FIRE PROTECTION PLAN
SIERRA FARMS PROJECT

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1 EXECUTIVE SUMMARY

This Fire Protection Plan (FPP) has been prepared for the Sierra Farms Project (Proposed Project) in northern San Diego County. This FPP evaluates and identifies the potential fire risk associated with the proposed project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, fire protection systems, and wildfire emergency pre-planning, among other pertinent fire protection criteria. It is important to note that the Proposed Project is included in the proposed Newland Sierra development which is located primarily in the Deer Springs Fire Protection District except for the Sierra Farms property that is within the San Marcos Fire Protection District's (SMFPD) jurisdiction. Therefore, the purpose of this plan is to generate and memorialize the fire safety requirements of the SMFPD along with project-specific measures based on the site, its intended use, and its fire environment.

This document provides analysis of the site's fire environment and its potential impact on the proposed Project as well as the Project's potential impact on the existing fire protection services provided by San Marcos Fire Department (SMFD), which serves the fire district. This document will be incorporated as a technical appendix of the Newland Sierra development Environmental Impact Report. Requirements and recommendations herein are based on site-specific fire environment and proposed project characteristics, and incorporate input from SMFD's Prevention Bureau, area fire planning documents, site risk analysis, and standard principles of fire protection planning.

As determined during the analysis of this site and its fire environment, the Sierra Farms site, in its current condition, is considered to include characteristics that, under favorable conditions, have the potential to facilitate fire spread. Under extreme conditions, wildfires from the northeast could burn downslope towards the site and result in significant ember production. Once the project is built, the on-site fire potential will be lower than its current condition due to conversion of wildland fuels to managed landscapes, improved accessibility to fire personnel, and structures built to the latest ignition resistant codes. The developed portion of this property is proposed for improvements that include construction of a community garden, approximately 65 parking spaces, fitness and picnic nodes, a designated maintenance area with storage shed, a private community building with covered patio and turf area, and vineyards.

The entire site has been designed with fire protection as a key objective. The site improvements are designed to facilitate emergency apparatus and personnel access throughout the site. Driveway and road improvements with fire engine turnarounds provide access to within 150 feet of all sides of every building. Water availability and flow will be consistent with SMFPD requirements including fire flow and hydrant distribution. These features along with the ignition resistance of all buildings, interior sprinklers, and pre-planning, training and awareness will assist

responding firefighters through prevention, protection and suppression capabilities. As described in this FPP, the project will meet or exceed all applicable Code requirements with the exception of minor modifications to the fuel management areas adjacent to the community center and maintenance shed. Where fuel management areas are proposed for width reductions, scientifically based alternative forms of protection will be provided.

Early evacuation for any type of wildfire emergency at the Proposed Project is the preferred method of providing for resident safety, consistent with the SMFPD's current approach for other communities and neighborhoods within the District. As such, Newland Sierra's Homeowner's Association (HOA) will formally adopt, practice, and implement a "Ready, Set, Go!" (International Fire Chiefs Association 2013) approach to site evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the state of California and most fire agencies. Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing potential for errors, maintaining the site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and site uses during periods of fire weather extremes.

Based on the results of this FPP's analysis and findings, the following FPP implementation measures will be provided by the Sierra Farms project as part of the proposed development plan. These measures are discussed in more detail throughout this FPP.

1. Project buildings will be constructed of ignition resistant construction materials based on the latest Building and Fire Codes. Both the proposed shed and private community building will incorporate 2 hour rated walls in lieu of a standard 150 feet wide fuel modification zone.
2. Fuel Modification will be provided throughout the Proposed Project site, not just on the perimeter. This is important as it eliminates susceptible fuels within the property and minimizes potential ember spot fires on site. Maintenance will occur as needed and the HOA will annually hire a 3rd party, qualified Fuel Modification Zone inspector to provide twice yearly (June 1 and October 1) certification that it meets the requirements of this FPP.
3. Fire apparatus access roads will be provided in the park and maintenance area and will vary in width and configuration, but will all provide at least the minimum required unobstructed travel lanes, lengths, turnarounds, parking spaces, and clearances.
4. Water capacity and delivery provide for a reliable water source for operations and during emergencies requiring extended fire flow.

5. A site-specific evacuation plan will be prepared for the project as part of the plan prepared for the proposed Newland Sierra project and will include input and coordination with SMFPD.
6. The Community HOA will include an outreach and educational role to coordinate with SMFPD, oversee landscape committee enforcement of fire safe landscaping, ensure fire safety measures detailed in this FPP have been implemented, educate residents from the Newland Sierra development on and prepare facility-wide "Ready, Set, Go!" plans.

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2 INTRODUCTION

This FPP has been prepared for the Proposed Project. The purpose of the FPP is to evaluate the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those risks to a level consistent with City thresholds. Additionally, this plan generates and memorializes the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the SMFPD.

As part of the assessment, this plan has considered the property location, topography, combustible vegetation (fuel types), climatic conditions, and fire history. The plan addresses water supply, access, structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. We have identified fuel reduction treatments and recommend the types and methods of treatment that will protect the Sierra Farms visitors, and infrastructure. The plan recommends measures that the newly formed homeowner's association (Newland Sierra HOA) will take to reduce the probability of structure ignition throughout the area addressed by the plan.

The following tasks were performed toward completion of this plan:

- Gather site specific climate, terrain, and fuel data;
- Process and analyze the data using the latest Geographical Information System technology;
- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment;
- Analyze and guide design of proposed infrastructure;
- Analyze the existing emergency response capabilities;
- Assess the risk associated with the Proposed Project and site;
- Collect site photographs and map fuel conditions using 200-scale aerial images. Field observations were utilized to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Appendix A provides representative photographs of existing site conditions.
- Prepare this FPP detailing how fire risk will be mitigated through a system of fuel modification, structural ignition resistance enhancements, and fire protection systems.

2.1 Proposed Project Summary

2.1.1 Location

The Proposed Project is located in the northern portion of Twin Oaks Valley of northern San Diego County, California (Figure 1). Specifically, the project site encompasses approximately

7.05 acres which is bound by Deer Springs Place on the east; by Deer Springs Road (S12) on the south; and by Sarver Lane on the west. Interstate 15 (I-15) is located approximately 1.2 miles east of the Proposed Project site. The nearest urban developed area is the City of San Marcos which occurs roughly 1.0 mile to the south of the project site. The Project lies within Township 11 south, Range 3 west in portions of the Southern half of Section 24 and the Northern half of Section 25 of the San Marcos, U.S. Geographical Survey 7.5-minute quadrangle.

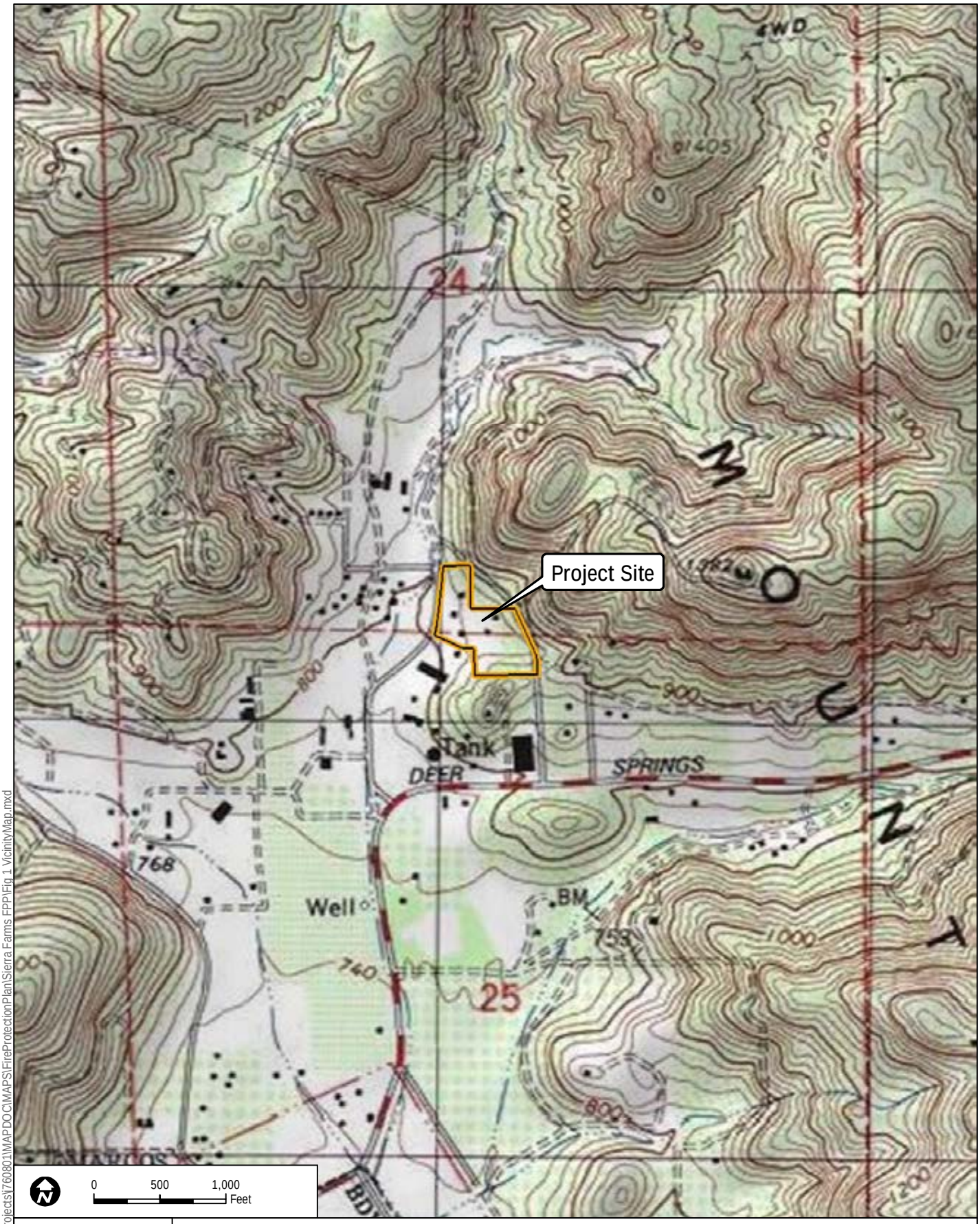
The Proposed Project site is located on the following Assessor Parcel Numbers: 178-222-16, 182-020-28, 182-020-29, and 182-040-69.

2.1.2 Project Description

The Proposed Project consists of a rustic park that will create a westerly gateway to the proposed Newland Sierra master-planned community. Park amenities include an open lawn area, picnic area, fitness node, community garden, vineyards, and a multi-purpose building (4,636 ft^2) that could be used for community or private events. A Newland Sierra HOA green waste compost area with a 600 ft^2 shed is proposed within the maintenance area. The green waste compost area is intended to be used for landscape trimmings from common area landscapes. Figure 3 provides the project's site plan, including roads and access points off of Sarver Lane.

2.2 Applicable Codes/Existing Regulations

This FPP demonstrates that the Proposed Project will be in compliance with applicable portions of the City of San Marcos (City) Municipal Code, Chapter 17.64-Fire Code, and City Ordinance 2014-1385. The project will also be consistent with the 2013 California Building Code (CBC), Chapter 7A, 2013 California Fire Code (CFC), Chapter 49, as adopted by the City. Chapter 7A of the California Building Code focuses primarily on preventing ember penetration into structures, a leading cause of structure loss from wildfires. Thus, it is an important component of the requirements of this FPP given the Project's wildland urban interface (WUI) location, which is within an area statutorily designated in the City's Municipal Code, Section 17.64.200(5) and illustrated in Figure 2, as Moderate Fire Hazard Severity Zone (FHSZ). WUI areas outside the district's sphere of influence have been designated as Very High FHSZs by the California Department of Forestry and Fire Protection (CAL FIRE 2014). Fire hazard designations are based on topography, vegetation, and weather, amongst other factors with more hazardous sites including steep terrain, unmaintained fuels/vegetation, and wildland urban interface (WUI) locations. As described in this FPP, the project will meet or exceed applicable Code requirements, except for fuel modification zones (FMZ) around community building and maintenance shed which don't achieve standard 150-foot FMZ widths.



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SOURCE: USGS 7.5-Minute Series Quadrangle; Fuscoe 2016

FIGURE 1
Vicinity Map

Sierra Farms Fire Protection Plan

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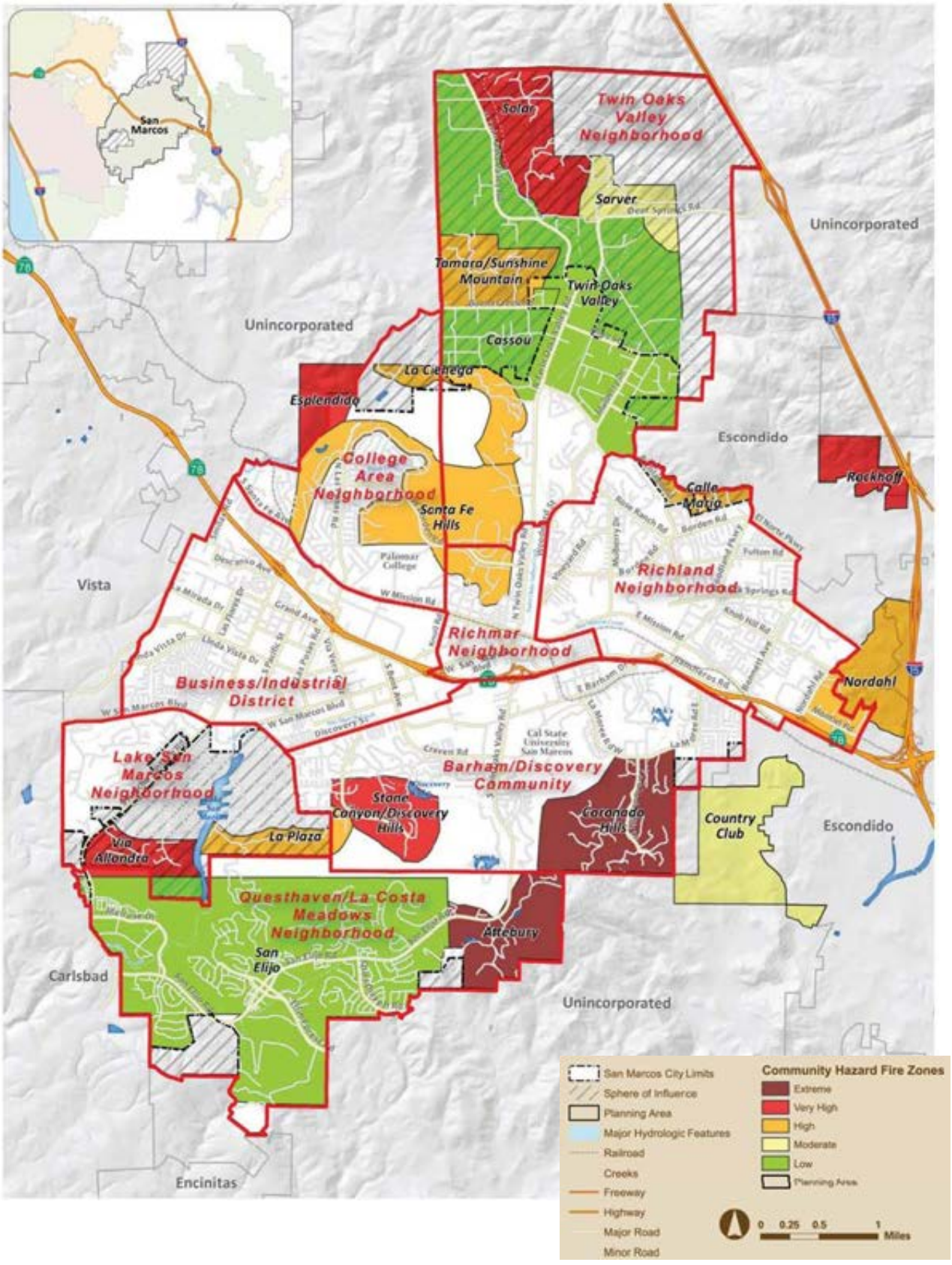

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SOURCE: City of San Marcos

FIGURE 2

City of San Marcos Fire Hazard Severity Zones

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Sierra Farms Fire Protection Plan

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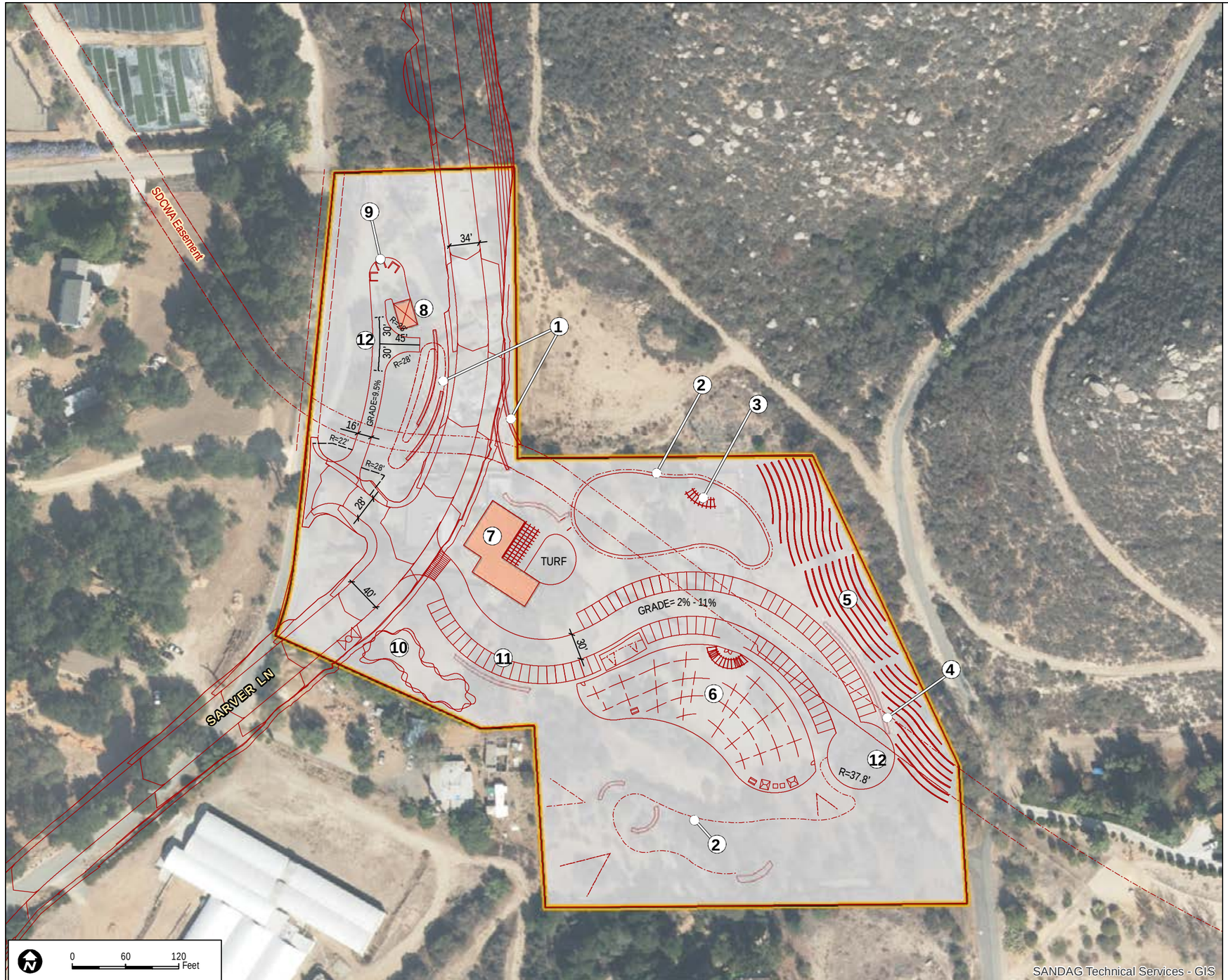

Legend

- Project Site
- Building

1. Community Entry Monument Signs
2. 6-Ft wide Decomposted Granite Trail
3. Picnic Node with Seating and Trash
4. Stone Wall
5. VineyardS
6. Community Garden
7. Private Community Building with Covered Patio
8. Maintenance Area with Storage Shed
9. Composting Area for HOA Greenwaste
10. Bioswale
11. Parking Spaces (+/- 65 spaces)
12. Fire Department Turnaround

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SOURCE: IMAGERY-SANDAG IMAGERY 2014; DESIGN-SCHMIDTT DESIGN 2016

FIGURE 3

Proposed Project Site Plan

Sierra Farms Fire Protection Plan

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3 PROPOSED PROJECT SITE RISK ANALYSIS

3.1 Field Assessment

Following extensive review of available digital site information, including topography, vegetation types, fire history, and the Proposed Project's site plan, Dudek fire protection planners conducted a field assessment of the Proposed Project on February 12, 2016, in order to confirm digital data and fill any identified data gaps. Among the field tasks that were completed are:

- Vegetation estimates and mapping refinements
- Fuel load analysis
- Topographic features documentation
- Photograph documentation
- Confirmation/verification of hazard assumptions
- Ingress/egress documentation.

Site photographs (See Appendix A, Representative Photographs) were collected and fuel conditions were mapped using 200-scale aerial images. Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the requirements provided in this FPP.

3.2 Site Characteristics and Fire Environment

The following sections discuss the characteristics within and surrounding the Proposed Project site. The intent of evaluating site conditions is to provide a better understanding of the fire environment, which is not constrained by property boundary delineations.

3.2.1 Topography

The Proposed Project site is situated at the northern portion of Twin Oaks Valley and at the base of the central portion of the Merriam Mountains. The Merriam Mountain range is a narrow chain of low mountains generally trending north–south with a variety of east–west trending ridgelines and scattered peaks. These mountains originate near the northern portions of City of Escondido and are bordered by Gopher Canyon Road to the north, I-15 to the east, and Twin Oaks Valley Road to the west. The project vicinity is composed of relatively flat terrain in the valley and moderate to steeply sloping terrain up a southwest aspect on the Merriam Mountain range. Elevations on the site range from 800 feet above mean sea level (AMSL) near the southwest corner of the property to roughly 860 feet AMSL in the north-eastern portion of the property. The entire property slopes downward towards Sarver Lane with gradients between 5% and 7%.

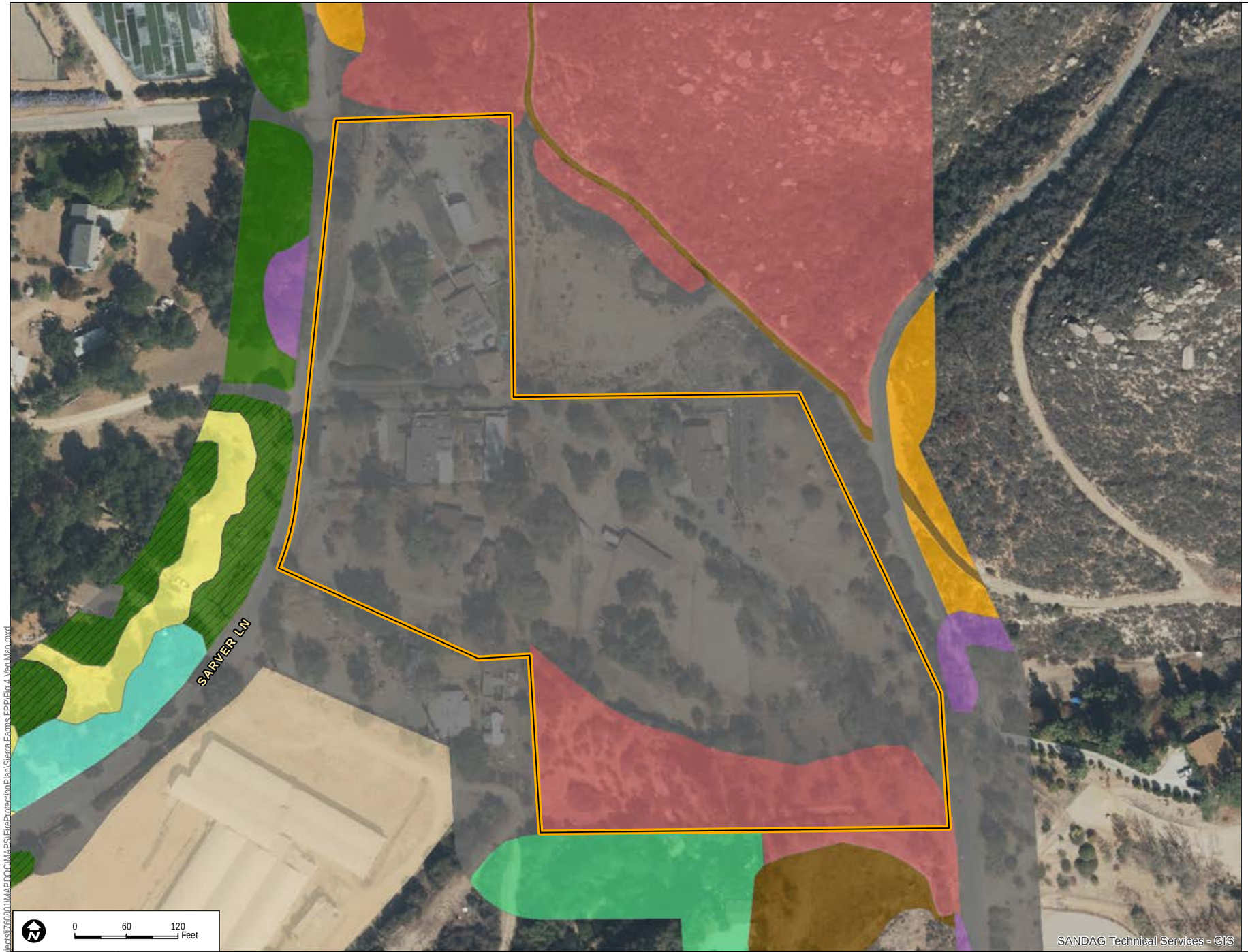
3.2.2 Existing/Vicinity Land Use

The Proposed Project site is currently comprised of private residential homes. The Project Area consists of developed land and naturally vegetated slopes adjacent to the northeastern corner. The surrounding land uses to the north, west, and south of the project site include large-lot, single-family residences and avocado groves, commercial uses such as several plant nurseries; Saint Mark's Mission Church, Hidden Valley Zen Center, and equestrian boarding and training facilities. Existing land uses to the east and northeast of the site include large-lot single-family residences and vacant parcels with some parcels being developed as part of the Newland Sierra master-planned community. A 66-inch San Diego County Water Authority underground pipeline easement runs through the site. Sarver Lane is located on the western portion of the Proposed Project site. Existing pavement widths on Sarver Lane vary from 28 feet along the St. Mark's Mission Church property (southern portion of Sarver Lane) to 16 feet north of the Church property.

3.2.3 Vegetation (Fuels)

The Proposed Project site is currently classified as urban/developed. The adjacent properties support a variety of vegetation types, including agriculture, Coast live oak (*Quercus agrifolia*) woodlands, disturbed habitat, non-native grasslands, and Southern mixed chaparral, that have been surveyed and mapped and remapped by Dudek over a span of 10 years between 2000 and 2015 (Dudek 2016). The Proposed Project's vegetation and land coverage is illustrated in Figure 4 and briefly described below.

Once completed, the area proposed for development will be converted to a community park with several amenities and landscape vegetation. Any native vegetative fuels within fuel modification zones will also be modified as a result of development, altering their current densities, distributions, and species composition. Areas within the sphere of influence for direct fire affects (approximately 300 feet outside of proposed development and fuel modification zones) will continue to be grasslands, oak woodlands, and chaparral. These vegetation types were confirmed by a Dudek fire protection planner in the field and assigned fuel models for use during fire behavior modeling (see Section 4.2.2.1: BehavePlus Fuel Model Inputs). These fuels are anticipated to remain in the areas adjacent to the project footprint (just outside the fuel modification zones), and represent the fuels that could potentially burn and encroach toward the Sierra Farms fuel modification area. This FPP outlines measures that plan for this occurrence and compensate for it through a system of fire protection.



Project Site

Vegetation/Land Cover Type (Fuel Model)

- Agriculture (TL3)
- Eucalyptus Woodland (TL6)
- Urban/Developed (0)
- Disturbed Habitat (GR4)
- Orchard (TL6)
- Non-native Grassland (GR4)
- Coastal Sage Scrub (SH2)
- Southern Mixed Chaparral (SH5)
- Coast Live Oak Woodland (TL6)
- Coast Live Oak Woodland (disturbed) (TL6)
- Non-native Woodland (TL6)

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SOURCE: IMAGERY-SANDAG IMAGERY 2014; VEGETATION-DUDEK 2015

FIGURE 4

Site Vegetation Map

Sierra Farms Fire Protection Plan

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3.2.3.1 Site Vegetation and Land Cover Type Descriptions

The following descriptions are adapted from the site's Draft Biological Resources Report (Dudek 2016).

Agriculture. Agriculture lands supporting active or historical agricultural operation occur to the south of the site.

Coast Live Oak Woodland. Coast live oaks occur in small groupings on both sides of Sarver Lane and in the southern portion of the site.

Disturbed Habitat. This category consists of permanently disturbed land cover consisting of small areas, including adjacent properties to the south.

Non-Native Grassland. This vegetation is primarily located in an area termed the linear "meadow" (north of Sarver Lane). Biologically, it is not a meadow, but rather an open field of non-native grasses and forbs, largely ripgut grass (*Bromus diandrus*). Within the site, the inner meadow is largely covered by weedy non-native grasses, is surrounded by a perimeter dirt road, and has another dirt road diagonally crossing it from southwest to northeast. Grasslands also occur along the west side of Sarver Lane between Deer Springs Road and Country Garden Lane.

Southern Mixed Chaparral. The hillsides north and east of the site are largely covered by Southern mixed chaparral that varies from an almost pure "Chamisal" of chamise (*Adenostoma fasciculatum*) to a mountain-mahogany-dominated type (*Cercocarpus minutiflorus*) in the deeper soil of inner valleys. The indicators of the more widespread Southern mixed chaparral chamise, mission manzanita (*Xylococcus bicolor*), black sage (*Salvia mellifera*), and Ramona wild-lilac (*Ceanothus tomentosus*). The extent of exposure, soil depth, and slope affect the extent of the diversity of the chaparral. One major characteristic of the chaparral vegetation is its level of maturity. This Mediterranean climate–associated vegetation is highly correlated with periodic fires that recycle the surface load of organic material and nutrients back into a nutrient-poor soil system. The fires also allow the cycling of a major suite of annual native wildflowers and stimulate the regrowth of the major shrubs in the region from subsurface specialized stems. Much of the chaparral in the Merriam Mountains has not burned in over 100 years.

Urban/Developed. Developed areas support no native vegetation and may be additionally characterized by the presence of man-made structures, such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species occur.

3.2.4 Vegetation Dynamics

The vegetation characteristics described above and presented in Table 1 are used to model fire behavior, discussed in Section 4.2 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, the native shrub species that compose the chaparral communities on site are considered to be less likely to ignite, but would exhibit higher potential hazard (higher intensity heat and flame length) than grass dominated plant communities (fast moving, but lower intensity) if ignition occurred. The corresponding fuel models for each of these vegetation types are designed to capture these differences. Additionally, vegetative cover influences fire suppression efforts through its effect on fire behavior. For example, while fires burning in grasslands may exhibit lower flame lengths and heat outputs than those burning in native shrub habitats, fire spread rates in grasslands are often more rapid.

As described, vegetation plays a significant role in fire behavior, and is an important component to the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high frequency fires tend to convert shrublands to grasslands or maintain grasslands, while fire exclusion tends to convert grasslands to shrublands, over time. In general, biomass and associated fuel loading will increase over time, assuming that disturbance (fire, grazing) or fuel reduction efforts are not diligently implemented. It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed fuel modification zones on site. The fuel modification zones on this site will consist of irrigated and maintained landscapes as well as thinned native fuel zones that will be subject to regular “disturbance” in the form of maintenance and will not be allowed to accumulate excessive biomass over time, which results in reduced fire ignition, spread rates, and intensity.

Conditions adjacent the project’s footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are classified as medium to heavy fuel loads due to the dominance of chaparral fuels on the hillside to the northeast of the site.

3.2.5 Climate

North San Diego County and the project area 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 2014a). 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 (WRCC 2014a). The average high temperature for the project area is approximately 75.9°F, with average highs in the summer and early fall months (July–October) reaching 88.2°F. The average precipitation for the area is approximately 16.2 inches per year, with the majority of rainfall concentrated in the months of December (2.7 inches), January (3.2 inches), February (3.1 inches), and March (2.7 inches), while smaller amounts of rain are experienced during the other months of the year (WRCC 2014b).

The prevailing wind pattern is from the west (on-shore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea) and at night winds are from the northeast (land), averaging 2 miles per hour (mph). During the summer season, the diurnal winds may average slightly higher (approximately 16 mph) than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds.

The project area's climate has a large influence on the fire risk as drying vegetation during the summer months becomes fuel available to advancing flames should an ignition be realized. Typically the highest fire danger is produced by the high-pressure systems that occur in the Great Basin, which result in the Santa Ana winds of Southern California. Sustained wind speeds recorded during recent major fires in San Diego County exceeded 30 mph and may exceed 50 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. Consequently, peak velocities are highest at the mouths of canyons and dissipate as they spread across valley floors. Santa Ana winds generally coincide with the regional drought period and the period of highest fire danger. The Sierra Farms Park is affected by Santa Ana winds from the north and east of the site. The slopes are generally in alignment with the extreme Santa Ana wind events, which can influence fire spread by creating wind-driven fires.

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4 ANTICIPATED FIRE BEHAVIOR

4.1 Fire History

Fire history is an important component of an FPP. Fire history information can provide an understanding of fire frequency, fire type, most vulnerable project areas, and significant ignition sources, amongst others. Appendix B – the Sierra Farms Vicinity Fire History Exhibit, presents a graphical view of the project area's recorded fire history. As presented in the exhibit, there have been several fires recorded by CAL FIRE in their FRAP database (FRAP 2015) [1] in the direct vicinity of the project site. The most notable fire, occurring to the north and east of the project site, was the 1969 Moosa Fire. That fire burned 6,900 acres in 1969 and spread within 1.2 miles of the Proposed Project site. A total of three fires are noted within 1.5 miles of the project site dating back to 1960. The closest and most recent of these three fires was the 40-acre Windy Fire (1981), which was approximately .5 mile southeast of the site. This information excludes fires less than 10 acres. There have been multiple fires throughout North County inland including two fires along Old Castle Road in 2006 to the east of the project area and numerous fires along the I-15 corridor annually. Rapid and overwhelming response to these fires has resulted in their containment before they could grow to the size that would include them in CAL FIRE's database.

As indicated, the Sierra Farms project's landscape and some natural areas to the east and west of I-15 have not burned in 100 years or more. The Merriam Mountains, as with much of the open space in the region, in their present state, represent a potential threat to the many existing homes scattered along Deer Springs Road, the small avocado and citrus ranches and homes along the western side of the Merriam Mountains and the City of San Marcos and beyond, which are all at risk from a Santa Ana wind driven wildfire. Note that once the proposed Newland Sierra development is built out, the fire spread patterns will be modified in this region, as the development will represent a large fuel break of maintained and irrigated landscapes, which fire may encroach upon and burn around, but will not burn through the Merriam Mountain region with current spread patterns. The Sierra Farm project will convert a semi-disturbed native landscape to a managed and maintained, ignition resistant landscape site-wide.

4.2 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 adjacent to the Proposed Project given characteristic site features such as topography, vegetation, and

[1] Based on polygon GIS data from CAL FIRE's Fire and Resource Assessment Program (FRAP), which includes data from CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2014.

weather. The BehavePlus (version 5.0.5) fire behavior modeling software package, the latest version of the industry standard fire behavior prediction software, was utilized in evaluating anticipated fire behavior adjacent to Sierra Farms Project's developed areas.

4.2.1 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 given specified fuels, terrain, and weather. The models have had varied complexities and applications throughout the years. One model has become the most widely used 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 5.0.5, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site-specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that has 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.

The most commonly used modeling software packages (including BehavePlus 5.0.5, FlamMap, FARSITE) provide reliable estimates of flame length, fire intensity, and spread rate, among other outputs. Although fire behavior modeling has some limitations, it provides valuable estimated fire behavior predictions, which can be used as a tool in the decision-making process and brush management considerations. In order to make reliable estimates of fire behavior, and interpret fire spread models, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels, and have experience with wildland fires or applicable knowledge of how fire reacts in similar fuels.

Fire behavior modeling conducted on this site includes a relatively high-level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels on and adjacent the property. Fire behavior calculations are based on site-specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. To objectively predict flame lengths and intensities, this analysis incorporated predominant fuel characteristics, slope percentages, and representative fuel models observed on

site. The BehavePlus 5.0.5 fire behavior modeling system was used to analyze anticipated fire behavior within and adjacent to key areas just outside of the Project's developed areas.

Predicting wildland fire behavior is not an exact science. As such, the minute-by-minute movement of a fire will probably never be predictable, especially when considering the variable state of weather and the fact that weather conditions are typically estimated from forecasts made many hours before a fire. Nevertheless, field-tested and experienced judgment in assessing the fire environment, coupled with a systematic method of calculating fire behavior, yields surprisingly accurate results. The following sections provide background on the various fire environment inputs utilized for the fire behavior modeling conducted for the project site.

4.2.2. BehavePlus Analysis

Both summer weather conditions (on-shore flow) and more extreme fall weather conditions (off-shore, Santa Ana conditions) were modeled for the project site condition.

4.2.2.1 BehavePlus Fuel Model Inputs

Fuel Model

Vegetation is comprised of living and dead fuel. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by topography (slope, aspect, and elevation), weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models (Anderson 1982) and the more recent custom fuel models developed for Southern California (Weise and Regelbrugge 1997). According to the model classifications, fuel models used for BehavePlus fire behavior modeling have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface-to-volume ratio. Documentation of field conditions determines which fuel models should be applied in modeling efforts. 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 (SCAL):

- Grasses — Fuel Models 1 through 3
- Brush — Fuel Models 4 through 7, SCAL 14 through 18

- Timber Fuel Models 8 through 10
- Logging Slash Fuel Models 11 through 13

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models (Scott and Burgan 2005) developed for use in the BehavePlus modeling system. These new models attempt to improve the accuracy of the 13 standard 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 40 more recently developed fuel models:

- Non-Burnable Models NB1, NB2, NB3, NB8, NB9
- 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

Fuel models were assigned to vegetation types documented by Dudek's Fire Planners adjacent to the Proposed Project site. Appendix A provides photographs showing the locations and representative fuel types that were used during fire modeling. Table 1 provides a description of four fuel models coded for the site that were subsequently used in the BehavePlus analysis for this project.

Table 1
Project Site Fuel Model Characteristics

Fuel Model	Description	Land Cover Classification
GR4	Moderate Load, Dry Climate Grass	Non-native Grassland
SH5	High Load, Dry Climate Shrub	Southern Mixed Chaparral
TL3	Moderate Load Conifer Litter	Agriculture
TL6	Moderate Load Broadleaf Litter	Orchard and Coast Live Oak Woodland

Weather

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 2010). These guidelines identify acceptable fire weather inputs for fire conditions during

summer months and Santa Ana fire weather patterns. The County analyzed and processed fire weather from 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 (v. 5.0.5) fire behavior modeling software package to determine fuel moisture values for BehavePlus runs discussed in this FPP.. The temperature, relative humidity, and wind speed data for the Transitional (SANGIS 2015) weather zone were utilized for this FPP 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 2 summarizes the FDFM inputs and the resulting fine dead fuel moisture values. Table 3 presents the fire behavior modeling input variables for the project site.

Table 2
BehavePlus Fine Dead Fuel Moisture Calculations

Variable	Summer Weather	Peak Weather
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	5 -9 %
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	2%	40% +
Aspect	Flat	South to Southwest
Fuel Shading	Exposed	Exposed
Fuel Moisture Correction	1 %	1 %
Fine Dead Fuel Moisture	3 %	2 %

Table 3
Fire Behavior Modeling Inputs

Variable	Summer Weather Condition	Peak Weather Condition (offshore/Santa Ana Condition)
Fire Scenario	Run #2	Run #1
Fuel Models	GR4,TL3, and TL6	SH5
1h Moisture	3%	2%
10h Moisture	6%	3%
100h Moisture	8%	5%

Table 3
Fire Behavior Modeling Inputs

Variable	Summer Weather Condition	Peak Weather Condition (offshore/Santa Ana Condition)
Live Herbaceous Moisture	60%	30%
Live Woody Moisture	90%	50%
20-foot Wind Speed (upslope/downslope)	19 mph	41 mph
Wind Direction	225°	45°

Topography

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. Slope values were measured from U.S. Geological Survey (USGS) topographic maps and are presented in units of percent. The Project site and surrounding terrain of the Project site varies from relatively flat (2%) to the southwest and very steep (40-50% slopes) to the northeast.

4.2.2.2 BehavePlus Fuel Model Outputs

Three fire behavior variables were selected as outputs from the BehavePlus analysis conducted for the Project site, and include flame length (feet), rate of spread (mph), and fireline intensity (BTU/feet/second). 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). It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). The information in Table 4 presents an interpretation of flame length and its relationship to fireline intensity. The results of fire behavior modeling efforts are presented in Table 5. Additionally, identification of modeling run locations is presented graphically in Figure 5.

Table 4
Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4–8	100–500	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.
8–11	500–1,000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1,000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 5.0.5 Online Documentation, March 16, 2010. BehavePlus Fire Modeling System: Version 4.0 User's Guide (Andrews, Bevins, and Seli 2008)

Table 5
BehavePlus Fire Behavior Modeling Results

Fire Scenario	Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Rate of Spread (mph)	Spotting Distance (miles)
Run #1	13.1	1,511	1.9	0.5
Run #2	41.1	18,289	6.0	2.0

The results presented in Table 5 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. Additionally, fuel model assignments are based on site and aerial photograph evaluation. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

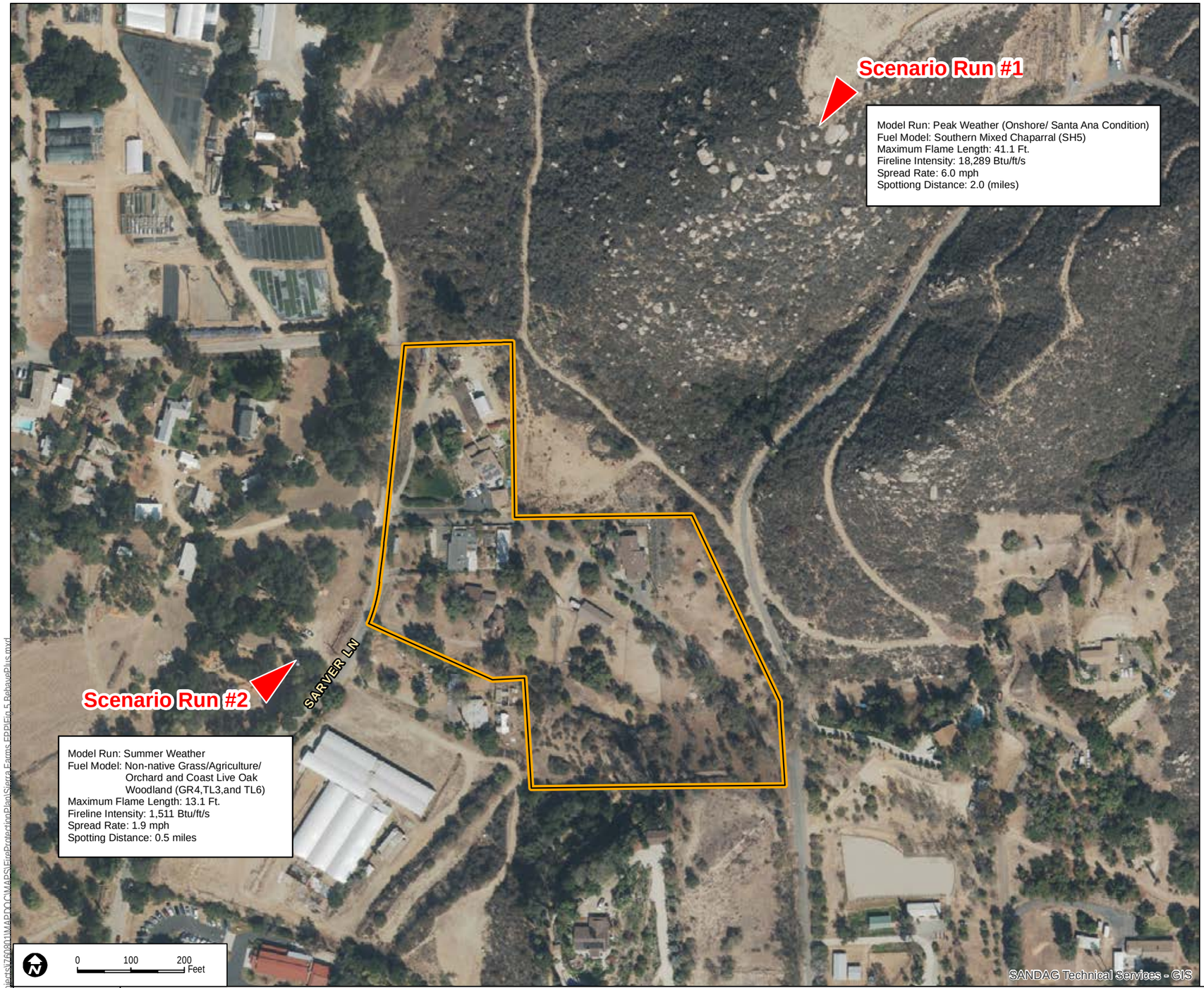
4.3 Fire Behavior Potential Summary

Given the climatic, vegetation, and topographic characteristics of the analysis area, along with the fire behavior modeling results discussed herein, the project site is considered potentially vulnerable to wildfire starting in, burning onto, or spotting onto the site. The fire behavior results described herein depict values based on inputs to the BehavePlus software. Localized changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis, but assumed across the landscape. Further, this modeling analysis assumes a correlation between the available vegetation data and fuel model characteristics. Wildfire activity may temporarily alter fuel beds, but fire behavior modeling efforts conducted for this site assume natural succession of

burned areas to more mature stand conditions, resulting in a conservative (near worst-case) estimate of fire behavior. Since fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns, modeling results are applicable as a basis for planning, but need to be considered in context with other site variables.

As presented, wildfire behavior in the chaparral northeast of the project site would be the fuels predominately affecting the constructed Project. Based on the observed fuel beds, a relatively high-intensity fire can be expected during extreme weather conditions with flame lengths reaching approximately 41 feet and peak intensity of over 18,289 Btu/ft/s. This type of fire would be relatively short-duration as vegetative fuels are consumed rapidly. As such, there would not be a sustained source of heat and or flame associated with site-adjacent wildland fuels. Adjacent native and undisturbed fuels would readily carry fire, especially during portions of the year where vegetation moisture content falls and warm temperatures, low humidity and high winds become common. However, fires approaching the Sierra Farms project site would burn into the project's perimeter fuel modification area and site wide maintained landscaping and with little fuel, would be spotty, lower intensity, and extinguishable. Embers produced from a wind driven fire would likewise find few, if any receptive fuel beds within the Project.

The post-project condition of this landscape will modify the ability of fire to spread across the site as it may have historically. The Proposed Project's landscaped and irrigated areas and FMZs, as well as the paved roadways and ignition resistant structures will result in reduced fire intensity and spread rates around the project. This will have the benefit of creating defensible space for firefighters, based on standard fire behavior and the positive effects that fuel conversion, higher fuel moisture, plant spacing, distribution and densities, plant species, and ongoing maintenance have on reducing fire threat.



Project Site

Modeling Inputs:

Summer Weather (Onshore Flow)	Peak Weather (Onshore/ Santa Ana Condition)
Fuel Model: GR4,TL3,and TL6	Fuel Model: SH5
1 hr Fuel Moisture: 3%	1 hr Fuel Moisture: 2%
10 hr Fuel Moisture: 6%	10 hr Fuel Moisture: 3%
100 hr Fuel Moisture: 8%	100 hr Fuel Moisture: 5%
Live Herbaceous Moisture: 60%	Live Herbaceous Moisture: 30%
Live Woody Moisture: 90%	Live Woody Moisture: 50%
20-Ft Wind Speed: 19 mph	20-Ft Wind Speed: 41 mph
Wind Direction: 225	Wind Direction:

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SOURCE: IMAGERY-SANDAG IMAGERY 2014

FIGURE 5

BehavePlus Fire Analysis Map

Sierra Farms Fire Protection Plan

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5 EMERGENCY RESPONSE AND SERVICE

5.1 Fire Facilities

The Project is located within the jurisdiction of the San Marcos Fire Department, which is a full-service department responsive to the City of San Marcos and the SMFPD. The San Marcos Fire Department provides structural fire protection and advanced life support-level emergency medical services within the City limits; unincorporated territory adjacent to the city's northern boundary (Project Area); discontinuous, unincorporated areas between the City of San Marcos and the City of Escondido; and the community of Lake San Marcos. The fire department operates two Fire Stations (Stations 1 and 3) that would respond to an incident at the Proposed Project site, although primary response would be from Station 1, with Station 3 responding as necessary. In addition, the City has signed an automatic aid agreement on first alarm or greater fires with all surrounding communities. As such, additional resources would also likely dispatch from the Deer Springs Fire Protection District's (DSFPD) Fire Station 12, which is the closest station, located to the east along Deer Springs Road. Table 6 presents a summary of the location, equipment, staffing levels, maximum travel distance, and travel time for the two SMFPD stations and the DSFPD station which could respond to the site. Travel distances are derived from Google road data while travel times are calculated applying the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance). The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time. The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time.

Table 6
Fire Department Responding Stations Summary

Station	Location	Equipment	Staffing	Maximum Travel Distance*	Travel Time**
Station 1	180 W. Mission Road San Marcos, California	Paramedic Engine Co. Paramedic Truck Co. Type 3 Engine Paramedic Ambulance	On duty : 8	4.1 mi.	7.6 min.
Station 3	404 Woodland Pkwy San Marcos, California	Paramedic Engine Co. Type 3 Engine Paramedic Ambulance	On-duty: 5	5.4 mi.	9.7 min.

Table 6
Fire Department Responding Stations Summary

Station	Location	Equipment	Staffing	Maximum Travel Distance*	Travel Time**
Station12	1321 Deer Springs Road Escondido, California	Type 1 Engine Type 2 Engine	On duty: 3 with one medic	1.9 mi.	3.9 min.

* Distance measured to entrance of the proposed Sierra Farms Park on Sarver Lane.
** Assumes travel to the project entrance, a 35 mph travel speed, and does not include turnout time

Based on the project site location in relation to existing fire stations, travel time to the site for the first responding engine from Station 1 is 7.6 minutes to the project's entrance on Sarver Lane. The DSFPD engine from Fire Station 12 could arrive within four minutes. Secondary response from a San Marcos Fire Department engine would arrive in approximately10 minutes. All response calculations are based on an average response speed of 35 mph, consistent with nationally recognized NFPA 1710. Based on these calculations, emergencies within the project can be responded to by first arriving units from two fire stations in accordance with the City's standard (i.e., average maximum initial response of no more than 8 minutes for fire apparatus and 9 minutes for ambulance, 90% of calls). Additionally, although not required, emergencies within the project meet the San Diego County General Plan 5 minute response time goal from DSFPD Station 12.

5.2 Estimated Calls and Demand for Service from the Project

Emergency call volumes related to typical projects, such as new residential developments, can be reliably estimated based on the historical per-capita call volume from a particular fire jurisdiction. However, it is important to note that this project does not include a large number of persons who are on-site permanently. The population statistics that will determine call volume are for visitors who are at the Sierra Farms Park facilities for a limited timeframe. A population like the Sierra Farms site, which will vary daily, is more difficult to fit into a standard equation. To normalize the transient population in order to calculate the potential number of calls on a "normal" population basis, a "discounting" process has been employed so that the population can be based on the number of hours per day people are on site. To that end, the following assumptions have been made:

- The use of the community building for a private event could generate up to 260 visitors once a month (65 parking spaces with a conservative number of four people per vehicle) or 3,120 visitors per year. Average on-site time for visitors at the event is 3 hours.
- Weekends could generate up to 2,080 visitors per month (260 visitors @ 4 weekends (Saturday and Sunday) or 24,960 visitors per year.

- 420 daily visitors per month (20 visitors @ 2 hrs. per day for 21 days) or 5,040 visitors per year
- one full time staff; average on-site time for staff – 40 hours (5 days @ 8 hours/day)
- No overnight presence

Using these assumptions, the 33,120 visitors who may visit during 360 days per year when the Sierra Farms site is open, equates to 92 visitors per open day. Since each visitor is on the site roughly 2 hours (one-eighth of a 24 hour day, or 12.5%) with some overlap, the normalized daily population would be 0.125 of the averaged daily population, or 11 persons. Total staff population would be one person per day.

Therefore, the conservatively calculated annual call generation estimate would be based on the equivalent on-site population of 12 persons. Based on the City's per capita call generation of 89 calls per 1,000 persons (2015 statistics indicating 8,000 alarms from a City-wide population[2] of 89,933), the total anticipated calls each year would be 1.1, (0.1 calls per month). The calculated call volume of one call per year is considered a high estimate because the per capita call generation factor is higher than, and not well-suited, to the site and its typical visitor. The per capita call generation factor is based on all areas within the city, including the more densely urban areas, which historically include higher call volumes. However, a conservative approach is warranted and therefore, the one anticipated annual call is used for calculating the potential impact on the fire department.

5.3 Response Capability Impact Assessment and Mitigation

Based on the potential for up to one additional call per year, fire service levels are not expected to be significantly impacted. For example, a typical urban fire station responds to about 5 calls per day while a station considered busy responds to 10 or more calls per day. Stations 1 and 3 are not currently responding to a high number of calls and therefore, the project is not expected to cause a decline in the San Marcos Fire Department's overall response times or service level. Additionally, the requirements described in this FPP are intended to aid firefighting personnel and minimize the demand placed on the existing emergency service system.

[2] www.san-marcos.net/about-us/demographics

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6 FIRE SAFETY REQUIREMENTS- INFRASTRUCTURE, BUILDING IGNITION RESISTANCE, AND DEFENSIBLE SPACE

The City of San Marcos Municipal Code, Chapter 17.64 (2012 International Fire Code and 2013 California Fire and Building Codes adopted by reference with several modifications), City Ordinance 2014-1385, and County of San Diego 2014 Consolidated Fire Code (SDCCFC) govern the building, infrastructure, and defensible space requirements detailed in this FPP. The project will meet or exceed applicable codes or will provide alternative materials and/or methods. The following summaries highlight important fire protection features, which some have been illustrated on Figure 6, Site Fire Safety Plan. Prior to bringing combustible materials onto the site, utilities shall be in place, fire hydrants operational, an approved all-weather roadway in place, and interim fuel modification zones established and approved.

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

6.1 Roads

6.1.1 Access

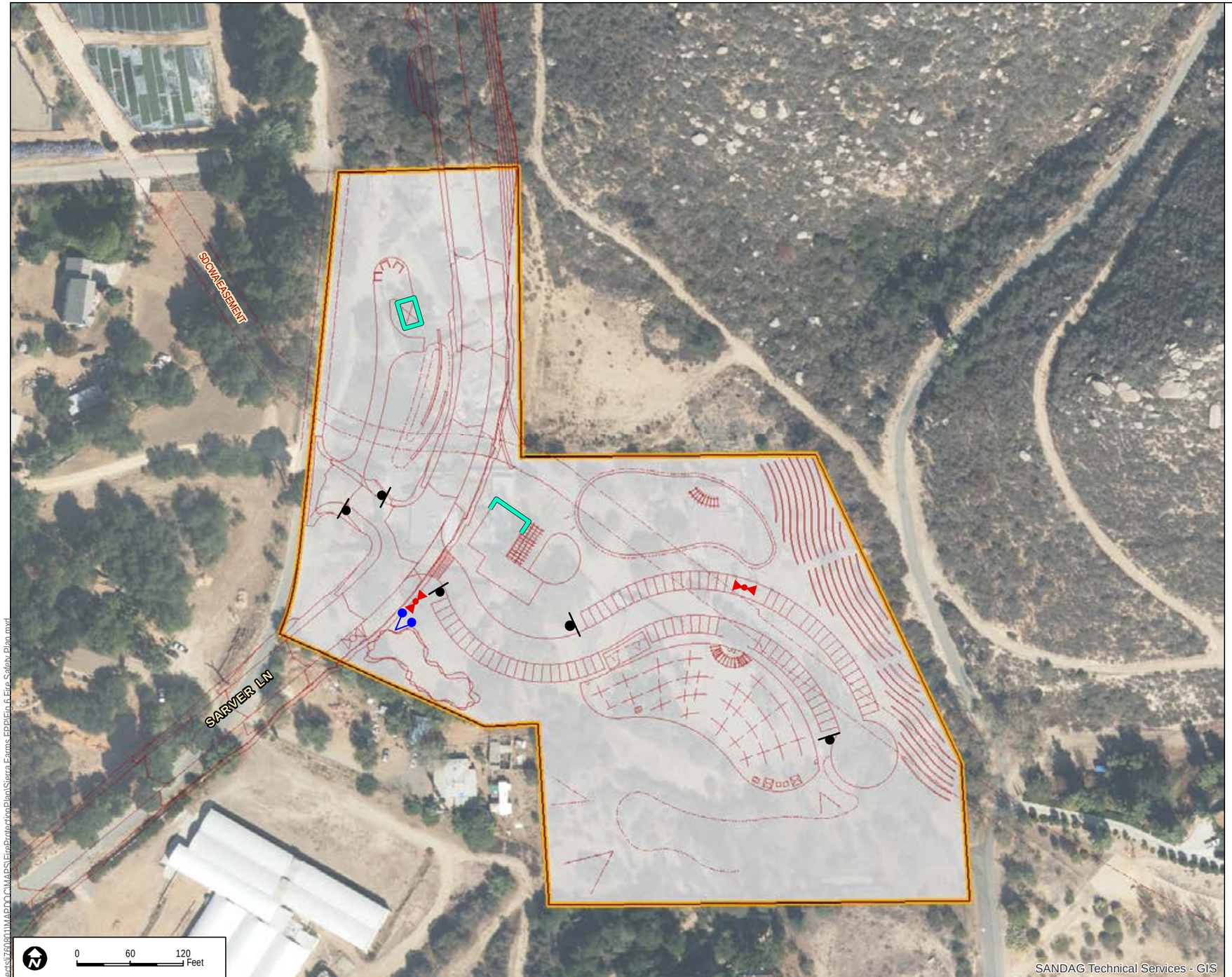
Site access will comply with the requirements of the City's Municipal Fire Code (Section 17.64.120). The project's private and public roads will be built to the City's standards and maintained by the Newland Sierra HOA.

The primary access for the Proposed Project will be from Sarver Lane. This road will be accessed via Deer Springs Road, which connects to I-15 to the east and N. Twin Oaks Valley Road to the south. The Sarver Lane intersection at Deer Springs Road would be signalized and is proposed to be 52 feet wide at the intersection to provide one northbound lane and two southbound lanes, transitioning to a width of 40 feet of pavement at the entrance to the Sierra Farms Park, and then transitioning to a width of 34 feet beyond the park entrance roadway. All of Sarver Lane would include an enhanced parkway with a linear greenbelt and multi-use pathway. Existing pavement widths on Sarver Lane vary from 28 feet along the St. Mark's Mission Church property (southern portion of Sarver Lane) to 16 feet north of the Church property. Sarver Lane, after being improved for the proposed Newland Sierra project, will accommodate a minimum of a 75,000-lb. fire apparatus load. It will also have an unobstructed vertical clearance of not less than 13 feet 6 inches.

6.1.2 Interior Circulation Roads

Interior circulation roads include two roadways that are considered common or primary roadways for traffic flow to the park and maintenance-composting area from Sarver Lane. Both roadways provide access to within 150 feet of all portions of the exterior walls of the first floor of the structures within the project site and meet the following specifications:

1. Fire apparatus access roads shall have an unobstructed improved width of not less than 24 feet. The roadway serving the community building and other park amenities is proposed at 30 feet in width. The maintenance-composting area will be accessed from a 16-foot wide driveway via a 28-foot wide roadway that connects with Sarver Lane.
2. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 lbs. unless authorized by the FAHJ) and shall be provided with an approved paved surface so as to provide all-weather driving capabilities. The 16-foot driveway to the maintenance-composting area will have a decomposed granite surface. A soils engineer report will be provided stating that the driveway as designed and built will support the imposed loads of fire engines (i.e., 75,000 lbs.).
3. Grades shall be less than 15%. If over 15%, they require Portland cement base with heavy broom finish and in no case can they exceed 20%.
4. The dead-end road serving the eastern portion of Sierra Farms Park, which is approximately 660 feet in length from Sarver Lane to the center of cul-de-sac bulb, shall have approved provisions for a fire apparatus turnaround. The proposed cul-de-sac will have a minimum paved radius width of 37 feet (74 feet diameter). The cul-de-sac will have a sign posted “No Parking; Fire Lane” at the entrance to the bulb.
5. The driveway leading to the maintenance-composting area is approximately 250 feet in length and will be provided with a 60 feet wide by 45 feet long hammerhead. The fire apparatus turnaround will be located adjacent to the shed and along the driveway as shown on Figure 6. The hammerhead configuration and location will be approved by the fire department.
6. Parking will be restricted for roadways less than 32 feet wide by posting of signs stating “No Parking; Fire Lane” pursuant to Appendix C, San Marcos Fire Department Requirements for Marking of Public and Private Fire Lanes. Signs shall be posted that include language identifying the towing company and their phone number enabling legal enforcement of the no parking areas per the California Vehicle code. Approximately 65 parking spaces will be provided in the eastern portion of the Sierra Farms Park for visitors to park near the private community building and other amenities.



Legend

- Project Site
- New Fire Hydrants
- FDC/Backflow Preventor/PIV
- No Parking Signs-Fire Lanes per San Marcos Fire Department
- 2-Hour Rated Exterior Walls, Fire-rated Doors, Dual-tempered Pane Windows

SOURCE: IMAGERY-SANDAG IMAGERY 2014; DESIGN-SCHMIDTT DESIGN 2016

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FIGURE 6
Fire Safety Plan

Sierra Farms Fire Protection Plan

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6.1.3 Gates

Access gates are not proposed for Sierra Farms Park or maintenance area. Any future use of a Security gate or security device across a fire access roadway will require the Fire Marshal's approval.

6.1.4 Premises Identification

Identification of roads and structures will comply with the SMFPD and Consolidated Fire Code, Sections 503.3 and 505, as follows:

1. Approved numbers and/or addresses shall be placed on all new and existing buildings and at appropriate additional locations, plainly visible and legible from the street or roadway fronting the property when approaching from either direction. Address numbers on new construction shall be automatically illuminated by low voltage lighting. The numbers shall contrast with their background and shall meet the following minimum size standards: 6" high with a.5" stroke for commercial buildings. Additional numbers shall be required where deemed necessary by the fire code official, such as rear access doors and building corners. The fire code official may establish different minimum sizes for numbers for various categories of projects (Sec. 505.1 Address numbers).
2. Structures 100 feet or more from the roadway will include structure identification at the entrance to the driveway (e.g., Maintenance area and storage shed).
3. Access roads to construction areas shall be completed and paved prior to issuance of building permits and prior to combustible construction occurring.

6.2 Ignition Resistant Construction and Fire Protection Systems

This section outlines ignition-resistant construction for all structures that will meet the requirements of the City's Municipal Fire Code, Chapter 17.64, and SDCCFC. All new structures will be primarily constructed to SMFPD standards. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the latest California Building Code (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, trellises, 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. Additionally, all commercial buildings will comply with appropriate building codes based on occupancy type.

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

6.2.1 Fire Protection Systems

6.2.1.1 Water

Water service for the Proposed Project site will be provided by Vallecitos Municipal Water District (VMWD) and sufficient water supplies will be available to serve the project from existing entitlements and resources. The static water pressure will remain above 20 psi at 2,500 gallons per minute when meeting the fire requirements for the SMFPD.

6.2.1.2 Hydrants

Proposed fire hydrants locations are illustrated in Figure 6, Site Fire Safety Plan (City Municipal Fire Code Section in parentheses).

- **Required installations.** The location, type and number of fire hydrants connected to a water supply capable of delivering the required fire flow shall be provided on the public or private street, or on the site of the premises to be protected or both. Fire hydrants shall be accessible to the fire department apparatus by roads meeting the requirements of section 507.5.1 of the CFC (Sec. 507.5.1.1). Fire service laterals, valves, backflow preventers, and meters will be installed on site as required by the VMWD. All fire department connections (FDC) shall be installed in accordance with mounting requirements as specified in Appendix D*,* San Marcos Fire Department FDC Mounting Requirements.
- **Location of fire hydrants.** Fire hydrants shall be located as required by the fire code official using the following criteria and taking into consideration departmental operational needs. Fire hydrants will be every 1,000 feet apart along Sarver Lane for road segments within SMFPD jurisdiction. Hydrants within Proposed Project site shall only be 300 feet apart. Fire hydrants are also required per local Fire Code to be within 50 feet of fire department connections for the multi-purpose building. Prior to the issuance of building permits, the applicant shall submit to San Marcos Fire Department plans demonstrating a water system capable of handling the fire flow requirements.
- **Fire hydrant construction and configuration** (Sec. 17.64.140). All fire hydrants shall be of bronze construction, including all internal parts except seats. Alternative materials may be used if approved by the fire code official and the local water district having jurisdiction. The stems shall be designed and installed in a manner that will ensure that they will not be projected outward from the main body by internal water pressure due to disassembly. The number and size of fire hydrant outlets shall be two 4-inch ports and one, 2 1/2-inch port.
- **Signing of water sources and fire department connections**. The fire code official may require fire hydrants and fire department connections to be identified. Fire hydrants may

be identified by a reflectorized blue marker and fire department connections may be identified by a reflectorized 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 (San Diego County CFC Sec. 507.5.7.1). Crash posts will be provided where needed in on-site areas where vehicles could strike fire hydrants.

6.2.1.3 Fire Sprinklers

An approved automatic, commercial fire extinguishing system (NFPA 13) shall be installed in the multi-purpose building since the structure resides within the direct WUI as shown on Figure 2, City of San Marcos Fire Hazard Severity Zones, and could be a high occupancy building when it is used for private or public events. The maintenance shed will not be required to be protected by a fire sprinkler system (Personal communication with Robert Scott, Fire Marshal, with San Marcos Fire Department on March 17, 2016).

6.2.2 Fire Alarm Systems

All commercial structures are to be equipped with an approved electronically supervised fire alarm and detection system.

6.2.3 Knox Box

A master key for entry to all gates, enclosures, equipment rooms, and assembly areas is required to be stored in a Knox key box. The Knox box shall be mounted on the multi-purpose building or in an area approved by fire department at a height of 60 to 66 inches above grade. Knox box shall be a type with a side hinged door.

6.3 Defensible Space and Vegetation Management

The Proposed Project will be exposed to chaparral-dominated natural areas to the north and east and developed areas with patches of oak woodlands and grasslands to the west and south. FMZs will be provided and will typically include a total of 150 feet of modified fuel areas encircling both the community building and storage shed within the project site. However, the fuel modification on the north side of the community building will be constrained to between 58 and 86 feet to the Project's property boundary. The storage shed in the maintenance area is constrained to between 87 and 115 feet of FMZ on the west and east sides, respectively. Both structures are being required by the City of San Marcos Fire Department's Fire Marshal (Personal communication with Robert Scott, Fire Marshal, with San Marcos Fire Department on March 17, 2016) to provide an additional fire protection measure (See Section 7.0) by providing a functional equivalency as a City-defined, standard 150 feet FMZ. The 150-foot FMZ is typically comprised of a 50-foot-wide irrigated zone (Zone A) and two, 50-foot wide thinned zones (Zones

B and C) per the City's Fire Code. The entire park and maintenance areas as illustrated in Figure 7, *Conceptual Fuel Modification Plan* will be irrigated and planted with drought-tolerant plant species. As such, the landscaping for the Proposed Project will meet FMZ Zone A standards as described below.

6.3.1. Fuel Modification Zones

Fuel modification zones are designed to gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures.

6.3.1.1. Fuel Modification Zone Requirements

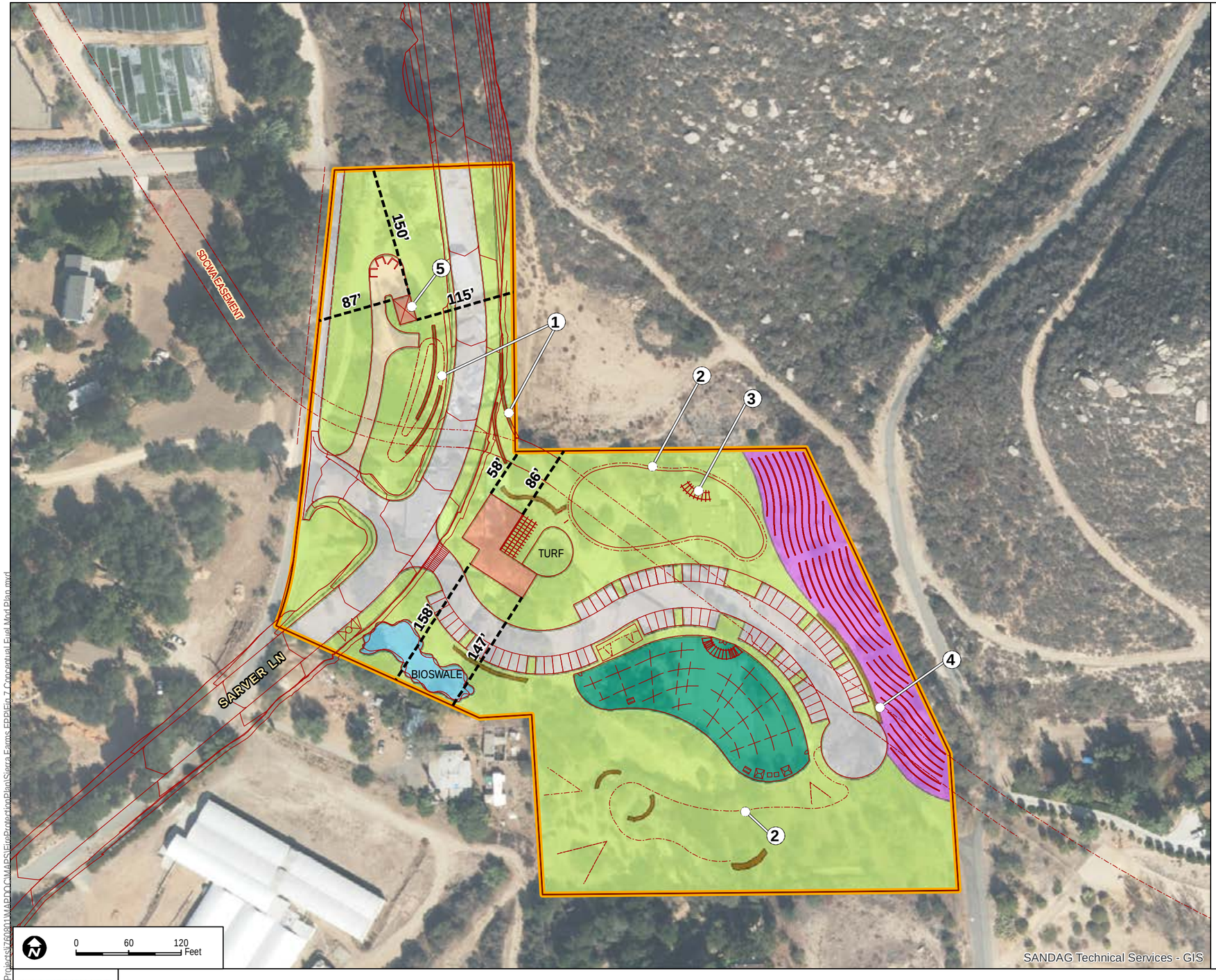
The following requirements are provided for fuel modification zones. The fuel modification area will occur within the fenced property.

Zone A – Non-Flammable, Irrigated Zone (from structure outward to property boundary)

Zone A is applicable site wide and is measured from the structure outward to the property line in all directions.

Zone A includes the following key components:

- Non-combustible surface (pavement, concrete, decomposed granite, etc.) or,
- Irrigated wet zone (water conserving irrigation systems with efficient drip emitters and "smart" controllers and use of California Friendly landscape concepts)
- Landscape Plan prepared and submitted in compliance with tree spacing and landscape plant material specified below in Section 6.3.1.2. Specific Landscaping Requirements.
- Tree spacing of a minimum 10 feet between crowns or as specified below in Section 6.3.1.2 Tree Planting and Maintenance Standards.
- No tree crowns within 10 feet of structures (at maturity).
- No open flame fireplaces or barbecues.
- Park and maintenance areas shall be maintained free of downed and dead vegetation.
- Year-round maintenance by Newland Sierra HOA of park and maintenance areas.



Legend

- Property Line Offsets
- Project Site
- HOA Maintained Park Lands
- Community Garden
- Vineyards
- Bioswale
- Building
- Pavement
- Decomposted Granite Driveway
- Wall

1. Community Entry Monument Signs
2. 6-Ft wide Decomposted Granite Trail
3. Picnic Node with Seating and Trash
4. Stone Wall
5. Maintenance Area with Storage Shed

FUEL MODIFICATION NOTES:

1. Landscape Plans for park to be prepared and submitted in compliance with Fire Protection Plan.
2. The entire site will be irrigated.
3. Tree spacing of a minimum 10 feet between crowns as specified in Fire Protection Plan.
4. No mature tree canopies within 10 feet of structures.
5. No open flame fireplaces or barbecues.
6. Park and maintenance areas shall be maintained free of downed and dead vegetation.
7. Vineyard will be maintained and kept clean of woody debris per Fire Protection Plan.
8. Year-round maintenance by Newland Sierra HOA of park and maintenance areas.

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SOURCE: IMAGERY-SANDAG IMAGERY 2014; DESIGN-SCHMIDTT DESIGN 2016

FIGURE 7

Conceptual Fuel Modification Plan

Sierra Farms Fire Protection Plan

Document Path: Z:\Projects\7608\01\MAPDOC\MAPS\FireProtectionPlan\Sierra Farms FPP\Fig 7 Conceptual Fuel Mod Plan.mxd

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6.3.1.2 Other Vegetation Management

Roadway-Adjacent Defensible Space

As required under SDCCFC, an area of 20 feet from each side of fire apparatus access roads shall be improved to Zone A standards and maintained clear of all but fire-resistive vegetation. This area shall be maintained by the HOA. Vertical clearance of 13 feet 6 inches shall also be maintained along fire apparatus access roads.

Specific Landscaping Requirements

Plants used in the fuel modification areas or landscapes will include drought-tolerant, fire resistive trees, shrubs, and groundcovers. The planting list and spacing will be reviewed and approved by the City's Fire Marshal, included on submitted landscape plans. The plantings will be consistent with County of San Diego's Suggested Plant List for Defensible Space (Appendix E). The intent of the list is to provide examples of plants that are less prone to ignite or spread flames to other vegetation and combustible structures during a wildfire. Additional Plants can be added to the landscape plant material palette with the approval from the City's Fire Marshal.

Undesirable Plants

Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be physical or chemical. The plants included in the Prohibited Plant List (Appendix F) are unacceptable from a fire safety standpoint, and will not be planted on the site or allowed to establish opportunistically within the fuel modification zones or landscaped park and maintenance areas.

Tree Planting and Maintenance Standards

Trees may be planted within the Proposed Project site as long as they conform to the SDCCFC, Section 4907.3.Trees (SMFPD has adopted the County standard). On the Project site, tree planting in the park and maintenance areas as well as along roadways is acceptable, as long as they meet the following restrictions as described below:

- For streetscape plantings, fire resistive trees can be planted 10 feet from edge of curb to center of tree trunk. Care should be given to the type of tree selected, that it will not encroach into the roadway, or produce a closed canopy effect.
- Crowns of trees located within a FMZ shall maintain a minimum horizontal clearance of 10 feet for fire resistant trees. Mature trees shall be pruned to remove limbs one-third the height or 6 feet, whichever is less, above the ground surface adjacent to the trees.

- Dead wood and litter shall be regularly removed from trees.
- Ornamental trees shall be limited to groupings of 2–3 trees with canopies for each grouping separated horizontally as described in Table 7.

Table 7
Distance Between Tree Canopies by Percent Slope

Percent of Slope	Required Distances Between Edge of Mature Tree Canopies (1)
0–20	10 feet
21–40	20 feet
41+	30 feet

1 Determined from canopy dimensions as described in Sunset Western Garden Book (Current Edition)
2 2014 CFC Section 4907.3.1. Trees, County of San Diego.

Oak Tree Management

The Proposed Project will preserve existing oak trees on the site. Individual oak specimens will be in a healthy state and maintained free of all dead, dying, or diseased trees (excluding tree stumps no higher than six inches above the ground). Dead, dying, or diseased trees include insect infested trees, no longer living, in the last stages of growth or infected by a pathogen of any type. If combustible vegetation is located underneath a tree's drip line, the lowest branch shall be at least three times as high as the understory brush or grasses, or ten feet, whichever is greater. This will reduce the build-up of "ladder" fuels[3]. Debris and trimmings produced by the removal process shall be removed from the site, or if left, shall be converted into mulch by a chipping machine and evenly dispersed to maximum depth of six inches.

Vineyards

Vineyards are proposed for inclusion in the eastern portion of the Sierra Farms Project site. The vineyard area would be a community asset with the HOA responsible for funding and maintenance through a contract for management by a licensed viticulturist. The professional management of the vineyard will help ensure that the operation is successful and that maintenance occurs at a high level, resulting in consistency with the ignition resistance and reduced fuel structure of typical irrigated fuel modification.

The vineyard will be designed and installed as follows:

- The grape plants would be grown on trellises made of non-combustible material.
- The plants will be irrigated via drip irrigation to maintain a high moisture content.

[3] Fuel which can spread fire from ground into tree canopies.

- Dead and dying plants or plant materials and debris will be removed from the area on an on-going basis.
- Should the vineyard operation ever be vacated or otherwise cease to operate, the area will be converted to parklands and consistent with the remaining fuel modification for the Sierra Farms site.

HOA Composting Area

Green waste recycling stockpiles are regulated under Municipal Fire Code Section 17.64.285. Fires due to spontaneous combustion are very common in green waste stockpiles, if not remixed and monitored on a regular basis to keep internal temperatures below 170 degrees Fahrenheit. A City permit will be obtained from the San Marcos Fire Department prior to engaging in the HOA green waste operation.

Environmentally Sensitive Areas

Once the FMZs are in place, there will not be a need to expand them as they have been planned to meet the fire code. However, if unforeseen circumstances were to arise that required hazard reduction within an area considered environmentally sensitive or part of the Multispecies Conservation Plan, it may require approval from the County and the appropriate resource agencies (California Department of Fish and Game, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers) prior to any vegetation management activities occurring within those areas.

6.3.2 Fuel Modification Area Vegetation Maintenance

All fuel modification area vegetation management shall occur as-needed for fire safety, compliance with the FMZ requirements detailed in this FPP, and as determined by the fire department. The Newland Sierra HOA or other established funding and management entity shall be responsible for all vegetation management throughout the respective project site, in compliance with the requirements detailed herein and FAHJ requirements. The HOA shall be responsible for ensuring long-term funding and ongoing compliance with all provisions of this FPP, including vegetation planting, and maintenance requirements throughout the Sierra Farms project.

6.3.3 Annual FMZ Compliance Inspection

The Newland Sierra HOA shall obtain an FMZ inspection and report from a qualified San Marcos Fire Department-approved 3rd party inspector in May and September of each year certifying that vegetation management activities throughout the project site have been performed pursuant to this FPP. The annual compliance inspection should be coordinated with and conducted at the same time as inspections for the FMZs in the proposed Newland Sierra master-

planned community. Inspection reports and certification of compliance with the FPP shall be provided to fire department annually by June 1st and October 1st.

6.3.4 Construction Phase Vegetation Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management shall be performed pursuant to the FAHJ on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation.

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

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

7 ALTERNATIVE MATERIALS AND METHODS FOR NON-CONFORMING FUEL MODIFICATION

As previously mentioned, due to constraints associated with the property configuration and boundaries, it is not feasible to achieve the jurisdictional FMZ on the north side of the community building and on the east and west sides of the storage shed. As such, this FPP incorporates additional analysis and measures that will be implemented to compensate for potential fire related threats. These measures are customized for this site based on the analysis results and focus on providing functional equivalency as a City-defined, standard FMZ.

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

These results support Cohen's (2000) findings that if a community's homes have a sufficiently low home ignitability, the community can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to homes/structures at the residential location without extensive wildland fuel reduction. Therefore, we are proposing "hardening" both structures per City's Fire Marshal's recommendations (Personal communication with Robert Scott, Fire Marshal, with San Marcos Fire Department on March 17, 2016) to minimize their ignition by an approaching wildfire by:

1. Constructing 2 hour rated exterior walls per 2013 CBC and 2013 CFC standards. The storage shed would be required to have all four sides of the structure built to the 2 hour

rated exterior wall standards. All doors for the shed would be non-combustible or be a fire rated door approved by the Fire Marshal.

2. The community building includes one side exposed to off-site fuels with relatively good setback for ignition resistant construction and interior protection by a fire sprinkler system. Therefore, the north side of the building where the FMZ is non-conforming with City's FMZ standard, would require a 2 hour rated exterior wall with the fire rated wall wrapping around five feet on either side of the building (See Figure 6, Site Fire Safety Plan).
3. Windows on all sides of the storage shed and the north side of the community building shall be dual pane, both panes tempered. Dual pane, one pane tempered glass has been shown during testing and in after fire assessments to significantly decrease the risk of breakage and ember entry into structures. Therefore, requiring code-exceeding dual pane, both panes tempered is anticipated to be an important safety measure that provides enhanced structure protection and provides mitigation for reduced fuel modification zones. *The window upgrade also exceeds the requirements of Chapter 7A of the CBC and providing additional protection for the structure's most vulnerable, exterior side.*

8 EVACUATION PLAN

An evacuation plan will be prepared for the project site that indicates how Park occupants will evacuate during a wildfire emergency. This plan will be prepared in coordination with and as part of the Newland Sierra Master Planned Community Evacuation Plan.

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9 HOMEOWNER'S ASSOCIATION WILDFIRE EDUCATION PROGRAM

The Newland Sierra HOA will provide on-going resident education outreach regarding wildfire safety, the "Ready, Set, Go!"[4] pre-planning model, and this FPP's requirements for the entire master-planned development. The community building will include site-specific wildfire information including practices that will not be allowed due to fire risk. Informational handouts, facility Web-site page, mailers, fire safe council participation, inspections, and seasonal reminders are some methods that will be used to disseminate wildfire and relocation awareness information. The HOA will coordinate with SMFPD and other applicable fire agencies regarding wildfire educational material/programs before printing and distribution.

[4] International Fire Chiefs Association "Ready, Set, Go" website link: http://wildlandfirersg.org/

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10 SAN MARCOS FIRE DEPARTMENT RESPONSE MAP UPDATES

Any new development, which necessitates updating of emergency response maps by virtue of new structures, hydrants, roadways or similar features, are required to provide map updates to the City of San Marcos. The applicant will provide a copy of building plans in Geo-Referenced format to be used by fire department for pre-fire planning purposes. Information shall specifically include a site plan and building plan showing locations of utility shut-offs, fire sprinkler risers and shut-off valves, the fire department connection for fire protection sprinkler system, fire alarm panels, fire hydrants, fire department connection standpipe, and Knox box . The map update information shall be provided in City-approved coordinate system: NAD_1983_StatePlane_California_VI_FIPS_0406_Feet.

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11 CONCLUSION

This FPP is submitted in support of an application for project entitlement of the Sierra Farms project. It is submitted in compliance with requirements of the Municipal Fire Code and SDCCFC. The requirements in this document meet fire safety, building design elements, fuel management/modification, and landscaping recommendations of the City and Fire District or provide alternative measures that meet the intent of the code. Fire and Building Codes and other local, county, and state regulations in effect at the time of each building permit application supersede these recommendations unless the FPP recommendation is more restrictive.

Where the project does not strictly comply with the Code, for slightly reduced fuel modification zones adjacent to the storage shed and community building, alternative materials and methods have been proposed that provide functional equivalency as the code intent. The information provided herein supports the ability of the proposed structures and FMZs to withstand the predicted short duration, low to moderate intensity wildfire and ember shower that would be expected from wildfire burning in the vicinity of the site or within the site's landscape.

The recommendations provided in this FPP have been designed specifically for the proposed construction of structures adjacent the WUI zone at the Project site. The Proposed Project site's fire protection system includes a redundant layering of protection methods that have been shown through post-fire damage assessments to reduce risk of structural ignition.

Modern infrastructure will be provided along with implementation of the latest ignition resistant construction methods and materials. Further, all structures are required to include interior sprinklers consistent with City of San Marcos Municipal Code, Section 17.64.200. Fuel modification will occur throughout the project site. The FMZs will be maintained annually by the HOA. Maintenance includes removing all dead and dying materials and maintaining appropriate horizontal and vertical spacing. In addition, plants that establish or are introduced to the fuel modification zone that are not on the approved plant list will be removed.

Ultimately, it is the intent of this FPP to guide, through code and other project specific requirements, the construction of structures that are defensible from wildfire and, in turn, do not represent significant threat of ignition source for the adjacent native habitat. It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and mitigating actions identified in this report are designed to reduce the likelihood that fire would impinge upon the proposed structures. There are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the mitigating fuel modification requirements provided in this FPP will accomplish the goal

of this FPP to assist firefighters in their efforts to defend these structures and reduce the risk associated with this project's WUI location.

Although the proposed development and landscape will be significantly improved in terms of ignition resistance, it should not be considered a shelter-in-place community. It is recommended that the homeowners or other occupants who may use the facilities at the Sierra Farms Park adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go" stance on evacuation. Accordingly, occupants and visitors should evacuate the area as soon as they receive notice to evacuate, or sooner, if they feel threatened by wildfire. Fire is a dynamic and somewhat unpredictable occurrence and it is important for residents to educate themselves on practices that will improve their personal safety.

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13 LIST OF PREPARERS

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APPENDIX A

Representative Photographs

SIERRA FARMS
PHOTOGRAPH LOG

Photograph 1. View from Sarver Lane looking at existing structures on the Proposed Project site. The knoll in the background is the Southern mixed chaparral fuelbed that was modeled in fire run #1.

Photograph 2. Close-up view of one of the structures within the Sierra Farms park that will be demolished.

Photograph 3. View of neighbor's property that is adjacent to the site's southern boundary.

Photograph 4. Another view of neighbor's property to the south of Proposed Project site.

Photograph 5. View looking to the north along Sarver Lane and along northwestern portion of site (right-hand side of roadway).

Photograph 6. This photograph is an example of non-native grasslands and oak woodlands fuelbeds modeled in fire run #2.

Photograph 7. View of Sarver Lane to the north. Photograph was taken in front of entrance to Hidden Valley Zen Center.

Photograph 8. Opposite view from photograph #7 looking south on Sarver Lane.

Photograph 9. View to north on Sarver Lane Photograph was taken at the intersection of Sarver Lane and Deer Springs Road.

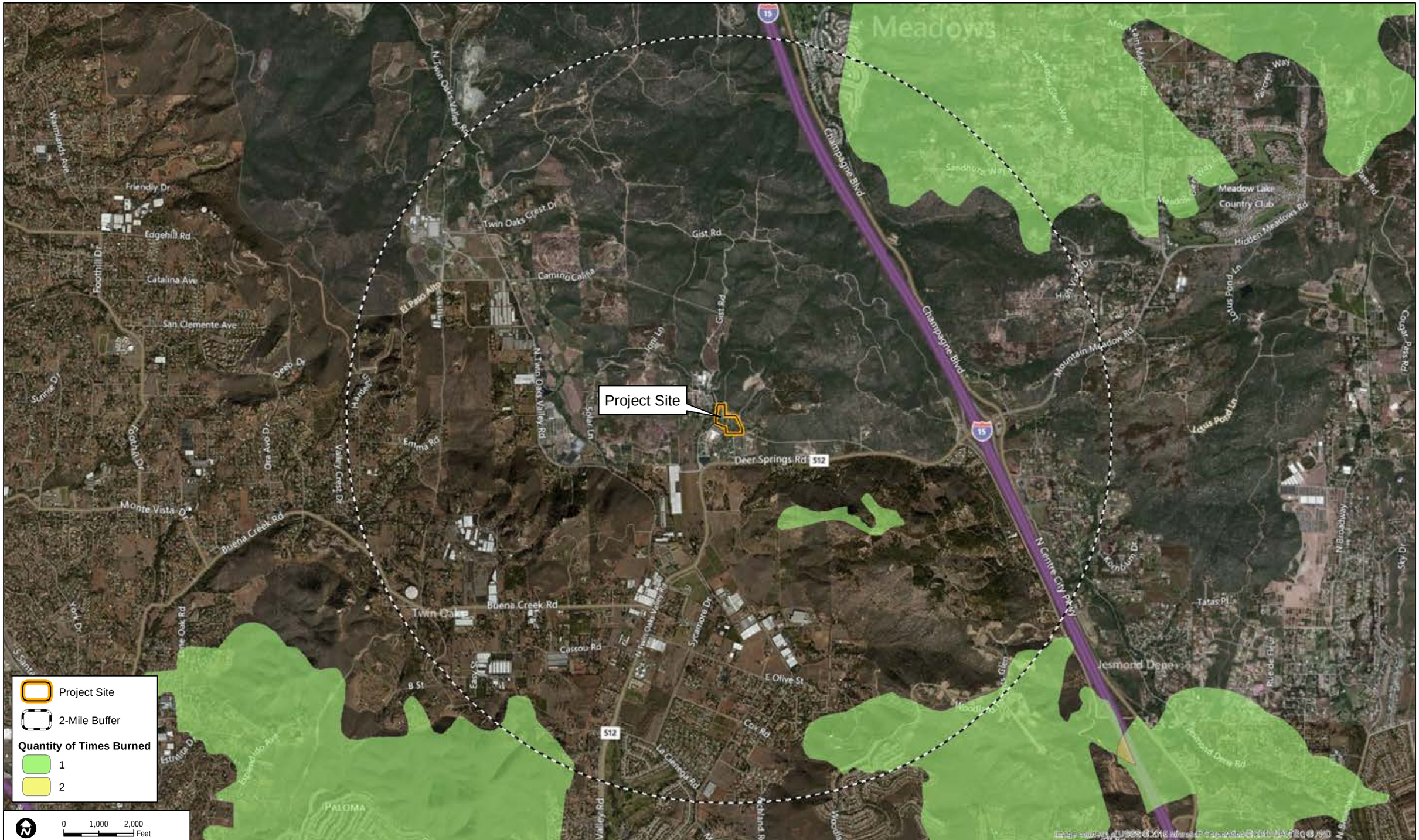
Photograph 10. View looking north on Sarver Lane.

Photograph 11. View looking east along Deer Springs Road. Photograph taken at the point where Sarver Lane intersects with Deer Springs Road.

Photograph 12. Opposite view from photograph #11 looking south on Deer Springs Road which connects with N. Twin Oaks Valley Road.

APPENDIX B

Fire History



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SOURCE: ESRI 2014; FRAP 2014

APPENDIX B

Fire History Map

7608

Sierra Farms Fire Protection Plan

APPENDIX C

San Marcos Fire Department Requirements for Marking of Public and Private Fire Lanes

SAN MARCOS FIRE DEPARTMENT

Requirements for Marking of PUBLIC and PRIVATE FIRE LANES

- **Bottom of sign shall be 4 to 6 feet above grade, mounted on Post or affixed to Building in visible location.**
- **Posts shall be metal 'U' channel, and permanently cemented 18 inches below grade for all signs.**
- **All signs shall be a minimum of 17 x 22 inches in size, with a reflective WHITE background and RED letters/numbers.**
- **Signs shall be installed in visible locations determined by Fire Department. Curbs stenciled every 30 feet.** ***Two-sided signs may be required by fire dept. Both Signs and Red Curbs may be required.***

References: 2013 - California Fire Code. Section 503.3 and 2014 - California Vehicle Code ***Revised 4/14***

Signs REQUIRED for PUBLIC PROPERTY

See San Marcos Engineering Dept. specification for detailed info

NO
STOPPING
FIRE LANE
CVC 22500.1

CURB Details -Both

"No Parking Fire Lane" WHITE letters on RED curb

NO PARKING FIRE LANE
stencil every 30 feet

Red Stripe on hard road side surface: 8-inch wide

NO PARKING FIRE LANE

Signs REQUIRED for PRIVATE PROPERTY

- **Signs required for all private streets and alleys.**
- **Signs Required for Private Access Roads, Drives or Easements that exceed 150 feet length.**

NO STOPPING - FIRE LANE
VEHICLES SUBJECT TO CITATION and/or TOW-AWAY AT OWNER EXPENSE
S.D. Sheriff Dept. 858-565-5200
CVC 22658 (a) CVC 22500.1
****Name and phone number of towing company here**

^

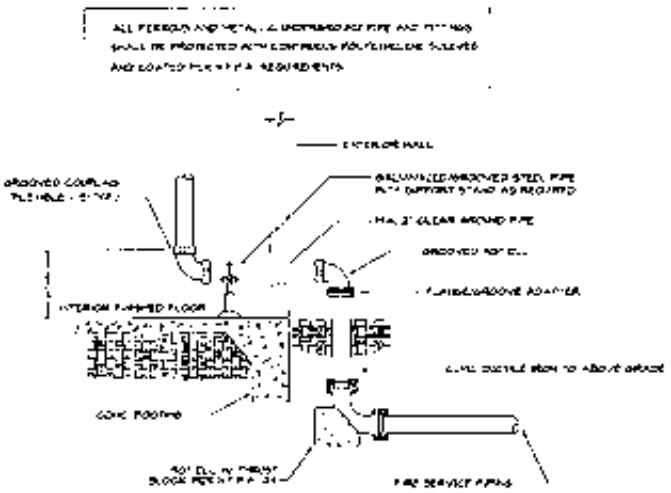
- **Signs for Private Roads, Drives and Easements shall be labeled as shown above.**
- ****Private Road, Drive and/or Easement Property Owners must provide name and number of Towing Co. on sign. The Tow Co. must have written general towing authorization agreement from said owner to remove vehicles from the property.**

APPENDIX D

San Marcos Fire Department
FDC Mounting Requirements

SAN MARCOS FIRE DEPARTMENT

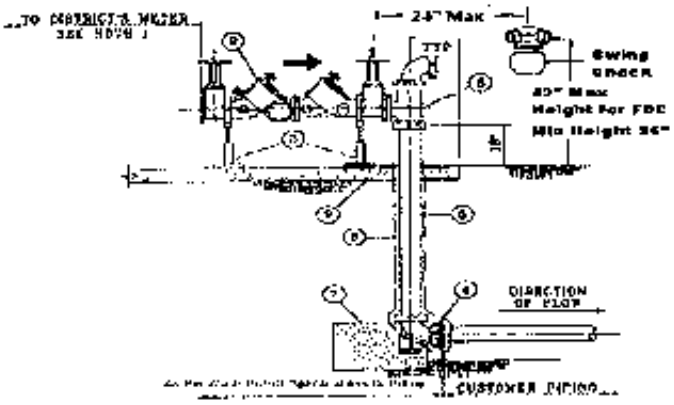
FDC Mounting Requirements



DCDA and RPDA Installation Shall comply with Governing Water District Standards.

SERVICE ENTRY

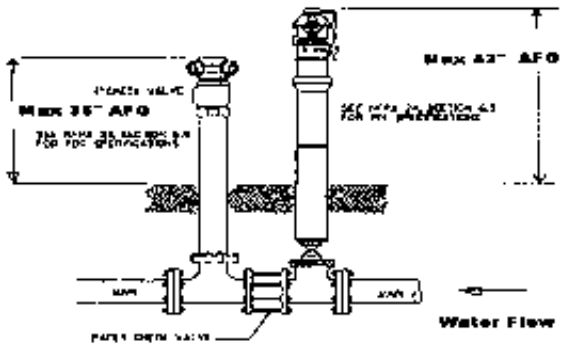
NO SCALE



FDC mounting height shall not exceed 36 to 42 inches above finished grade to top of connection.

FDC ports shall face in direction that allows easy access from street. The OS&Y handles on DCDA or RPDA shall not interfere with access or ability to connect to FDC ports. OS&Y handles shall be easy to operate

FDC mounting height shall not exceed 36 to 42 inches above finished grade to top of connection.



June 2014

APPENDIX E

Suggested Plant List for Defensible Space

SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE

BOTANICAL NAME	COMMON NAME	Climate Zone
TREES		
Acer		
platanoides	Norway Maple	M
rubrum	Red Maple	M
saccharinum	Silver Maple	M
saccarum	Sugar Maple	M
macrophyllum	Big Leaf Maple	C/ (R)
Alnus rhombifolia	White Alder	C/I/M (R)
Arbutus		
unedo	Strawberry Tree	All zones
Archontophoenix		
cunninghamiana	King Palm	C
Arctostaphylos spp.**	Manzanita	C/I/D
Brahea		
armata	Blue Hesper Palm	C/D
edulis	Guadalupe Palm	C/D
Ceratonia siliqua	Carob	C/I/D
Cerdidium floridum	Blue Palo Verde	D
Cercis occidentalis**	Western Redbud	C/I/M
Cornus		
nuttallii	Mountain Dogwood	I/M
stolonifera	Redtwig Dogwood	I/M
Eriobotrya		C/I/D
japonica	Loquat	C
Erythrina caffra	Kaffirboom Coral Tree	I/M
Gingko biloba "Fairmount"	Fairmount Maidenhair Tree	I/D/M
Gleditisia triacanthos	Honey Locust	
Juglans		I
californica	California Walnut	C/I
hindsii	California Black Walnut	I/D/M
Lagerstroemia indica	Crape Myrtle	I
Ligustrum lucidum	Glossy Privet	C/I/M
Liquidambar styraciflua	Sweet Gum	I
Liriodendron tulipifera	Tulip Tree	
Lyonothamnus floribundus		C
ssp. Asplenifolius	Fernleaf Catalina Ironwood	C/I/D
Melaleuca spp.	Melaleuca	C/I
Parkinsonia aculeate	Mexican Palo Verde	
Pistacia	Chinese Pistache	
chinensis	Pistachio Nut	C/I/D

vera	Pistachio Nut	I
Pittosporum		
phillyraeoides	Willow Pittosporum	C/I/D
viridiflorum	Cape Pittosporum	C/I
Platanus		
acerifolia	London Plane Tree	All zones
racemosa**	California Sycamore	C/I/M
Populus		
alba	White Poplar	D/M
fremontii**	Western Cottonwood	I
trichocarpa	Black Cottonwood	I/M
Prunus		
xblireiana	Flowering Plum	M
caroliniana	Carolina Laurel Cherry	C
ilicifolia**	Hollyleaf Cherry	C
lyonii**	Catalina Cherry	C
serrulata ‘Kwanzan’	Flowering Cherry	M
yedoensis ‘Akebono’	Akebono Flowering Cherry	M
Quercus		
agrifolia**	Coast Live Oak	C/I
engelmannii	Engelmann Oak	I
** suber	Cork Oak	C/I/D
Rhus		
lancea**	African Sumac	C/I/D
Salix spp.**	Willow	All zones (R)
Tristania conferta	Brisbane Box	C/I
Ulmus		
parvifolia	Chinese Elm	I/D
pumila	Siberian Elm	C/M
Umbellularia californica**	California Bay Laurel	C/I

SHRUBS		
Agave	Century Plant	D
americana	Century Plant	D
deserti	Shawis Century Plant	D
shawi**		
Amorpha fruticosa**	False Indigobush	I
Arbutus		
menziesii**	Madrone	C/I
Arctostaphylos spp.**	Manzanita	C/I/D
Atriplex**		
canescens	Hoary Saltbush	I
lentiformis	Quail Saltbush	D
Baccharis**		
glutinosa	Mule Fat	C/I
pilularis	Coyote Bush	C/I/D
Carissa grandiflora	Natal Plum	C/I
Ceanothus spp.**	California Lilac	C/I/M
Cistus spp.	Rockrose	C/I/D
Cneoridium dumosum**	Bushrue	C
Comarostaphylis**		
diversifolia	Summer Holly	C
Convolvulus cneorum	Bush Morning Glory	C/I/M
Dalea		
orcuttii	Orcutt's Delea	D
spinosa**	Smoke Tree	I/D
Elaeagnus		
pungens	Silverberry	C/I/M
Encelia**		
californica	Coast Sunflower	C/I
farinose	White Brittlebush	D/I
Eriobotrya		
deflexa	Bronze Loquat	C/I
Eriophyllum		
confertiflorum**	Golden Yarrow	C/I
staechadifolium	Lizard Tail	C
Escallonia spp.	Escallonia	C/I
Feijoa sellowiana	Pineapple Guava	C/I/D
Fouqueria splendens	Ocotillo	D
Fremontodendron**		
californicum	Flannelbush	I/M
mexicanum	Southern Flannelbush	I
Galvezia		
juncea	Baja Bush-Snapdragon	C
speciosa	Island Bush-Snapdragon	C
Garrya		
elliptica	Coast Silktassel	C/I
flavescens**	Ashy Silktassel	I/M

Heteromeles arbutifolia**	Ashy Silktassel	I/M
Lantana spp.	Toyon	C/I/M
Lotus scoparius	Lantana	C/I/D
Mahonia spp.	Deerweed	C/I
	Barberry	C/I/M
Malacothamnus		
clementinus		
	San Clemente Island Bush Mallow	C
fasciculatus**		
	Mesa Bushmallow	C/I
Melaleuca spp.		
Mimulus spp.**	Melaleuca	C/I/D
Nolina	Monkeyflower	C/I (R)
parryi		
parryi ssp. wolfii	Parry's Nolina	I
Photinia spp.	Wolf's Bear Grass	D
Pittosporum	Photinia	All Zones
crassifolium		
rhombifolium		CI/I
tobira 'Wheeleri'	Queensland Pittosporum	C/I
undulatum	Wheeler's Dwarf	C/I/D
viridiflorum	Victorian Box	C/I
Plumbago auriculata	Cape Pittosporum	C/I
Prunus	Cape Plumbago	C/I/D
caroliniana		
ilicifolia**	Carolina Laurel Cherry	C
lyonii**	Hollyleaf Cherry	C
Puncia granatum	Catalina Cherry	C
Pyracantha spp.	Pomegranate	C/I/D
Quercus	Firethorn	All Zones
dumosa**		
Rhamus	Scrub Oak	C/I
alaternus		
californica**	Italian Blackthorn	C/I
Rhaphiolepis spp.	Coffeeberry	C/I/M
Rhus	Rhaphiolepis	C/I/D
integrifolia**		
laurina	Lemonade Berry	C/I
lentii	Laurel Sumac	C/I
ovata**	Pink-Flowering Sumac	C/D
trilobata**	Sugarbush	I/M
Ribes	squawbush	I
viburnifolium		
speciosum**	Evergreen Currant	C/I
Romneya coulteri	Fuschia-Flowering Gooseberry	C/I/D
Rosa	Matilija Poppy	I
californica**		
minutifolia		

	Salvia spp.**	California Wild Rose	C/I
	Sambucus spp.**	Baja California Wild Rose	C/I
	Symphoricarpos mollis**	Sage	All Zones
	Syringa vulgaris	Elderberry	C/I/M
	Tecomaria capensis	Creeping Snowberry	C/I
	Teucrium fruticans	Lilac	M
	Toxicodendron**	Cape Honeysuckle	C/I/D
	diversilobum	Bush Germander	C/I
	Verbena		
	lilacina	Poison Oak	I/M
	Xylosma congestum		
	Yucca**	Lilac Verbena	C
	schidigera	Shiny Xylosma	C/I
	whipplei		
		Mojave Yucca	D
		Foothill Yucca	I

GROUNDCOVERS		
Achillea**	Yarrow	All Zones
Aptenia cordifolia	Apteria	C
Arctostaphylos spp.**	Manzanita	C/I/D
Baccharis**		
pilularis	Coyote Bush	C/I/D
Ceanothus spp.**	California Lilac	C/I/M
Cerastium tomentosum	Snow-in-Summer	All Zones
Coprosma kirkii	Creeping Coprosma	C/I/D
Cotoneaster spp.	Redberry	All Zones
Drosanthemum hispidum	Rosea Ice Plant	C/I
Dudleya		
brittonii	Brittonis Chalk Dudleya	C
pulverulenta**	Chalk Dudleya	C/I
virens	Island Live Fore-ever	C
Eschscholzia californica**	California Poppy	All Zones
Euonymus fortunei		
‘Carrierei’	Glossy Winter Creeper	M
‘Coloratus’	Purple-Leaf Winter Creeper	M
Ferocactus viridescens**	Coast Barrel Cactus	C
Gaillardia grandiflora	Blanket Flower	All Zones
Gazania spp.	Gazania	C/I
Helianthemum spp.**	Sunrose	All Zones
Lantana spp.	Lantana	C/I/D
Lasthenia		
californica**	Common Goldfields	I
glabrata	Coastal Goldfields	C
Lupinus spp.**	Lupine	C/I/M
Myoporum spp.	Myoporum	C/I
Pyracantha spp.	Firethorn	All zones
Rosmarinus officinalis	Rosemary	C/I/D
Santolina		
chamaecyparissus	Lavender Cotton	All Zones
virens	Santolina	All Zones
Trifolium frageriferum	O’Connor’s Legume	C/I
Verbena		
rigida	Verbena	All Zones
Viguiera laciniata**	San Diego Sunflower	C/I
Vinca		
minor	Dwarf Periwinkle	M

VINES		
Antigonon leptopus	San Miguel Coral Vine	C/I
Distictis buccinatoria	Blood-Red Trumpet Vine	C/I/D
Keckiella cordifolia**	Heart-Leaved Penstemon	C/I
Lonicera		
japonica 'Halliana'	Hall's Honeysuckle	All Zones
subspicata**	Chaparral Honeysuckle	C/I
Solanum		
jasminoides	Potato Vine	C/I/D

PERENNIALS		
Coreopsis		
gigantean	Giant Coreopsis	C
grandiflora	Coreopsis	All Zones
maritime	Sea Dahlia	C
verticillata	Coreopsis	C/I
Heuchera maxima	Island Coral Bells	C/I
Iris douglasiana**	Douglas Iris	C/M
Iva hayesiana**	Poverty Weed	C/I
Kniphofia uvaria	Red-Hot Poker	C/M
Lavandula spp.	Lavender	All Zones
Limonium californicum		
var. mexicanum	Coastal Statice	C
perezii	Sea Lavender	C/I
Oenothera spp.	Primrose	C/I/M
Penstemon spp.**	Penstemon	C/I/D
Satureja douglasii	Yerba Buena	C/I
Sisyrinchium		
bellum	Blue-Eyed Grass	C/I
californicum	Golden-Eyed Grass	C
Solanum		
xantii	Purple Nightshade	C/I
Zauschneria**		
californica	California Fuschia	C/I
cana	Hoary California Fuschia	C/I
'Catalina'	Catalina Fuschia	C/I

ANNUALS		
Lupinus spp.**	Lupine	C/I/M

APPENDIX F

Prohibited Plant List

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Trees		
Abies species	Fir	F
Acacia species (numerous)	Acacia	F, I
Agonis juniperina	Juniper Myrtle	F
Araucaria species (A. heterophylla, A. araucana, A. bidwillii)	Araucaria (Norfolk Island Pine, Monkey Puzzle Tree, Bunya Bunya)	F
Callistemon species (C. citrinus, C. rosea, C. viminalis)	Bottlebrush (Lemon, Rose, Weeping)	F
Calocedrus decurrens	Incense Cedar	F
Casuarina cunninghamiana	River She-Oak	F
Cedrus species (C. atlantica, C. deodara)	Cedar (Atlas, Deodar)	F
Chamaecyparis species (numerous)	False Cypress	F
Cinnamomum camphora	Camphor	F
Cryptomeria japonica	Japanese Cryptomeria	F
Cupressocyparis leylandii	Leyland Cypress	F
Cupressus species (C. fobesii, C. glabra, C. sempervirens,)	Cypress (Tecate, Arizona, Italian, others)	F
Eucalyptus species (numerous)	Eucalyptus	F, I
Juniperus species (numerous)	Juniper	F
Larix species (L. decidua, L. occidentalis, L. kaempferi)	Larch (European, Japanese, Western)	F
Leptospermum species (L. laevigatum, L. petersonii)	Tea Tree (Australian, Tea)	F
Lithocarpus densiflorus	Tan Oak	F
Melaleuca species (M. linariifolia, M. nesophila, M. quinquenervia)	Melaleuca (Flaxleaf, Pink, Cajeput Tree)	F, I
Olea europea	Olive	I
Picea (numerous)	Spruce	F
Palm species (numerous)	Palm	F, I
Pinus species (P. brutia, P. canariensis, P. b. eldarica, P. halepensis, P. pinea, P. radiata, numerous others)	Pine (Calabrian, Canary Island, Mondell, Aleppo, Italian Stone, Monterey)	F

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Platycladus orientalis	Oriental arborvitae	F
Podocarpus species (P. gracilior, P. macrophyllus, P. latifolius)	Fern Pine (Fern, Yew, Podocarpus)	F
Pseudotsuga menziesii	Douglas Fir	F
Schinus species (S. molle, S. terebenthifolius)	Pepper (California and Brazilian)	F, I
Tamarix species (T. africana, T. aphylla, T. chinensis, T. parviflora)	Tamarix (Tamarisk, Athel Tree, Salt Cedar, Tamarisk)	F, I
Taxodium species (T. ascendens, T. distichum, T. mucronatum)	Cypress (Pond, Bald, Monarch, Montezuma)	F
Taxus species (T. baccata, T. brevifolia, T. cuspidata)	Yew (English, Western, Japanese)	F
Thuja species (T. occidentalis, T. plicata)	Arborvitae/Red Cedar	F
Tsuga species (T. heterophylla, T. mertensiana)	Hemlock (Western, Mountain)	F
Groundcovers, Shrubs & Vines		
Acacia species	Acacia	F, I
Adenostoma fasciculatum	Chamise	F
Adenostoma sparsifolium	Red Shanks	F
Agropyron repens	Quackgrass	F, I
Anthemis cotula	Mayweed	F, I
Arbutus menziesii	Madrone	F
Arctostaphylos species	Manzanita	F
Arundo donax	Giant Reed	F, I
Artemisia species (A. abrotanium, A. absinthium, A. californica, A. caucasica, A. dracunculus, A. tridentata, A. pynocephala)	Sagebrush (Southernwood, Wormwood, California, Silver, True tarragon, Big, Sandhill)	F
Atriplex species (numerous)	Saltbush	F, I
Avena fatua	Wild Oat	F
Baccharis pilularis	Coyote Bush	F
Bambusa species	Bamboo	F, I
Bougainvillea species	Bougainvillea	F, I
Brassica species (B. campestris, B. nigra, B. rapa)	Mustard (Field, Black, Yellow)	F, I

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Bromus rubens	Foxtail, Red brome	F, I
Castanopsis chrysophylla	Giant Chinquapin	F
Cardaria draba	Hoary Cress	I
Carpobrotus species	Ice Plant, Hottentot Fig	I
Cirsium vulgare	Wild Artichoke	F,I
Conyza bonariensis	Horseweed	F
Coprosma pumila	Prostrate Coprosma	F
Cortaderia selloana	Pampas Grass	F, I
Cytisus scoparius	Scotch Broom	F, I
Dodonaea viscosa	Hopseed Bush	F
Eriodictyon californicum	Yerba Santa	F
Eriogonum species (E. fasciculatum)	Buckwheat (California)	F
Fremontodendron species	Flannel Bush	F
Hedera species (H. canariensis, H. helix)	Ivy (Algerian, English)	I
Heterotheca grandiflora	Telegraph Plant	F
Hordeum leporinum	Wild barley	F, I
Juniperus species	Juniper	F
Lactuca serriola	Prickly Lettuce	I
Larix species (numerous)	Larch	F
Larrea tridentata	Creosote bush	F
Lolium multiflorum	Ryegrass	F, I
Lonicera japonica	Japanese Honeysuckle	F
Mahonia species	Mahonia	F
Mimulus aurantiacus	Sticky Monkeyflower	F
Miscanthus species	Eulalie Grass	F
Muhlenbergia species	Deer Grass	F
Nicotiana species (N. bigelovii, N. glauca)	Tobacco (Indian, Tree)	F, I
Pennisetum setaceum	Fountain Grass	F, I
Perovskia atroplicifolia	Russian Sage	F
Phoradendron species	Mistletoe	F
Pickeringia montana	Chaparral Pea	F
Rhus (R. diversiloba, R. laurina, R. lentii)	Sumac (Poison oak, Laurel, Pink Flowering)	F
Ricinus communis	Castor Bean	F, I

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Rhus Lentii	Pink Flowering Sumac	F
Rosmarinus species	Rosemary	F
Salvia species (numerous)	Sage	F, I
Salsola australis	Russian Thistle	F, I
Solanum Xantii	Purple Nightshade (toxic)	I
Silybum marianum	Milk Thistle	F, I
Thuja species	Arborvitae	F
Urtica urens	Burning Nettle	F
Vinca major	Periwnkle	I

*F = flammable, I = Invasive

NOTES:

1. Plants on this list that are considered invasive are a partial list of commonly found plants. There are many other plants considered invasive that should not be planted in a fuel modification zone and they can be found on The California Invasive Plant Council's Website www.cal-ipc.org/ip/inventory/index.php. Other plants not considered invasive at this time may be determined to be invasive after further study.
2. For the purpose of using this list as a guide in selecting plant material, it is stipulated that all plant material will burn under various conditions.
3. The absence of a particular plant, shrub, groundcover, or tree, from this list does not necessarily mean it is fire resistive.
4. All vegetation used in Vegetation Management Zones and elsewhere in this development shall be subject to approval of the Fire Marshal.
5. Landscape architects may submit proposals for use of certain vegetation on a project specific basis. They shall also submit justifications as to the fire resistivity of the proposed vegetation.