-Weather-in-San-Marcos-California-United-States-Year-Round>

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 mph³) 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 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.

2.4 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 a combination of Diegan Coastal Sage Scrub, Southern Mixed Chaparral, Coast Live Oak Woodland, and Urban/Developed (SANGIS 2025) (see Figure 3, Vegetation/Land Cover).

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.

³ FEMS RAWs Station Data Valley Center Station 045734

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 Fuel Modification Zones (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 FMZs, where the wildfire threat will exist post-development (southeast and northeast 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, they can offer a safer landscape that is resistant to Wildland Urban Interface (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 RSFFPD 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 Ascend Specific Plan 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
- 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 the ignition resistant construction requirements detailed in Chapter 5 of the CWUIC decrease the wildfire vulnerability of individual buildings (Quarles & Pohl, 2019). When these features are adopted on a community-wide scale, and coupled with FMZs 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 Chapter 5 CWUIC 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 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 VHFHSZs 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

⁴ (Orange County Fire Authority, 2008)

⁵ (FEMA, n.d.)

⁶ (Mutch et al., 2011)

⁷ (Audencial, 2016)

⁸ (Murphy 2003)

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 VHFHSZs within the County, such as the Ascend Specific Plan Project, include key wildfire safety features and measures, such as:

- Ignition resistant construction required by Chapter 5 of the CWUIC
- Annually maintained FMZ
- Ember resistant structures required by Chapter 5 of the CWUIC
- Modern code compliant roadways and turnarounds
- Multiple ingress/egress points
- HOA maintained landscaping
- 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 FMZs or lack of FMZ maintenance
- Lack of interior landscaping area maintenance
- Narrow road widths (non-compliant with modern codes)
- Hazardous vegetation between structures

The Ascend Specific Plan 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 Project takes a multi-scaled approach to fire protection through wildfire education, ignition prevention, fuels management, increased response capacity, and ignition-resistant construction. The 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 is fire resistant is that it offers protection to the surrounding communities and the environment. The requirements and recommendations outlined in this FPP Letter Report have been designed specifically for the proposed construction in VHFHSZ and HFHSZ areas and can significantly reduce the potential threat to offsite areas.

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.

Exhibit 1. Planned Wildfire Resilient Community Features

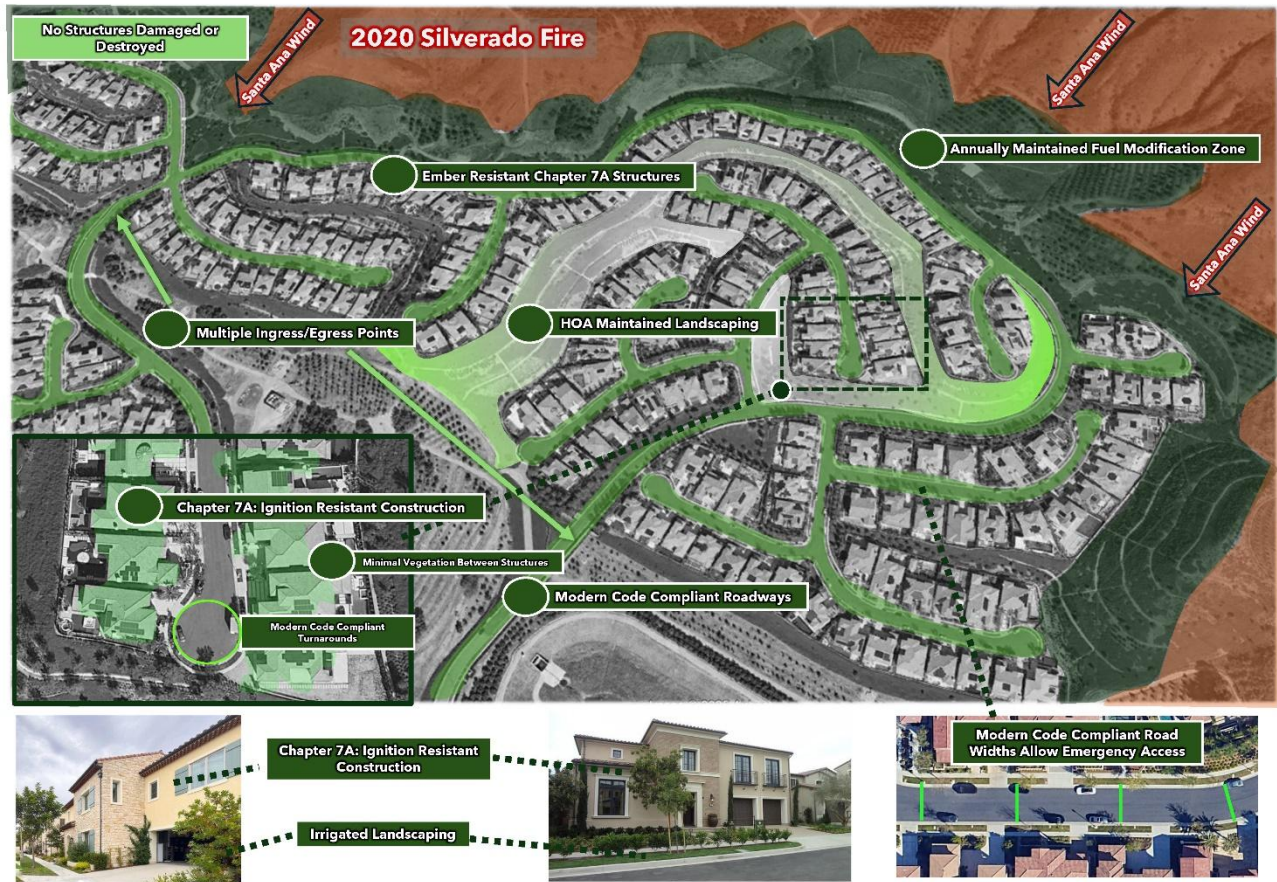


Exhibit 2. Palisades Community Features



Exhibit 3. Eaton Community Features



3 Project Exposure to Wildland Fires

The Project currently proposes 147 dwelling units on the Project site, but would allow for up to 160 units. 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 5 of the 2025 CWUIC, as adopted by SMFD, or the current building code standards, along with Defensible Space in the form of FMZs, 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. Onsite fire hydrants must meet the requirements for fire flow as stated in the 2026 SDCFC 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, gates, surface, and other requirements will comply with roadway standards as identified in in Standard No. 1401, Fire Department Access Requirements¹⁰, the 2026 SDCCFC, 2025 CFC, and 2025 CWUIC. 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 the intersection at Melrose Drive and Diamond Street. An emergency vehicle only, secondary access to the Project will be provided by a gated access roadway along Melrose Drive, to the northwest of the primary access point. Melrose Drive and Diamond Street are compliant with the existing code for street width, and both roadways allow for increased capacity, emergency response access, and evacuation efficiency (North Coast Resource Partnership 2026).

The gated entry into the Project site from the secondary access point 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 F2200¹¹. The gate will be equipped with a Knox emergency key-operated switch that overrides all command functions and opens the gate, as well as a Knox box, per code.

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 2026 SDCCFC, or then current code, requirements as follows:

1. A residential driveway constructed of 3½ inch 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.
2. Driveways serving no more than two residential parcels will be 16 feet wide unobstructed with a fire apparatus turnaround.
3. 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.
4. 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.
5. Modification/removal of combustable vegetation is required within 20 feet of each side of an evacuation road, including driveways.

¹⁰ <https://www.sanmarcosca.gov/files/assets/city/v/1/public-safety/fire-department/documents/fire-prevention-standards-amp-forms/smfd-access-roads.pdf>.

¹¹ UL 325: Underwriters Laboratories, Inc. 325 Standard to Which Vehicular Gate Operators are Manufactured and Tested.
ASTM 2200: American Society for Testing and Materials 2200 Standard Specification for Automated Vehicular Gate Construction

At buildout, the Project roadways shall be a minimum of 16-feet wide with unobstructed fire apparatus turnaround areas, and all driveways shall not exceed 150 feet. The interior of the Project site complies with Zone 1 requirements, as discussed further in Section 3.8 below, which provides the roadside FMZ required. Addresses shall be posted as required by the 2026 SDCCFC requirements, or the then current code.

3.2.2 Dead-End Roadways

A Dead-End Roadway is defined in the 2026 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 Section 503.2.5, Dead ends and the SMFD approved turnaround requirements. 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 5 to 19.99 acres, such as the proposed Project area, is 2,640 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 two dead-end roadways, within the allowable distance, that terminate in approved fire apparatus turnarounds, as listed in the SMFD Standard 1401, Fire Department Access Requirements. The dead-end roadways are at minimum 20 feet in width and terminate in approved SMFD fire apparatus access turnarounds, including the Hammerhead turnaround for commercial and multifamily, and the Single family dwelling alternative turnaround. All other dead-end roadways within the Project site are within the code allowable dead end road length of 2,640 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 2026 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 (2026 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 Vallecitos Water District. The proposed fire hydrants will meet the requirements of the SMMC as described in Section 17.64.130, Fire Hydrant Requirements, and 17.64.140, Fire Hydrants. Section 507.5.1 of the 2025 CFC 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 SMMC also amends and adopts Section 507.5.7, Fire Hydrant and Fire Valve Location, and Appendix C of the 2025 CFC, Table C102.1 Required Number and Spacing of Fire Hydrants, including:

- 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.
- Fire hydrants shall be identified by a reflective blue marker and fire department connections shall be identified by a reflective green marker, with a minimum dimension of 3 inches, in the center of the travel lane adjacent the water source, or by other methods approved by the fire code official
- 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 Project site is located within the City, a designated LRA, 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, CFD, and RSFFPD are the closest responding fire response agencies to the Project site. A mutual aid agreement exists between the SMFD, CFD, and RSFFPD, referred to as a “boundary drop,” under which the closest and most appropriate emergency vehicles respond regardless of jurisdictional boundaries.¹²

¹² City of Carlsbad Fire Department 2024 Annual Report. PDF Page 22. <https://www.carlsbadca.gov/home/showpublisheddocument/16557/638785210585800000>; and Phone Call Conversation with RSFFPD Battalion Chief Luke Bennett

Emergency response for the Project would be provided by CFD Station 6, located at 7201 Rancho Santa Fe Rd, Carlsbad. The apparatus' available for emergency response that are located at CFD Station 6 include a paramedic fire engine, a brush engine and an ALS ambulance (CFD 2025). Station 6 is approximately 1.4 miles from the entrance to the Project site with a calculated travel time of approximately 3 minutes and 2 seconds¹³. Therefore, CFD can respond to the Project site within the County Time Response Standards¹⁴ of 5 minutes for urban areas.

There are additional firefighting resources within the vicinity of the Project site, including SMFD Station 2, located at 1250 S Rancho Santa Fe Rd, San Marcos, SMFD Station 4, located at 204 San Elijo Rd, San Marcos, and RSFFPD Station 6, located at 20223 Elfin Forest Rd, Escondido. SMFD Station 2 is approximately 1.9 miles away, SMFD Station 4 is approximately 3.5 miles away, and RSFFPD Station 6 is approximately 3.6 miles from the Project site. SMFD Station 2 has a calculated travel time of 3 minutes and 53 seconds.

SMFD Station 4 has a calculated travel time of approximately 6 minutes and 36 seconds, and RSFFPD 6 has a calculated travel time of approximately 6 minutes and 46 seconds. Based on these estimated travel times, SMFD Station 4 and RSFFPD Station 6 cannot respond to the Project site within the County Time Response Standards¹⁵ of 5 minutes for urban areas. Table 1, below, summarizes the four fire stations nearest to the Project site, including their assigned equipment, staffing levels, travel distance, and estimated travel time.

Table 1. Closest Responding Fire Stations Summary

Station No.	Location	Equipment	Staffing	Maximum Travel Distance	Est. Travel Time*
CFD Station 6	7201 Rancho Santa Fe Rd, Carlsbad, California 92009	1 Paramedic Engine, 1 Paramedic Ambulance	4 Firefighter Paramedics and 1 EMT 24/7	1.4 miles	3 minutes 2 seconds
SMFD Station 2	1250 S Rancho Santa Fe Rd, San Marcos, California 92078	1 Paramedic Engine 2 Paramedic Ambulance	4 Firefighter Paramedics 2 EMTs	1.9 miles	3 minutes 53 seconds
SMFD Station 4	204 San Elijo Rd, San Marcos, California 92078	1 Paramedic Engine 1 Paramedic Ambulance	3 Firefighter Paramedics 1 EMT	3.5 miles	6 minutes 36 seconds

¹³ 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).

¹⁴ County of San Diego General Plan Safety Element Table S-3, Travel Time Standards from the Closest Fire Station

¹⁵ 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	Equipment	Staffing	Maximum Travel Distance	Est. Travel Time*
RSFFPD Station 6	20223 Elfin Forest Rd, Escondido, California 92029	Patrol 266 (Type 6 Engine), UTV 266, Water Tender 266	2 Firefighter Paramedics 24/7	3.6 miles	6 minutes 46 seconds

Note: 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).
* 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 2025, the City’s population of approximately 95,000 residents¹⁶ generated 12,326 total annual calls¹⁷. This results in a call volume of approximately 129.75 calls per 1,000 people, or a per capita call volume of approximately 0.13.

The Project proposes the development of 147 units, but would allow for the development of up to 160 residential units. For a conservative analysis, the maximum allowable dwelling unit count was used. The possible 160 unit would generate a population of approximately 479 residents based on the average of 2.99 persons per household (U.S. Census Bureau, 2023). The Project would potentially generate approximately 63 calls every year (roughly 5 calls per month or 1 call per week), most of which would be expected to be medical-related calls, consistent with typical emergency call statistics (Refer to Table 2 for call volume calculations).

Table 2. Calculated Call Volume Associated with the Sunrise at San Marcos Project

Emergency Calls per 1,000 (County Data)	Number of Residents	Avg. No. Calls per Year (479/1,000) x130	Avg. No. Calls per Month (62.27/12)
130	479 (estimate)	62.27	5.19

Service level requirements are not expected to be significantly impacted with the increase of approximately 5 calls per month for the local fire response system. For example, SMFD currently responds to roughly 34 calls per day (12,326 calls per year, approximately 1,027 calls per month or 237 calls per week) in its primary service area split amongst 4 stations, so approximately 9 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.

¹⁶ <https://www.census.gov/quickfacts/fact/table/sanmarcoscitycalifornia/POP010220>

¹⁷ Public Records Request submitted to City of San Marcos. Total incident data for 2024 provided on September 16, 2025, from Julia Nagy via email.

3.6 Ignition Resistant Building Construction

The Project currently proposes 147 residential dwelling units, but would allow for the development of up to 160 residential units. All new structures would be constructed to the 2026 SDCCFC/SDCCWUIC standards, or then current codes. Due to its location within a VHFHSZ, potential buildings would comply with the enhanced ignition-resistant construction standards of the 2025 CWUIC, or then current codes. These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. While these standards will provide a high level of protection to structures in this development 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 ignition resistant construction requirements for 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, 2026 SDCCFC, 2026 SDCCWUIC 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 California Building Standards 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 may include required or code exceeding building features as follows:

- Application of the 2025 CWUIC Chapter 5, 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 Project proposes CWUIC Chapter 5 compliant home hardening measures, automatic fire sprinklers, and the entire interior of the Project site meeting FMZ Zone 0 and 1 requirements, as well as providing a paved roadway around the entirety of the Project structures, to reduce the likelihood of starting a fire, and preventing onsite ignition or fire spread, in the event of an offsite wildfire encroaching on the Project.

3.7 Fire Protection Systems – Automatic Interior Fire Sprinkler Systems

The Project currently proposes 147 residential dwelling units, but would allow for the development of up to 160 residential units.. 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-D¹⁸ and SMFD requirements that are consistent with Section R309.3 of the 2025 CRC, Chapter 9 and Section 903 of the 2025 CFC, adopted by SMFD in the 2026 SDCCFC and SMMC.

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. 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. The Fuel Modification Plan (Figure 5) demonstrates FMZs around the perimeter of the Project structures; all Homeowner lots will comply with Zone 0 and Zone 1 requirements.

The following details the fuel modification requirements as described in the SMFD amendments of the 2026 SDCCWUIC, Section 604.6, Fuel Modification.

A person owning, leasing, controlling, operating or maintaining a building or structure in or adjoining a hazardous fire area, and a person owning, leasing or controlling land adjacent to a building or structure in or adjoining a hazardous fire area shall maintain an effective fuel modification zone by removing, clearing or modifying combustible vegetation and other flammable materials from areas within 150 feet from each building or structure.

¹⁸ NFPA 13D. Standard for the Installation of Sprinkler Systems in Detached Single Family Residential Occupancies. 2019 Edition.

The fuel modification zone may be replanted with either approved irrigated, fire-resistant planting material or approved non-irrigated, drought-tolerant, fire-resistant plant material. Replanting of the fuel modification zone may be required for erosion control.

Exceptions:

1. Single specimens of trees, ornamental shrubbery or similar plants used as ground cover, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure.
2. Grass and other vegetation located more than 30 feet from a building or structure and less than 18 inches in height need not be removed where necessary to stabilize the soil and prevent erosion.
3. With the approval of the FAHJ, the width of the fuel modification zone may be reduced where ignition-resistant structures or other features are constructed. However, in no case shall the fuel modification zone be reduced to less than 100 feet. This exception shall not be construed to allow the FAHJ to require ignition-resistant construction on an existing structure with a fuel modification zone of less than 100 feet

The Project site will consist of three FMZs that extend across the Project site, as depicted in Figure 5. A typical landscape/fuel modification installation in the City 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 following are requirements of FMZs 0, 1, and 2 as identified in the 2026 SDCCWUIC:

Zone 0 “Immediate Zone” – 0 to 5 feet from the structures

Meaning from exterior wall surface or patio, deck or attachment to building or structure extending 5 feet on a horizontal plane. This zone shall be constructed of continuous hardscape or non-combustible materials. Removal of combustible materials surrounding the exterior wall area and maintaining area free and clear of combustible materials. The use of mulch and other combustible materials shall be prohibited.

Zone 1 “Intermediate Zone” – between 5 and 50 feet from the structure (unless constrained by property lines)

Meaning from the immediate edge of Zone 0 extending out in a horizontal plane. This zone shall consist of planting of low growth, drought tolerant and fire resistive plant species. The height of the plants in this zone starts at 6” adjacent to Zone 0 and extending in a linear fashion up to a maximum of 18 inches at intersection with Zone 2. Vegetation in this zone shall be irrigated and not exceed 6 feet in height and shall be moderate in nature as per the requirements for shrubs set forth in 2026 SDCCWUIC Section 603.4:

All new plantings of shrubs shall comply with the following:

1. Shrubs shall not exceed 6 feet in height.
2. Groupings of shrubs are limited to a maximum aggregate diameter of 10 feet.
3. Shrub groupings shall be separated from other groupings a minimum of 15 feet
4. Shrub groupings shall be separated from structures a minimum of 30 feet.
5. Where shrubs are located below or within a tree’s drip line, the lowest tree branch shall be a minimum of three times the height of the understory shrubs or 10 feet, whichever is greater.
6. Ornamental grasses shall be planted a minimum of 5 feet from any structure.

Firewood inside this zone shall be piled a minimum of 30 feet away from all buildings and structures. Cords of firewood shall also be maintained at least 10 feet from property lines and not stacked under tree canopies drip lines.

Zone 2 “Extended Zone” – between 50 and 150 feet from the structure (unless constrained by property lines)

Meaning from the immediate edge of Zone 1 extending out in a horizontal plane for 50 feet. This zone consists of planting of drought tolerant and fire resistive plant 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 feet off the ground on mature trees. This area would be considered selective clearing of natural vegetation and dense chaparral by removing a minimum of 50% of the square footage of this area

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. All FMZ 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

Due to site constraints, it is not possible to achieve a minimum of 150 feet of on-site fuel modification surrounding the entirety of the Project structures. However, the proposed Project achieves a minimum 150 feet of FMZ to the northeast and northwest sides of the Project site through a combination of on-site and off-site equivalent FMZs in the form of existing non-combustible roadways and existing infrastructure with maintained landscapes and hardscapes and will provide code complying methods of fire protection along the northeast and southeast sides of the Project site.

As demonstrated in Figure 5, Fuel Modification Plan, Zone 0 will be provided around the entire perimeter of each structure, and the entirety of the Project will comply with the Zone 1 requirements above. Code meeting measures to meet the intent of the defensible space requirements are provided below for areas on the Project site with reduced FMZs.

3.8.2 FMZ Measurements and Equivalency

FMZ Measurements

As evaluated in Figure 5, Fuel Modification Plan, 100 feet of defensible space is obtainable around each proposed structure, including 5 feet of Zone 0 and 95 feet of Zone 1. The remaining 50 feet of defensible space is impaired at various locations around the perimeter of the Project. The following zone impairments are observed:

- The Project site will not achieve a full 150 feet of defensible space along the northern portion of the northwestern boundary, as the FMZs are limited by the property boundary at 100 feet from the structures.
 - The structures are set back from the northwestern property line by 100 feet and therefore achieve 100 feet of Zone 1 defensible space onsite in addition to the fully compliant Zone 0.

- The perimeter road will provide emergency vehicle access to the Project boundary and open space to the west of the Project site. The Project roadway improves upon the required FMZ by creating a complete fuel break completely void of vegetative fuels.
- The Project site will not achieve the full 150 feet of defensible space along the northeastern boundary, as the FMZs are limited by the property line 114 feet from the structures.
 - The residential lot lines are set back from the northeastern property line by 114 feet, and therefore achieves 114 feet of Zone 1 defensible space onsite in addition to the fully compliant Zone 0.
 - A geogrid wall will be constructed approximately 20 feet from the property line. The geogrid block wall is between 1 and 20 feet in height and will function as a heat deflecting wall which provides additional protection to the Project structures. Heat deflecting walls are proven to be efficient methods of fire protection, and in this case may be even more effective due to the fuel modification between the wall and unmaintained open space.
 - The perimeter road will provide emergency vehicle access to the Project boundary and open space to the south and east of the Project site. The Project roadway improves upon the required FMZ by creating a complete fuel break completely void of vegetative fuels.
 - The Project also includes a gate to provide access to the eastern exterior of the Project site, to allow for firefighting access.
- The Project site will not achieve a full 150 feet of defensible space in an area to the southeast, as the FMZs are limited by the property line 100 feet from the structures.
 - The residential lot lines are set back from the southeastern property line by 100 feet, and therefore achieve 100 feet of Zone 1 defensible space in addition to the fully compliant Zone 0.
 - A geogrid block wall will be constructed approximately 10 feet from the property line. The geogrid wall will range in height from 1 to 15 feet, and will function as a heat deflecting wall which provides additional protection to the Project structures.
 - Two additional 10-foot tall tiered geogrid block walls will be provided in the southwest corner of the Project boundary providing additional protection to the Project structures.
 - The perimeter road will provide emergency vehicle access to the Project boundary and open space to the south of the Project site. The perimeter roadway also improves upon the required FMZ by creating a complete fuel break completely void of vegetative fuels.

Off-site FMZ

As shown in Figure 5, Fuel Modification Plan, there are areas to the northwest of the Project, on and offsite, that will be maintained by outside agencies. The homeowner's association of the Larkspur Heights/Calico Hills development to the northwest of the Project site, is responsible for maintaining part of the offsite vegetation adjacent to the Project site, shown in pink. Vegetation on the slopes in the southwest corner of the Project site along Melrose Drive, shown in orange, is maintained by, and will continue to be maintained by the City per the Community Facilities District.

FMZ Equivalency

The 2026 SDCCWUIC, adopted by many of the agencies throughout the County, requires 100 feet of fuel modification surrounding all structures. The SMFD amendments to the adopted WUI code hosts more stringent requirements and requires 150 feet of fuel modification surrounding structures, but allows an exception (Exception 3 of Section 604.6 of the 2026 SDCCWUIC, stated above in Section 3.8, FMZ Requirements) for new developments that provide ignition resistant construction, such as the Project. As discussed above, the Project implements Zone 0 around each structure, and achieves an extended 100 feet of on-site Zone 1 FMZs throughout the development. The Project also implements various fire prevention measures as detailed throughout this FPP Letter Report that improve the defensibility of the structures. These fire protection measures include:

- The entirety of the Project site complying with the more stringent Zone 1 requirements, providing a minimum of 100 feet of defensible space surrounding all structures. This exceeds the typical requirement for 50 feet of Zone 1 and the balance as Zone 2. Zone 1 provides increased vegetation reduction compared to Zone 2, therefore eliminating more fuels than would otherwise be allowed.
- A minimum 24-foot wide peripheral roadway that is void of fuel and provides access for firefighters in the event of an emergency, placing them between the wildland and project structures. The roadway exists between the structures and open space functioning as a complete fuel break surrounding the Project site.
- Geogrid retaining walls that function as a heat deflecting, noncombustible wall between the Project and the open space to the northeast and southeast. The block walls provide heat deflection for the Project, are between 1 and 20 feet in height, and have additional Zone 1 compliant fuel modification between the wall and the property line.

As discussed further in Section 4, Fire Behavior Modeling, a worst-case Santa Ana wind driven wildfire would produce flame lengths of up to 40 feet from wildland areas with unmaintained fuels. The southeastern portion of the Project site are able to achieve a minimum of 100 feet of onsite FMZ, which is more than two times the width of the highest flame lengths produced for the unmaintained vegetation in the adjacent open space. A paved perimeter road is proposed to surround all Project structures onsite. The paved road will be located between the structures and open space within Zone 1; however, the roadway exceeds the requirements of Zone 1 and is completely void of vegetative fuels, increasing the resiliency of the Project. The entirety of the Project will meet Zone 1 requirements and be either irrigated landscaping or non-combustible paved surfaces in the form of roads, walkways, or parking areas. The paved surfaces will vary in their dimension and location but exceed the requirements for Zones 1 and 2 given their non-combustible nature. In addition to the code-exceeding paved areas, the landscaping requirements for each zone are described above. This road will provide emergency vehicles with access to the open space surrounding the Project while simultaneously providing an enhanced buffer for additional fire protection.

The Project also proposes 1-20 foot geogrid block walls to the northeast and 1-15 foot geogrid block walls to the southeast that will function as heat deflecting walls providing additional fire protection by deflecting heat and flames from a fire in the open space adjacent to the Project site. Heat deflecting walls are extremely effective at mitigating the forward spread of fire by disrupting fuel continuity and deflecting heat upwards away from the sparse surface fuels in the FMZs (NFPA 2018). The geogrid block walls would provide a vertical, non-combustible surface in the line of heat, fumes, and flame travel up the slope. Once these fire byproducts intersect the wall, they are deflected upward or, in the case where lighter fuels are encountered, they are quickly consumed, heat and flame are absorbed or deflected by the wall, and the fuels closest to the wall burn out within a short (30 seconds to 2 minutes) time frame (Quarles and Beall 2002).

Walls like these have proven to deflect heat and airborne embers on numerous wildfires in San Diego, Orange, Los Angeles, Ventura, and Santa Barbara County. RSFFPD, Laguna Beach Fire Department, Orange County Fire Authority, and others utilize these walls as alternative methods based on observed performance during wildfires. This has led to these agencies approving use of non-combustible heat deflecting walls as mitigations for reduced FMZs. These walls are consistent with NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3 and International Urban Wildland Interface Code (ICC 2012). NFPA 1144, A.5.1.3.3 states: “Noncombustible walls and barriers are effective for deflecting radiant heat and windblown embers from structures.” These walls and barriers are usually constructed of noncombustible materials (concrete block, bricks, stone, stucco) or earth with emergency access openings built around a development where 30 feet (9 meters) of defensible space is not available and the open cells filled.

Through Zone 0 and ignition resistant construction compliance detailed in Chapter 5 of the 2025 CWUIC, the structures are protected from ignition by embers. With the application of a heat deflecting retaining wall between the Project structures and unmaintained open space in the northeast and southeast, and the paved perimeter road that exceeds Zone 1 requirements and will surround all Project structures, the Project would be further protected from the possibility of structural ignition from wildfire through radiant and convective heat ignition.

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 northwest, northeast, and southeast, 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 Letter Report utilized the guidelines and standards presented by the County, Department of Planning and Land Use (County of San Diego 2022a). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed 44 years of fire weather data from fire stations and Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County’s analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

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

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	0-4 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July
Time of Day	12:00 - 13:59	12:00 - 13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	0-30%	0-30%
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	28 mph sustained, 41 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			
GS2	Moderate load dry climate grass-shrub	Grass and shrubs on Project site, and in drainage to the northeast of the Project site.	1.5 ft
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
GR1	Low load grassland	Fuel Modification Zone 2	1 ft
GS2	Moderate load dry climate grass-shrub	Grass/shrubs in drainage to the northeast of the Project site.	1.5 ft
SH5	High load dry climate shrub	Chaparral surrounding Project site.	4-6 ft

Four (4) pre-Project and post-Project fire modeling scenario locations were selected to better understand the different fire behavior that may be experienced on or adjacent to the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

Pre-Project Conditions On/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning in the open space northwest of the Project site with average summer winds (19 mph) being fueled offsite by scrub brush, and onsite as it burns through small shrubs and disturbed habitats.
- **Scenario 2.** Fire flaming front burning onto the Project site from the drainage to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by grass and scrub brush.
- **Scenario 3.** Fire flaming front burning onto the Project site from the open space to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by scrub brush, and onsite as it burns through small shrubs and disturbed habitats.
- **Scenario 4.** Fire flaming front burning in the open space southeast of the Project site with average summer winds (19 mph) being fueled by scrub brush and onsite as it burns through small shrubs and disturbed habitats.

Post-Project Conditions On/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning in the open space northwest of the Project site with average summer winds (19 mph) being fueled offsite by scrub brush, and onsite as it burns through irrigated and maintained vegetation.

- **Scenario 2.** Fire flaming front burning onto the Project site from the drainage to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by grass and scrub brush.
- **Scenario 3.** Fire flaming front burning onto the Project site from the open space to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by scrub brush and onsite as it burns through irrigated and maintained vegetation.
- **Scenario 4.** Fire flaming front burning in the open space southeast of the Project site with average summer winds (19 mph) being fueled by scrub brush and onsite as it burns through irrigated and maintained vegetation.

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 6, BehavePlus Fire Behavior Analysis exhibit.

Table 6. BehavePlus Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet ³)	Fireline Intensity (BTU/feet/second ³)	Spread Rate (mph ^{1,3})	Spotting Distance (miles ^{2,3})
Scenario 1: (On and Offsite) Summer onshore wind from the S, 14% slope, 19 mph sustained winds				
GS2 (Onsite)	9.1	687	0.8	0.4
SH5 (Offsite)	22.3	4,827	1.7	0.8
Scenario 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Offsite)	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Onsite)	14.0 (18.2)	1,749 (3,128)	1.8 (3.3)	0.7 (1.2)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
GS2 (Onsite)	9.1	686	0.8	0.4
SH5 (Offsite)	22.2	4,816	1.7	0.8

Notes:

¹ mph = miles per hour

² Spotting distance from a wind driven surface fire.

³ Values in parentheses represent 42 mph gusts.

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

Fire Scenarios	Flame Length (feet ³)	Fireline Intensity (BTU/feet/second ³)	Spread Rate (mph ^{1,3})	Spotting Distance (miles ^{2,3})
Scenario 1: (On and Offsite) Summer onshore wind from the S, 14% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	9.1	4,827	1.7	0.8
NB	N/A	N/A	N/A	N/A

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

Fire Scenarios	Flame Length (feet ³)	Fireline Intensity (BTU/feet/second ³)	Spread Rate (mph ^{1,3})	Spotting Distance (miles ^{2,3})
Scenario 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2: Drainage Offsite	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
FM8: Zone 1 FMZ	2.7 (3.0)	50 (62)	0.1 (0.2)	0.2 (0.3)
SH1: Zone 2 FMZ	7.4 (9.5)	439 (765)	0.7 (1.2)	0.5 (0.7)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
NB	N/A	N/A	N/A	N/A
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	22.2	4,816	1.7	0.8
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 42 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

The results of the fire behavior modeling conducted for this Project are presented in Table 6, and Attachment D, Fire Behavior Modeling Analysis.

Pre-Project

Scenario 1 represents a fire burning upslope toward the Project, through the open space to the northwest of the Project site, burning through thick scrub brush during average summer wind conditions. This fire would be expected to burn at a low to moderate rate of spread 1.7 mph during sustained wind), produce high flame lengths (22.3 feet during sustained winds), and has the potential to spot 0.8 miles during sustained winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (0.8 mph during sustained winds), produce moderate flame lengths (9.1 feet during sustained winds), and could produce embers that could spot up to 0.4 miles away.

Scenario 2 represents a fire burning through the scrub brush in the open space drainage to the northeast of the Project site, during extreme Santa Ana wind conditions. This fire is expected to burn at a moderate rate of spread (1.8 mph during sustained winds, 3.3 mph during gusts), produce moderate to high flame lengths (13 feet during sustained winds, 18.2 feet during gusts), and produce embers that could spot up to 1.2 miles during gusting winds. Given that this scenario was modeled exclusively in offsite fuels that will not be modified, the post-Project conditions would produce the same results.

Scenario 3 represents a fire burning downslope toward the Project, through the open space to the southeast of the Project site, burning through thick scrub brush during extreme Santa Ana wind conditions. This fire would be expected to burn at a moderate rate of spread (3.4 mph during sustained winds, 5.5 mph during gusts), produce very high flame lengths (32.5 feet during sustained winds, 40.5 feet during gusts), and has the potential to spot up to 2 miles during gusting winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (1.8 mph during sustained winds, 3.3 mph during gusts), produce moderate flame lengths (14 feet during sustained winds, 18.2 feet during gusts), and could produce embers that could spot up to 1.2 miles away.

Scenario 4 represents a fire burning downslope toward the Project, through the open space to the south of the Project site, burning through thick scrub brush during average summer wind conditions. This fire would be expected to burn at a low to moderate rate of spread (1.7 mph during sustained wind), produce high flame lengths (22.2 feet during sustained winds), and has the potential to spot 0.8 miles during sustained winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (0.8 mph during sustained winds), produce moderate flame lengths (9.1 feet during sustained winds), and could produce embers that could spot up to 0.4 miles away.

Post-Project

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 exterior of the Project structure. The Project site is not able to achieve 150 feet of defensible space onsite, but will utilize alternative fire prevention methods, such as the implementation of a heat deflecting wall along parts of the property boundary.

For modeling the onsite post-FMZ treatment condition, the fuel model assignment of onsite moderate load grass-shrub vegetation was re-classified according to the specific fuel's management (e.g., irrigated, fire resistive landscaping vs. 50% thinned native brush) treatment. Offsite fuels to the northeast and southeast are not currently proposed to be modified, so all offsite vegetation would produce the same pre- and post- Project results. If an ember were to ignite vegetation on the Project site following buildout conditions, in areas where onsite Zone 2 fuel modification will occur, flame lengths are modeled to be reduced to roughly 7.4 feet during sustained Santa Ana wind conditions (9.5 feet during gusts) and spread rates would decrease to 0.7 mph during sustained Santa Ana winds (1.2 mph during gusts). If a fire burning in Zone 2 were to spread into the onsite Zone 1 fuel modification, flame lengths are modeled to be reduced to roughly 2.7 feet during sustained Santa Ana winds (3.0 feet during gusting Santa Ana wind conditions) and spread rates would be reduced to 0.1 miles per hour during sustained Santa Ana wind conditions (0.2 mph during gusts). Overall, the conversion from unmaintained vegetation on the project site, to irrigated, maintained landscapes, would reduce wildfire flame lengths by up to 37 feet.

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, FMZs, 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 Ascend Specific Plan 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 Project 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 and the County 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 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, 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 partially in evacuation zone SDC – 0850, and partially in evacuation zone SDC - 0848. A complete map of all evacuation zones in the County can be accessed at:

<https://protect.genasys.com/location?z=14&latlon=33.10601315549589%2C-117.21502755027763>.

The City and County 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 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 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 Ascend Specific Plan Project can receive emergency notifications through Alert San Diego, the SD Emergency App, and City website, local radio station and social media platforms¹⁹.

- **Alert San Diego:** <http://www.readysandiego.org/AlertSanDiego/>
- **SD Emergency App:** <https://www.alertsandiego.org/en-us/preparedness/SDEmergencyApp.html>
- **San Marcos Website:** <https://www.san-marcos.net/>
- **San Marcos X:** <https://x.com/sanmarcocity>
- **San Marcos Facebook:** <https://www.facebook.com/sanmarcocity>
- **San Marcos Radio:** 1610 AM

¹⁹ <https://www.san-marcos.net/home/showpublisheddocument/15481/636205162115900000>

6 Conclusion

This FPP Letter Report for the Ascend Specific Plan Project evaluates the fire risk of the Project proposing up to 160 residential dwelling units. As described, CAL FIRE has designated the Project Area as a VHFHSZ; therefore, defensible space and ignition resistant construction compliance with the 2025 CWUIC is required. Defensible space measures will be provided around all structures throughout the proposed development. The requirements and recommendations provided in this FPP Letter Report have been designed specifically for the Project. This analysis and its fire protection approach is 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 5 of the 2025 CWUIC decreases the wildfire vulnerability of individual buildings, while defensible space between structures and open space prevents wildfire from contacting the Project through limiting combustible fuel pathways.

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 Letter Report 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 Letter Report 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,

TO: JASON NAILON
SUBJECT: FIRE PROTECTION PLAN - LETTER REPORT FOR ASCEND SPECIFIC PLAN PROJECT,
COUNTY OF SAN DIEGO, CALIFORNIA

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 FPP Letter Report and its conclusions.

Respectfully,

 _____ Prepared by (Signature)	<u>06/24/2026</u> _____ Date	<u>Austin Ott, Dudek, Fire Protection Planner</u> _____ Printed Name, Title
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_____ Project Applicant (Signature)	_____ Date	_____ Printed Name, Title
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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
Figure 6 – Fire Behavior Modeling Analysis
A – Photograph Log
B – Fire History Map
C – Undesirable Plant List
D – Fire Behavior Modeling

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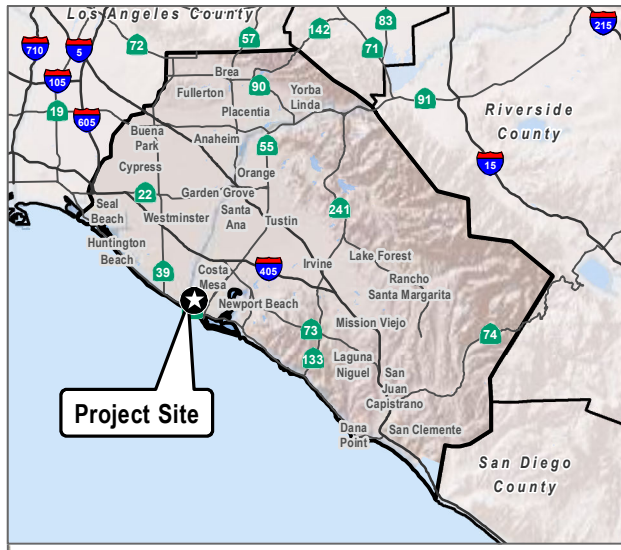
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SOURCE: SANGIS 2025; ESRI World Imagery

FIGURE 1
Project Location
 Ascend Condos Fire Protection Plan

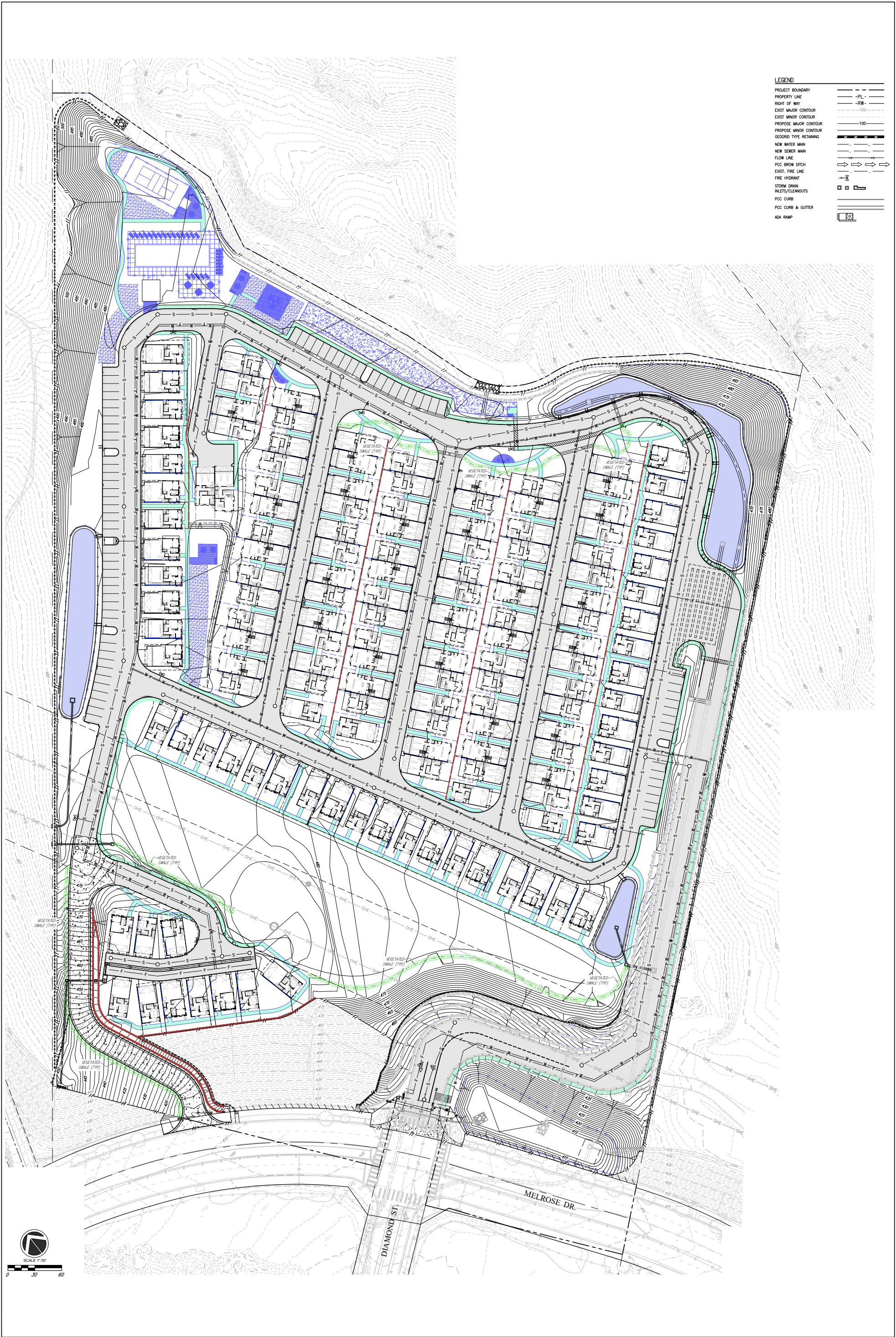
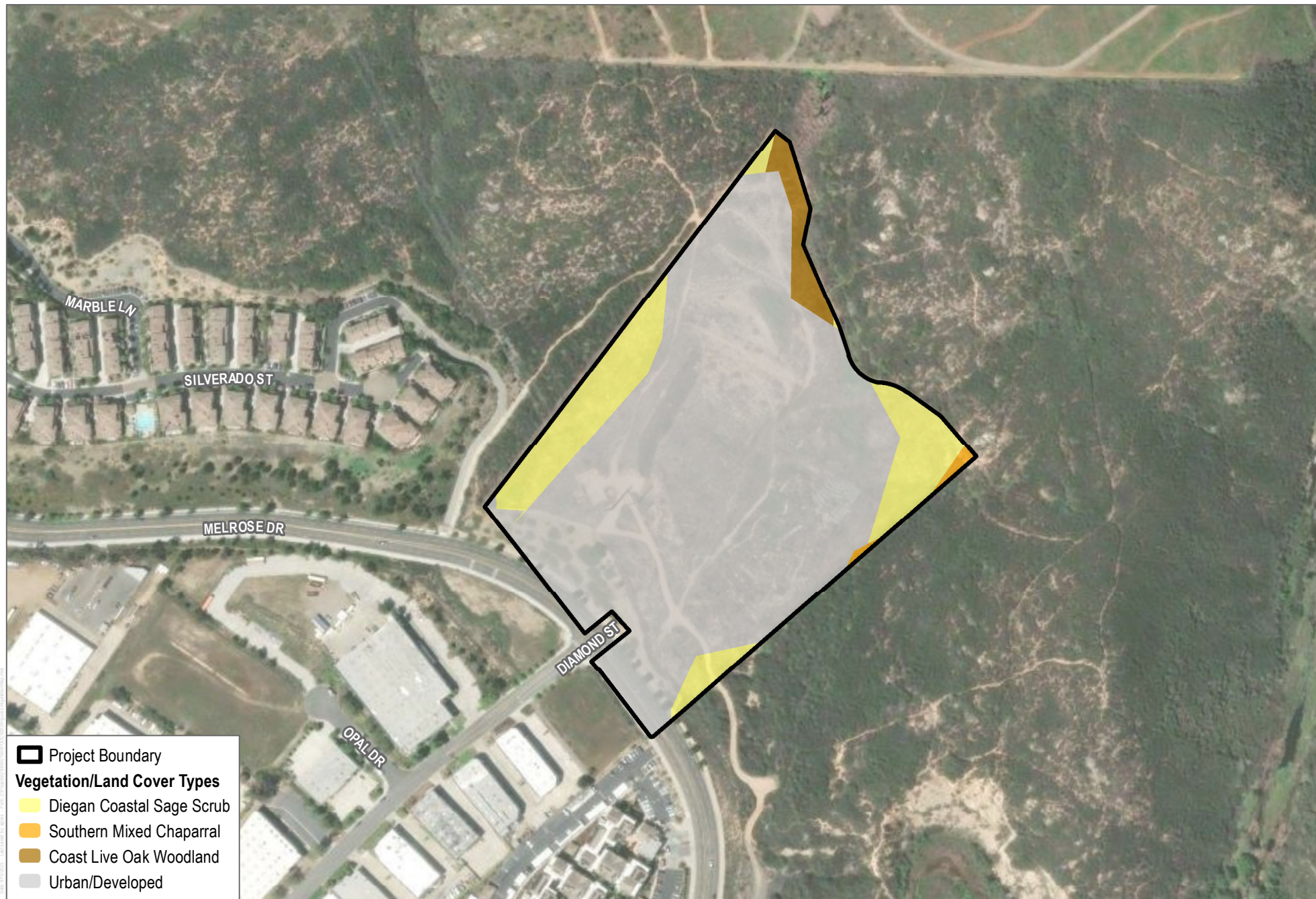
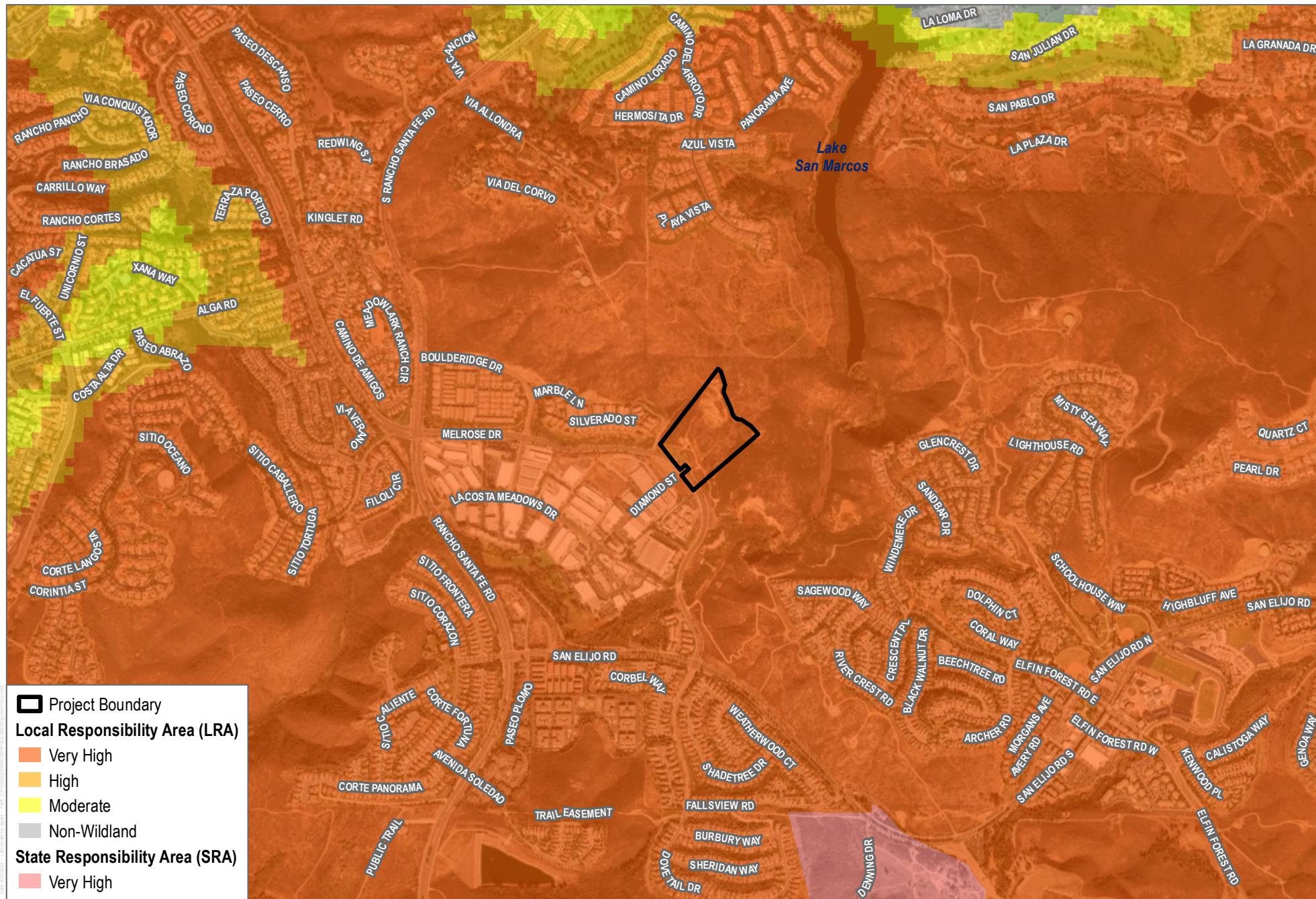


FIGURE 2
Site Plan

Ascend Condos Fire Protection Plan



SOURCE: SANGIS 2025; ESRI World Imagery



SOURCE: CALFIRE 2025; SANGIS; ESRI World Imagery

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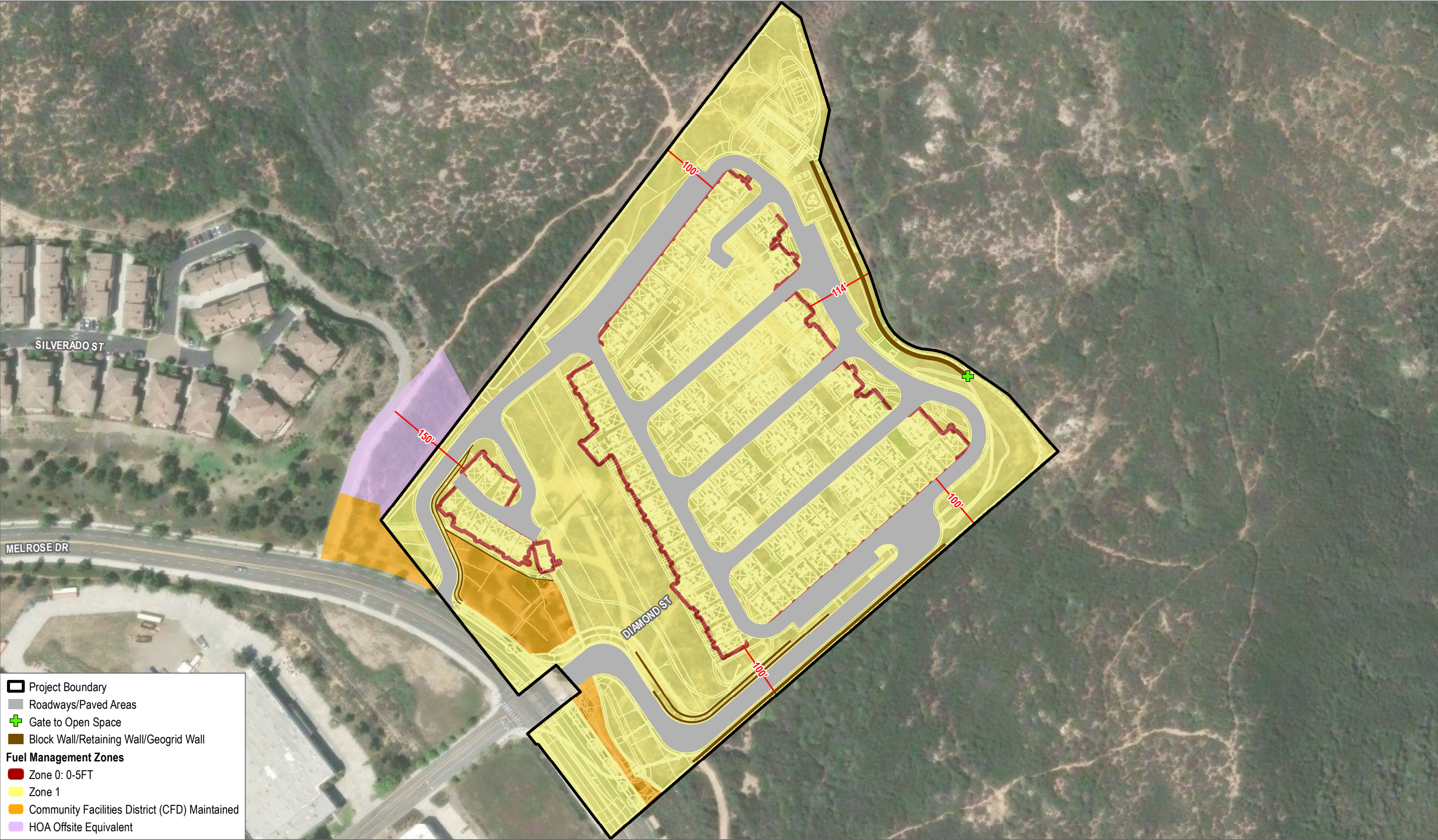


0 750 1,500 Feet

FIGURE 4

Cal Fire Hazard Severity Zones

Ascend Condos Fire Protection Plan



SOURCE: SANGIS 2025; ESRI World Imagery

FIGURE 5
Fuel Management Zones
Ascend Condos Fire Protection Plan

Date: 6/2/2025 User: qardner Path: Z:\Projects\17554\01\MapDocs\TheAscend\PP\TheAscend\Map Layout: Figure 4 Fire Behavior Scenario Analysis 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)
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GS2 (Onsite)	9.1	687	0.8	0.4
SH5 (Offsite)	22.3	4,827	1.7	0.8
Scenario 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Offsite)	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Onsite)	14.0 (18.2)	1,749 (3,128)	1.8 (3.3)	0.7 (1.2)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
GS2 (Onsite)	9.1	686	0.8	0.4
SH5 (Offsite)	22.2	4,816	1.7	0.8

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: (On and Offsite) Summer onshore wind from the S, 14% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	9.1	4,827	1.7	0.8
NB	N/A	N/A	N/A	N/A
Scenario 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2: Drainage Offsite	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
FM8: Zone 1 FMZ	2.7 (3.0)	50 (62)	0.1 (0.2)	0.2 (0.3)
SH1: Zone 2 FMZ	7.4 (9.5)	439 (765)	0.7 (1.2)	0.5 (0.7)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
NB	N/A	N/A	N/A	N/A
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	22.2	4,816	1.7	0.8
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 42 mph gusts.



SOURCE: Bing Imagery 2024; Open Street Map 2019

Attachment A

Photograph Log

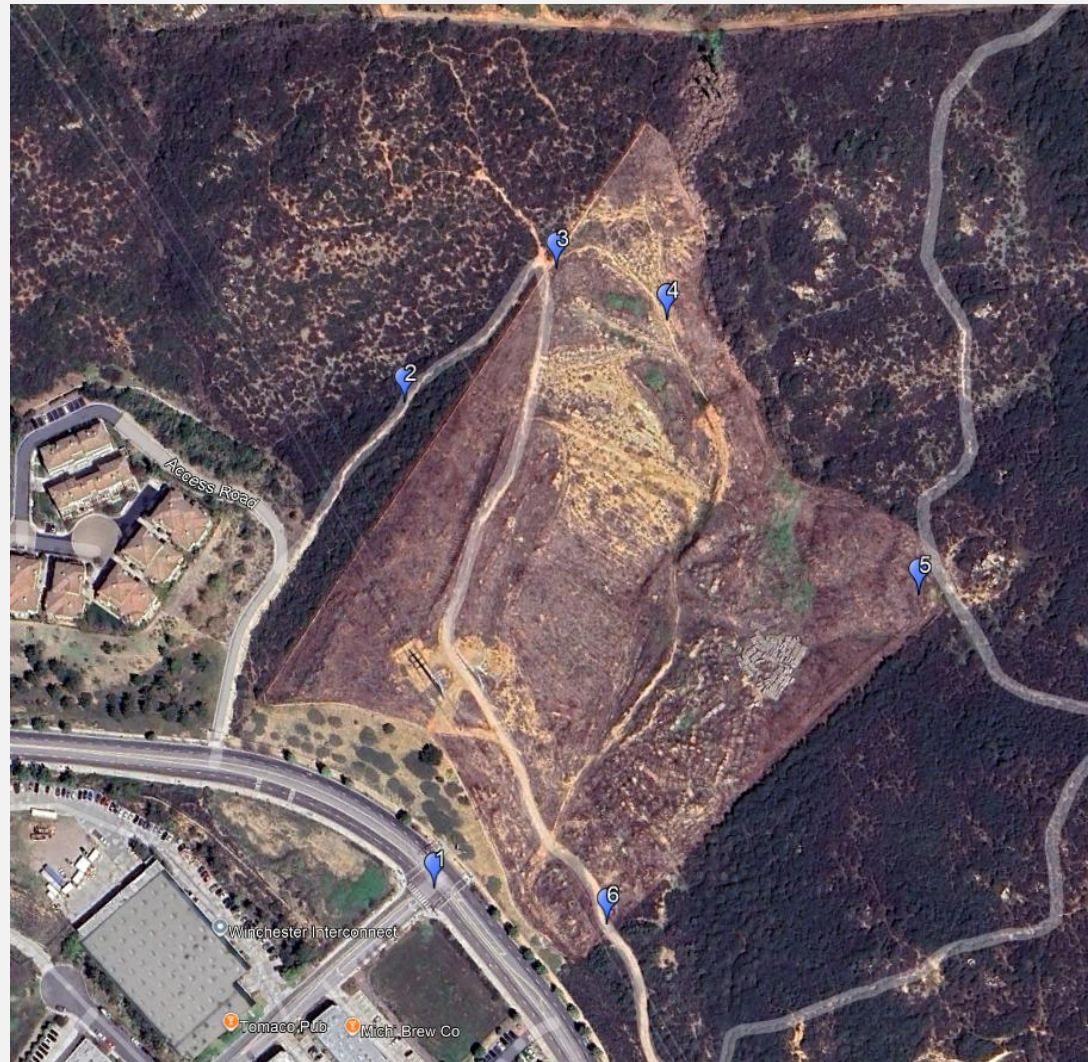


Photo Location Map



Photo 1. Photo Location 1 looking north



Photo 2. Photo Location 1 looking northeast



Photo 3. Photo Location 1 looking south



Photo 4. Photo Location 2 looking north



Photo 5. Photo Location 2 looking east



Photo 6. Photo Location 2 looking south



Photo 7. Photo Location 2 looking west



Photo 8. Photo Location 3 looking east



Photo 9. Photo Location 3 looking south



Photo 10. Photo Location 3 looking southwest



Photo 11. Photo Location 3 looking north



Photo 12. Photo Location 4 looking northeast



Photo 13. Photo Location 4 looking east



Photo 14. Photo Location 4 looking southeast



Photo 15. Photo location 5 looking north



Photo 16. Photo location 5 looking north east



Photo 17. Photo location 5 looking east



Photo 18. Photo location 5 looking southeast



Photo 19. Photo location 5 looking southwest



Photo 20. Photo location 5 looking west



Photo 21. Photo location 5 looking northwest



Photo 22. Photo location 5 looking north



Photo 23. Photo Location 6 looking northwest



Photo 24. Photo Location 6 looking north



Photo 25. Photo Location 6 looking east



Photo 26. Photo Location 6 looking southeast



Photo 27. Photo Location 6 looking south



Photo 28. Photo Location 6 looking northwest

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Attachment B

Fire History Map



SOURCE: CALFIRE 2025; SANGIS; ESRI World Imagery

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 150-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 150-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 californica - 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 humilis - 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 officinalis - Rosemary*
Tecoma capensis - Cape Honeysuckle*
Trachycarus fortunei - Windmill Palm*
Washingtonia 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
Erythrina 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
Podocarpus 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
Hymenoporum 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
Melaleuca nesophila	Pink Melaleuca	10	E
Myoporum laetum		10	E
Pittosporum undulatum	Victorian Box	10	E
Punica granatum	Pomegranate	10	D
Thevetia thevetiodes	Giant Thevetia	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>.

Attachment D

Fire Behavior Modeling Analysis

1 BehavePlus Fire Behavior Modeling History

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used as the industry standard for predicting fire behavior on a given landscape. That model, known as “BEHAVE”, was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus 6.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models’ ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Marsden-Smedley and Catchpole 1995, Grabner et. al. 1997, Alexander 1998, Grabner et al. 2001, Arca et al. 2007). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

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

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

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

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

2 Modeling Inputs

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the proposed development site in San Marcos, San Diego County, California. For this analysis, four pre-proposed Project scenarios were evaluated, including two average summer weather conditions (northwest and southwest of the proposed Project site) and two extreme weather offshore wind condition (north and northeast of the proposed Project site). Additionally, all of the scenarios were run for post-project conditions (two average and two extreme weather conditions respectively). The proposed Project site currently consists of disturbed habitat with grass and some shrubs onsite. The onsite topography is varied, and the site slopes downward toward the south, with the highest elevation in the northwestern portion of the Project site. With that said, fuels and terrain adjacent to the development area could produce flying embers that may affect the proposed Project, but defenses will be built into the structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels directly adjacent to and within fuel modification zones that could have the potential to affect the proposed Project’s structures from a radiant and convective heat perspective as well as from direct flame impingement, however, the ignition resistant structures would be surrounded by irrigated landscape and hardscape areas. BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles), crown fire flame length (feet), crown fire intensity (BTU/feet/second), crown fire spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the proposed Project site. In addition, data sources are cited and any assumptions made during the modeling process are described.

2.1 Vegetation (Fuels)

The seven fuel characteristics help define the 13 standard fire behavior fuel models and the five custom fuel models developed for Southern California (Anderson 1982; Weise & Regelbrugge 1997). According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which

fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

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

In addition, the aforementioned fuel characteristics were utilized in the development of 40 more fire behavior fuel models developed for use in BehavePlus modeling efforts (Scott & Burgan 2005). These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- Grass Models GR1 through GR9
- Grass-shrub Models GS1 through GS4
- Shrub Models SH1 through SH9
- Timber-understory Models TU1 through TU5
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

To support the fire behavior modeling efforts conducted for the proposed, a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and they were subsequently classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the site and proposed fuel modification zones (FMZ) are used for determining flame lengths and fire spread.

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GS2	Moderate load dry climate grass- shrub	Represents the vegetation in the areas offsite to the northeast and northwest.	1.5 ft
SH5	High load dry climate shrub	Chaparral surrounding Project site.	4-6 ft

Note:

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

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
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

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) ¹
GR1	Low load grassland	Fuel Modification Zone 2	1 ft
GS2	Moderate load dry climate grass-shrub	Grass/shrubs in drainage to the north of the Project site.	1.5 ft
SH5	High load dry climate shrub	Chaparral surrounding Project site.	4-6 ft

Note:

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

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope in the absence of wind. Flat terrain tends to have little effect on fire spread, resulting in fires that are driven by wind. The existing terrain on the site is sloping down toward the southwestern boundary, along Melrose Drive. Elevations at the Project site range from approximately 415 feet above mean sea level (amsl) to 505 feet amsl. The topography of the open space surrounding the Project hosts steep slopes up to 20% grade, and slopes downward toward the Project site.

2.3 Weather Analysis

Historical weather data for San Marcos was utilized in determining appropriate fire behavior modeling inputs for the proposed Project area. Average, on-shore (50th weather percentile and extreme off-shore (97th percentile) weather conditions were derived from Remote Automated Weather Stations (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. The Valley Center RAWS Station (Station 045734) was utilized to find average and extreme weather values for the proposed Project area. Data from fire seasons dating back to 2005 and up through 2025 were included in the analysis.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through December 31 for each year between 2005 and 2025 for 97th percentile weather conditions and from June 1 through September 30 for each year between 2005 and 2025 for 50th percentile weather conditions.

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

Weather and wind inputs for fire behavior modeling conducted in support of this FPP utilized the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use (County of San Diego 2022a). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed 44 years of fire weather data from fire stations

and Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

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

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	0-4 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July
Time of Day	12:00 - 13:59	12:00 - 13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	0-30%	0-30%
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. Wind and Weather Input Variables

Model Variable	Summer Weather (50 th Percentile) On and Offshore Wind	Peak Weather (97 th Percentile) Offshore Wind
Fuel Models	GS2, SH5	GS2, SH5
1 h fuel moisture	3%	2%
10 h fuel moisture	6%	3%
100 h fuel moisture	8%	6%
Live herbaceous moisture	36%	30%
Live woody moisture	72%	60%
20 ft. wind speed	19 mph	28 mph sustained, 41 mph gusts
Wind Directions from north (degrees)	292	67
Wind adjustment factor	0.4	0.4
Slope	10-15%	5-20%

3 Fire Behavior Modeling Efforts

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the proposed Project site. Four focused scenarios were completed for pre-Project existing fuels conditions, and three were completed for the post proposed Project conditions. The results of the modeling effort included anticipated values for surface fires flame length (feet), rate of spread (mph), fireline intensity (Btu/ft/s), and spotting distance (miles). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. Four (4) pre-Project and post-Project fire modeling scenario locations were selected to better understand the different fire behavior that may be experienced on or adjacent to the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

Pre-Project Conditions On/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning in the open space northwest of the Project site with average summer winds (19 mph) being fueled offsite by scrub brush, and onsite as it burns through small shrubs and disturbed habitats.
- **Scenario 2.** Fire flaming front burning onto the Project site from the drainage to the north, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by grass and scrub brush.
- **Scenario 3.** Fire flaming front burning onto the Project site from the open space to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by scrub brush, and onsite as it burns through small shrubs and disturbed habitats.
- **Scenario 4.** Fire flaming front burning in the open space southeast of the Project site with average summer winds (19 mph) being fueled by scrub brush and onsite as it burns through small shrubs and disturbed habitats.

Post-Project Conditions On/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning in the open space northwest of the Project site with average summer winds (19 mph) being fueled offsite by scrub brush, and onsite as it burns through irrigated and maintained vegetation.
- **Scenario 2.** Fire flaming front burning onto the Project site from the drainage to the north, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by grass and scrub brush.
- **Scenario 3.** Fire flaming front burning onto the Project site from the open space to the northeast, with extreme Santa Ana winds (28 mph sustained, 41 mph gusts) being fueled offsite by scrub brush and onsite as it burns through irrigated and maintained vegetation.
- **Scenario 4.** Fire flaming front burning in the open space southeast of the Project site with average summer winds (19 mph) being fueled by scrub brush and onsite as it burns through irrigated and maintained vegetation.

4 Fire Behavior Modeling Results

The results of the fire behavior modeling conducted for this Project are presented in Table 6.

Pre-Project

Scenario 1 represents a fire burning upslope toward the Project, through the open space to the northwest of the Project site, burning through thick scrub brush during average summer wind conditions. This fire would be expected to burn at a low to moderate rate of spread (1.7 mph during sustained wind), produce high flame lengths (22.3 feet during sustained winds), and has the potential to spot 0.8 miles during sustained winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (0.8 mph during sustained winds), produce moderate flame lengths (9.1 feet during sustained winds), and could produce embers that could spot up to 0.4 miles away.

Scenario 2 represents a fire burning through the scrub brush in the open space drainage to the northeast of the Project site, during extreme Santa Ana wind conditions. This fire is expected to burn at a moderate rate of spread (1.8 mph during sustained winds, 3.3 mph during gusts), produce moderate to high flame lengths (13 feet during sustained winds, 18.2 feet during gusts), and produce embers that could spot up to 1.2 miles during gusting winds. Given that this scenario was modeled exclusively in offsite fuels that will not be modified, the post-Project conditions would produce the same results.

Scenario 3 represents a fire burning downslope toward the Project, through the open space to the southeast of the Project site, burning through thick scrub brush during extreme Santa Ana wind conditions. This fire would be expected to burn at a moderate rate of spread (3.4 mph during sustained winds, 5.5 mph during gusts), produce very high flame lengths (32.5 feet during sustained winds, 40.5 feet during gusts), and has the potential to spot up to 2 miles during gusting winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (1.8 mph during sustained winds, 3.3 mph during gusts), produce moderate flame lengths (14 feet during sustained winds, 18.2 feet during gusts), and could produce embers that could spot up to 1.2 miles away.

Scenario 4 represents a fire burning downslope toward the Project, through the open space to the south of the Project site, burning through thick scrub brush during average summer wind conditions. This fire would be expected to burn at a low to moderate rate of spread (1.7 mph during sustained wind), produce high flame lengths (22.2 feet during sustained winds), and has the potential to spot 0.8 miles during sustained winds. Once the fire reaches the scattered low load grass-shrub onsite, the spread rates would decrease (0.8 mph during sustained winds), produce moderate flame lengths (9.1 feet during sustained winds), and could produce embers that could spot up to 0.4 miles away.

Post-Project

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 exterior of the Project structure. The Project site is not able to achieve 150 feet of defensible space onsite, but will utilize alternative fire prevention methods, such as the implementation of a heat deflecting wall along parts of the property boundary.

For modeling the onsite post-FMZ treatment condition, the fuel model assignment of onsite moderate load grass-shrub vegetation was re-classified according to the specific fuel's management (e.g., irrigated, fire resistive landscaping vs. 50% thinned native brush) treatment. Offsite fuels to the northeast and southeast are not currently proposed to be modified, so all offsite vegetation would produce the same pre- and post- Project results. If an ember were to ignite vegetation on the Project site following buildout conditions, in areas where onsite Zone 2 fuel modification will occur, flame lengths are modeled to be reduced to roughly 7.4 feet during sustained Santa Ana wind conditions (9.5 feet during gusts) and spread rates would decrease to 0.7 mph during sustained Santa Ana winds (1.2 mph during gusts). If a fire burning in Zone 2 were to spread into the onsite Zone 1 fuel modification, flame lengths are modeled to be reduced to roughly 2.7 feet during sustained Santa Ana winds (3.0 feet during gusting Santa Ana wind conditions) and spread rates would be reduced to 0.1 miles per hour during sustained Santa Ana wind conditions (0.2 mph during gusts). Overall, the conversion from unmaintained vegetation on the project site, to irrigated, maintained landscapes, would reduce wildfire flame lengths by up to 37 feet.

Table 5. 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: (On and Offsite) Summer onshore wind from the S, 14% slope, 19 mph sustained winds				
GS2 (Onsite)	9.1	687	0.8	0.4
SH5 (Offsite)	22.3	4,827	1.7	0.8
Scenario 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Offsite)	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
GS2 (Onsite)	14.0 (18.2)	1,749 (3,128)	1.8 (3.3)	0.7 (1.2)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
GS2 (Onsite)	9.1	686	0.8	0.4
SH5 (Offsite)	22.2	4,816	1.7	0.8

Note:

¹ Wind-driven surface fire.

² Values in parentheses represent the respective output in the presence of 42 mph gusts.

Table 6. 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: (On and Offsite) Summer onshore wind from the S, 14% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	9.1	4,827	1.7	0.8
NB	N/A	N/A	N/A	N/A

Table 6. 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 2: (Offsite) Extreme Santa Ana winds from the N/NE, 6% slope, 28 mph sustained winds (41 mph gusts)				
GS2: Drainage Offsite	13. (18.2)	1,739 (3,119)	1.8 (3.3)	0.7 (1.2)
Scenario 3: (On and Offsite) Extreme Santa Ana winds from the N/NE, 18% slope, 28 mph sustained winds (41 mph gusts)				
FM8: Zone 1 FMZ	2.7 (3.0)	50 (62)	0.1 (0.2)	0.2 (0.3)
SH1: Zone 2 FMZ	7.4 (9.5)	439 (765)	0.7 (1.2)	0.5 (0.7)
SH5 (Offsite)	32.5 (40.5)	11,014 (17,689)	3.4 (5.5)	1.3 (2.0)
NB	N/A	N/A	N/A	N/A
Scenario 4: (On and Offsite) Summer onshore wind from the S, 11% slope, 19 mph sustained winds				
FM8: Zone 1 FMZ	1.9	23	0.1	0.1
SH1: Zone 2 FMZ	4.0	117	0.3	0.2
SH5 (Offsite)	22.2	4,816	1.7	0.8
NB	N/A	N/A	N/A	N/A

Notes:¹ Wind-driven surface fire.² Values in parentheses represent the respective output in the presence of 42 mph gusts.

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 5 and 6:

Surface Fire:

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

The information in Table 7 presents an interpretation of the outputs for five fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 5 and 6. Identification of modeling run locations is presented graphically in Figure 6 of the FPP.

Table 7. Fire Suppression Interpretation

Flame Length (ft)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4 feet	Under 100 BTU/ft/s	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.

Table 7. Fire Suppression Interpretation

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