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Preliminary Fire Protection Plan

Moreno Valley Farm

Tract 38955

SEPTEMBER 2025

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	above mean sea level
APN	Assessor Parcel Number
CBC	California Building Code
CEQA	California Environmental Quality Act
CFA	California Fire Alliance
CFC	California Fire Code
City	Moreno Valley
County	Riverside County
EIR	Environmental Impact Report
EMWD	Eastern Municipal Water District
FHSZ	Fire Hazard Severity Zone
FMZ	Fuel Modification Zone
FS	Fire Station
FRAP	Fire and Resource Assessment Program
FPP	Fire Protection Plan
gpm	gallons per minute
HOA	Homeowner's Association
IFC	International Fire Code
LRA	Local Responsibility Area
mph	miles per hour
MVMC	Moreno Valley Municipal Code
NFPA	National Fire Protection Association
PRC	Public Resources Code
PA	Planning Area
Project	Moreno Valley Farm
MVFD	Moreno Valley Fire Department
RCFD	Riverside County Fire Department
SRA	State Responsibility Area
VHFHSZ	Very High Fire Hazard Severity Zone

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Executive Summary

This Preliminary Fire Protection Plan (FPP) has been prepared for the Moreno Valley Farm (Project) located within the City of Moreno Valley (City) in Riverside County (County) in Southern California (Inland Empire region). The Moreno Valley Farm Project proposes the construction of a residential development with 139 townhome units, a clubhouse, a pool, and open space areas on 9.33 acres. The Project also incorporates a bioretention basin, bioretention trenches, manufactured slopes, roadways, and essential infrastructure. Furthermore, the Project preserves approximately 1.04 acres of common open space and 21,165 square feet of private outdoor space attached to each unit.

This FPP provides measures for fire protection that meet the applicable portions of Riverside County Fire Department (RCFD) and Moreno Valley Fire Department (MVFD) standards and further evaluates and identifies the potential fire risk associated with the Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria. The purpose of this plan is to generate and memorialize the fire safety requirements and standards of the RCFD 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 Project as well as the Project's potential impact on the existing fire protection service. Tasks completed in preparation of this FPP include data review, code review, site fire risk analysis, land use plan review, fire behavior modeling, and site-specific recommendations. Requirements and recommendations herein are based on site-specific fire environment analysis and Project characteristics and incorporates 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 Project, in its current condition, may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire spread. Under extreme conditions, wind-driven wildfires from the north and/or east could cast embers onto the property. Once the Project site is developed, the on-site fire potential will be much lower than its current condition due to the conversion of wildland fuels to building footprints, parking areas, managed landscapes, fuel modification areas, improved accessibility for fire personnel, and structures built to the latest ignition and ember resistant fire codes.

It is important to note that the fire safety requirements that will be implemented on this site, including ignition resistant construction standards, along with requirements for water supply, fire apparatus access, fuel modification and defensible space, the installation of National Fire Protection Association (NFPA) 13D automatic interior fire sprinkler systems within each of the single-family dwelling units, and fire response travel times were integrated into the code requirements and internal guidelines based on results of post-fire assessments, similar to the After Action Reports that are now prepared after large fire events. When it became clear that specifics of how structures were built, how fire and embers contributed to ignition of structures, what effects fuel modification had on structure ignition, how fast firefighters could respond, and how much (and how dependable) water was available, were critically important to structure survivability, the Fire and Building codes were revised appropriately. Riverside County now boasts some of the most restrictive codes for building within Wildland Urban Interface (WUI) areas that focus on preventing structure ignition from heat, flame, and burning embers.

The proposed Project encompasses a span of 9.33 acres of single-family residential units, open space, recreational amenities, and essential infrastructure. As such, 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. Road improvements with fire engine turnouts and turnarounds provide access to within 150 feet of the structures. Water availability and flow will be consistent with requirements including fire flow and hydrant distribution required by local and state codes. These features along with the ignition resistance of all structures, NFPA 13D automatic interior fire sprinkler systems, and the pre-planning, training and awareness will assist responding firefighters through prevention, protection, and suppression capabilities.

As detailed in this FPP, the Project site's fire protection systems will include a redundant layering of protection methods that have proven to reduce overall fire risk. The requirements and recommendations included herein are performance based and Project site–specific, considering the Project site's unique characteristics rather than a prescriptive, one-size-fits-all approach. The fire protection systems are designed to increase occupant and building safety, to reduce the fire risk on site, to minimize risks associated with typical uses, and aid the responding firefighters during an emergency. No singular measure is intended to be relied upon for the Project site's fire protection, but rather, a system of fire protection measures, methods, and features combine to result in enhanced fire safety, reduced fire potential, and improved safety in the development.

Early evacuation for any type of wildfire emergency at the Project site is the preferred method of providing for occupant and business safety, consistent with the Owner's and RCFD's current approach for evacuation. As such, the Project's Owner and Property Management Company will formally adopt, practice, and implement a "Ready, Set, Go!" (Riverside County Fire Department 2020) approach to Project site evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the state of California and most fire agencies, including; Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing potential for errors, maintaining the Project site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and Project 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 Moreno Valley Farm Project as part of the proposed development plan. These measures are discussed in more detail throughout this FPP.

The following measures shall be established to the satisfaction of the City for each Planning Area prior and as a condition to issuance of a building permit for any building on that Planning Area.

1. The proposed project buildings will be constructed of ignition resistant[1] construction materials and include National Fire Protection Association (NFPA) 13D consistent automatic fire sprinkler systems.
2. Fuel Modification will be provided around the perimeter of all structures, as required by RCFD/MVFD and will be a minimum of 100 feet wide, with all areas of the Project site around structures being converted to either non-combustible paved surfaces or fire-resistant landscaping including an ember resistant Zone 0 around each structure. The Project will comply with Zone 0 and Zone 1 requirements onsite and will achieve an offsite FMZ equivalent on adjacent properties due to existing land uses.

[1] A type of building material that resists ignition or sustained flaming combustion sufficiently to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames, as prescribed in CBC, Chapter 7A and State Fire Marshal Standard 12-7A-5, Ignition-Resistant Materials.

3. For any Planning Area in which the square footage or footprint of a proposed building has been modified from that described in this FPP, the applicant shall submit and the MVFD shall have approved the revised FPP for the Planning Area, consistent with Item 2 above.
4. Landscape plantings will utilize plants recommended by the MVFD for use in Fuel Modification Zones (See Appendix F, *County of Riverside California Plant Friendly List)*
5. Fire apparatus access roads (i.e., public, and private streets) will be provided for the entire Project and will provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and width. Primary access and internal circulation will comply with the requirements of the MVFD.
6. All structures will include automatic interior fire sprinkler systems meeting NFPA and MVFD requirements for each occupancy type.
7. Water capacity and delivery will be provided by a reliable water source for operations and during emergencies requiring extended fire flow.
8. Should future iterations of the Project's site plan result in buildings that do not achieve a minimum of 100 feet of defensible space, then alternative materials and methods may be proposed to provide the functional equivalency of a full 100 feet of defensible space. Alternative materials and methods will be to the satisfaction of the MVFD and may include structural hardening enhancements or landscape features, like non-combustible walls and/or heat deflecting walls.

The following measures shall be implemented by the Project's Homeowner's Association (HOA) and/or Property Manager, or similar entity. Annual maintenance should occur before May 1st of each year and inspected by MVFD or an approved third party.

1. On-going maintenance of all fuel modification will be managed by each individual property owner, the Project's Property Manager(s), or another approved entity, at least annually or as needed.
2. The Project will provide property owners informational brochures at time of occupancy, which will include an outreach and educational role to ensure fire safety measures detailed in this FPP have been implemented and development-wide "Ready, Set, Go!" plans prepared.

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1 Introduction

This Preliminary Fire Protection Plan (FPP) has been prepared for the proposed Moreno Valley Farm (Project) within the City of Moreno Valley in the County of Riverside, California. This FPP evaluates and identifies the potential fire risk associated with the Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria, including a conceptual development plan for the Project site described below. The purpose of this plan is to generate and memorialize the fire safety requirements and standards of the Riverside County Fire Department (RCFD) and Moreno Valley Fire Department (MVFD) along with Project-specific design features and implementation measures based on the Project site, its intended use, and its fire environment.

As part of the assessment, the plan has considered the property location, topography, surrounding combustible vegetation (fuel types), climatic conditions, and fire history for the Project site and the surrounding area. 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 for the Project site and to address potential fire impacts to the surrounding area. The plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect structures and essential infrastructures within the Project site. The following tasks were performed toward completion of this plan:

- Gather Project site specific climate, terrain, and fuel data;
- Collect Project site photographs;
- Process and analyze the data using the latest GIS technology;
- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment;
- Analyze and guide design of proposed infrastructure;
- Analyze the existing emergency response capabilities;
- Assess the potential fire risk posed by the construction and operation of the Project to the Project site and surrounding area;
- Prepare this FPP detailing how fire risk will be mitigated on the Project site and in the surrounding area through a system of fuel modification, structural ignition resistance enhancements, and fire protection delivery system upgrades.

Field observations were utilized to augment existing digital Project site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Refer to Appendix A, *Representative Project Site Photographs* for Project site photographs of existing conditions.

1.1 Intent

The intent of this FPP is to provide fire planning guidance and requirements for reducing fire risk and demand for fire protection services associated with the Project. To that end, the fire protection "system" detailed in this FPP includes redundant layering of measures, including pre-planning, fire prevention, fire protection, passive and active suppression, and related measures proven to reduce fire risk. The fire protection system planned for the Project has proven, through real-life wildfire encroachment examples throughout Southern California, to reduce the fire risk associated with this type of residential development along with recreational spaces and open areas.

1.2 Applicable Codes/Existing Regulations

The FPP demonstrates that the Project site would comply with applicable portions of RCFD, Fire Prevention Standards and County Ordinances No. 460 and No. 787.10 and California Code of Regulations, Title 24, Part 2, 2022 California Building Code (CBC), which is based on the 2021 International Building Code, Part 2.5, 2022 California Residential Code (CRC), which is based on the 2021 International Residential Code (IRC), and Part 9, 2022 California Fire Code (CFC), including Chapter 49, which is based on 2021 International Fire Code (IFC) or applicable code as adopted and amended by RCFD and the City of Moreno Valley at the time of construction. Additionally, MVFD references Technical Policies & Standards for informational purposes in clarifying and interpreting provisions of the CFC, National Fire Protection Association (NFPA) and California Public Resources Code (PRC).

The Project site is located within an area considered to be a Local Responsibility Area (LRA) Very High Fire Hazard Severity Zone (VHFHSZ), High Fire Hazard Severity Zone (HFHSZ), and Moderate Fire Hazard Severity Zone (MFHSZ) as designated by the California Department of Forestry and Fire Protection (CAL FIRE) as shown in Figure 3. The previous CAL FIRE Fire Hazard Severity Zone map classified the Project site within LRA land without a Fire Hazard Severity Zone designation (Figure 4). It should be noted that CAL FIRE released new LRA FHSZ maps for Southern California on March 24, 2025. Local agencies have 120 days from receiving the maps from CAL FIRE to adopt the new maps or provide modifications that are additive. Fire hazard designations are based on topography, vegetation, and weather, amongst other factors. High and Very High FHSZ designations do not indicate that an area is not safe for development. They do, however, indicate that specific fire protection features that minimize structure vulnerability will be required, including Chapter 7A of the CBC, Section R337 of the CRC, Chapter 49 of the 2022 CFC, and provisions for maintained fuel modification zones, amongst others described in the FPP. The review and possible acceptance of FHSZ designations in LRA will be in compliance with California Government Code Sections 51175 through 51189.

The designations of Fire Hazards are based on topography, vegetation, and weather, amongst other factors with more hazardous sites, which include steep terrain, un-maintained fuels/vegetation, and WUI locations. As described in this FPP, the Project will meet all applicable fire and building code requirements for building in these higher fire hazard areas or meet the intent of the code through the application of Project site-specific fire protection measures. These codes have been developed through decades of after fire structure save and loss evaluations to determine what causes building loss during wildfires. The resulting fire codes now focus on mitigating former structural vulnerabilities through construction techniques and materials so that the buildings are resistant to ignitions from direct flames, heat, and embers, as indicated in the 2022 California Building Code (Chapter 7A, Section 701A Scope, Purpose, and Application).

1.3 Project Summary

1.3.1 Location

The 9.33-acre Project site is located within the City of Moreno Valley (City) in Riverside County (County) in Southern California (Inland Empire region). The Project site is located north of the intersection of California State Route 60 (SR-60) and Interstate 215 (I-215). More specifically, the Project site is located north of Box Springs Road, east of Morton Road, and west of Lewisia Avenue on Assessor Parcel Numbers (APNs): 256-200-002, 256-200-003, and 256-200-004.The Project site is located in Section 34, Township 02S, Range 04W on the U.S. Geological Survey (USGS) Riverside East 7.5-Minute Quadrangle. Refer to Figure 1 for Project Location Map.

1.3.2 Existing Land Use

The Project site is currently comprised of a strip mall and parking lot on the southern portion of the project site and vacant undeveloped land on the northern portion of the Project site. The vacant land is predominately disturbed habitat, characterized primarily by bare soil with some patches of low-growing grass, and trees and shrubs dispersed throughout. The Project site has a single-family residential development to the north, a nonprofit to the east, and a multi-family residential development to the west.

1.3.3 Project Description

The Moreno Valley Farm Project proposes the construction of a single-family residential development consisting of townhomes on 9.33 acres within the city of Moreno Valley in Riverside County (Figure 2, Project Site Plan Map). The Project involves the construction of 139 townhome units, a clubhouse, a pool, and open space areas. The Project also incorporates a bioretention basin, bioretention trenches, manufactured slopes, roadways, and essential infrastructure. Furthermore, the Project preserves approximately 1.04 acres of common open space and 21,165 square feet of private outdoor space attached to each unit.

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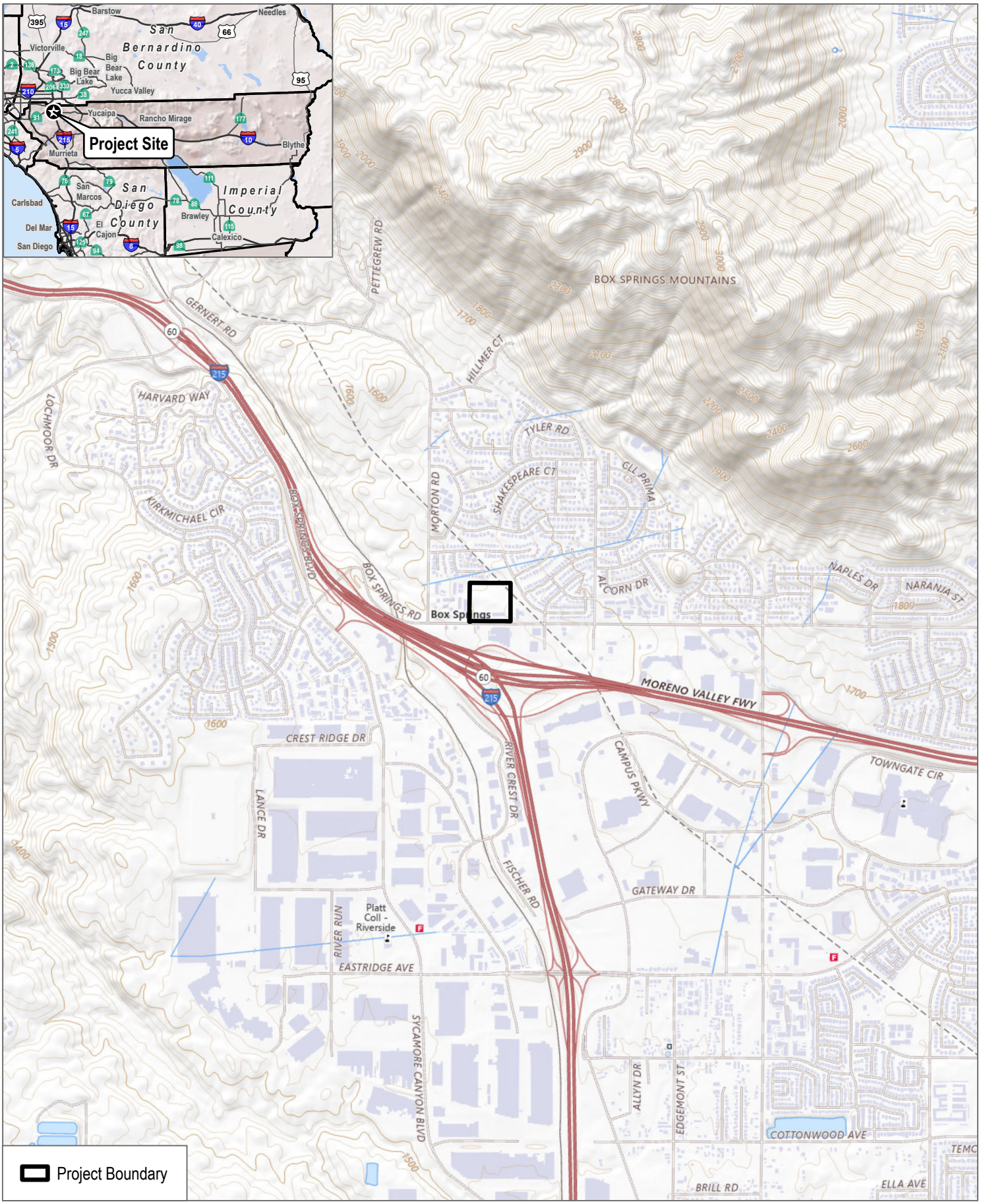

SOURCE: USGS National Map 2025

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location Map

Moreno Valley Farm Preliminary Fire Protection Plan

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SOURCE: D.F. Adler Designs 2025

FIGURE 2

Proposed Site Plan Map

Moreno Valley Farm Preliminary Fire Protection Plan

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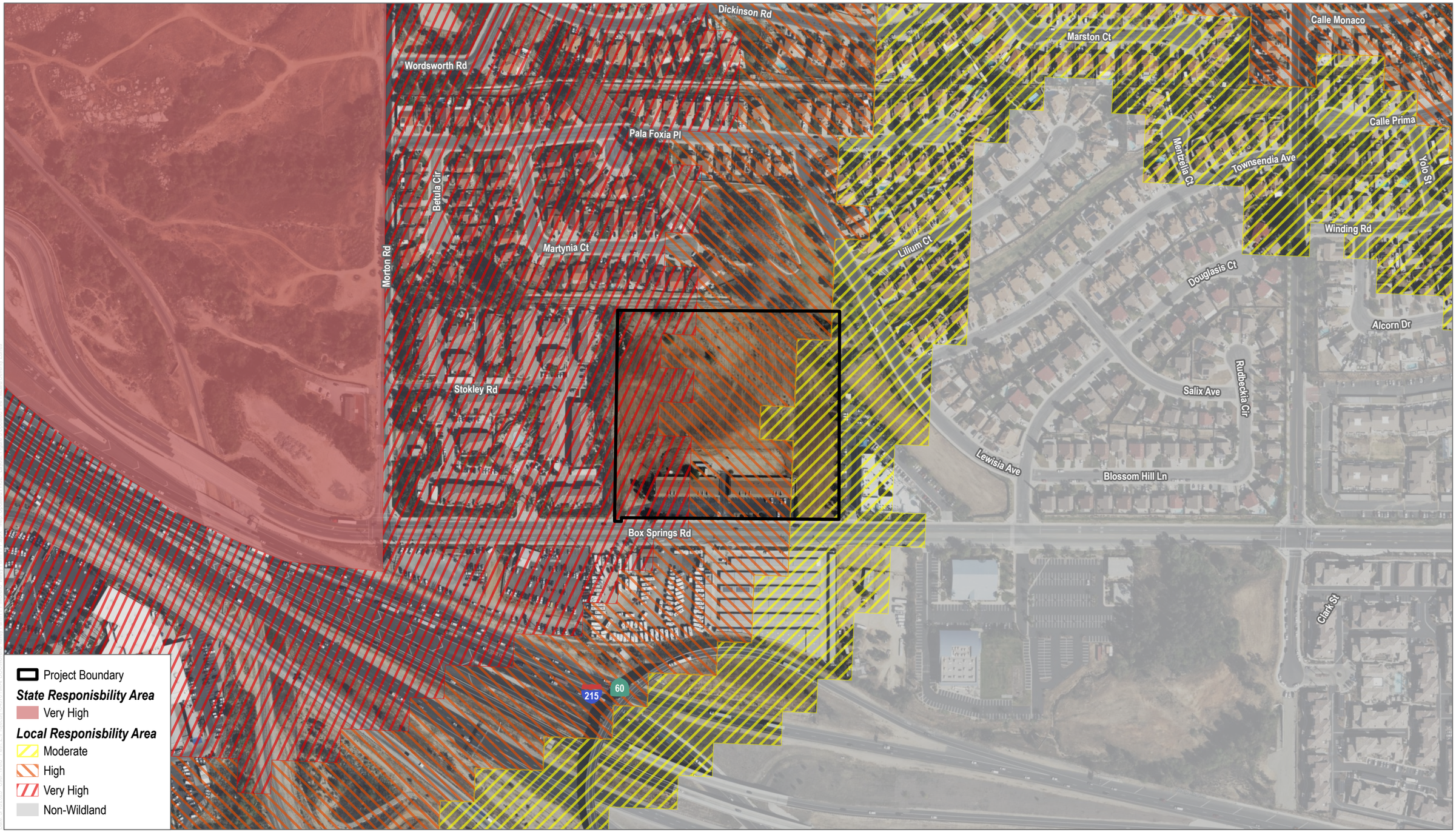

SOURCE: Bing Maps Imagery 2024; CalFire 2025

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0 125 250 Feet

FIGURE 3

Updated CAL FIRE Fire Hazard Severity Zone Map

Moreno Valley Farm Preliminary Fire Protection Plan

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SOURCE: Bing Maps Imagery 2024; CalFire 2025

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0 125 250 Feet

FIGURE 4

Previous CAL FIRE Fire Hazard Severity Zone Map

Moreno Valley Farm Preliminary Fire Protection Plan

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2 Project Site Risk Analysis

2.1 Field Assessment

A field assessment of the Moreno Valley Farm Project area was conducted on May 14, 2025, in order to confirm and acquire Project site information, document existing conditions, and to determine potential actions for addressing the protection of the Project's structures. While on the Project site, Dudek's Fire Protection Planner assessed the area's topography, natural vegetation and fuel loading, surrounding land use and general susceptibility to wildfire. Among the field tasks that were completed are:

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

Field observations were utilized to augment existing Project site data in generating the fire behavior models and formulating the recommendations detailed in this report.

2.2 Project Site Characteristics and Fire Environment

Fire environments are dynamic systems and include many types of environmental factors and Project site characteristics. Fires can occur in any environment where conditions are conducive to ignition and fire movement. Areas of naturally vegetated open space are typically comprised of conditions that may be favorable to wildfire spread. The three major components of fire environment are topography, climate, and vegetation (fuels). The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fire resistive landscapes directly adjacent to the structure(s), application of known ignition resistive materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent to the Project site is necessary to understand the potential for fire within and around the Project site.

The following sections discuss the Project site characteristics, local climate, and fire history within and surrounding the Project site. The following sections discuss the characteristics of the Project site at a regional scale. The intent of evaluating conditions at this macro-scale is providing a better understanding of the regional fire environment, which is not constrained by property boundary delineations.

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope in the absence of wind. Flat terrain tends to have insignificant effect on fire spread, resulting in fires that are driven by wind. The portion of the project site planned to be developed is relatively flat with a slight hill towards the western boundary. The highest point is approximately 1,555 feet amsl, while the lowest point is approximately 1,530 feet amsl. Box Springs Mountain Reserve is to the northeast, north, and northwest and Sycamore Canyon Park is southwest of the Project site.

2.2.2 Climate

Throughout southern California, and specifically at the Project site, climate has a considerable influence on fire risk. The climate of Moreno Valley in Riverside County is typical of a Mediterranean area, with warm, dry summers and cool, wet winters. Average elevated temperatures range from around 65° F in December up to 94°F in August. Precipitation has been averaging just under 10 inches and typically occurs between December and March. The average hourly wind speed ranges between 5 mph and 7 mph. The prevailing wind direction is an onshore flow from the west (Weather Spark, 2023).

From a regional perspective, the fire risk in southern California can be divided into three distinct “seasons” (Nichols et al. 2011, Baltar et al 2014). The first season, the most active season and covering the summer months, extends from late May to late September. This is followed by an intense fall season characterized by fewer but larger fires. This season begins in late September and continues until early November. The remaining months, November to late May cover the mostly dormant, winter season. Mensing et al. (1999) and Keeley and Zedler (2009) found that large fires in the region consistently occur at the end of wet periods and the beginning of droughts. Fires can be a significant issue during summer and fall, before the rainy period, especially during dry Santa Ana wind events. Although Santa Ana events can occur any time of the year, they generally occur during the autumn months, although the last few years have resulted in spring (April - May) and summer events. Santa Ana winds may gust up to 75 miles per hour (mph) or higher. This phenomenon markedly increases the wildfire danger and intensity in the Project area by drying out and preheating vegetation (fuel moisture of less than 5% for 1-hour fuels is possible) as well as accelerating oxygen supply, and thereby, making possible the burning of fuels that otherwise might not burn under cooler, moister conditions.

The prevailing wind pattern is from the west (onshore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west–southwest (sea), and at night winds are from the northeast (land). The highest wind velocities are associated with downslope, canyon, and Santa Ana winds.

2.2.3 Vegetation

2.2.3.1 Fuels

The Project site is predominately disturbed habitat, as the site is characterized primarily by bare soil with some patches of low-growing grass. Additionally, some trees and shrubs are dispersed throughout the site. Offsite, the Project is surrounded by residential and commercial developments with some shrubs and trees. Vegetation types were derived from an on-site field assessment of the Project site. The vegetation cover types were assigned corresponding fuel models for use during Project site fire behavior modeling. Section 3 describes the fire modeling conducted for the Project Area.

2.2.3.2 Vegetation Dynamics

The vegetation characteristics described above are used to model fire behavior, discussed in Section 3.0 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species 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, non-native grass dominated plant communities become seasonally prone to ignition and produce lower intensity, higher spread rate fires. In comparison, sage scrub can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels.

As described, vegetation plays a significant role in fire behavior and is a vital 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, or grading) or fuel reduction efforts are not diligently implemented. It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed fuel modification zones on-site. The fuel modification zones on the Project 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 (live or dead) over time, which results in reduced fire ignition, spread rates, and intensity.

2.2.4 Fire History

Fire history is a vital component of an FPP. Fire history data provides valuable information regarding fire spread, fire frequency, most vulnerable areas, and significant ignition sources, amongst others. In turn, this understanding of why fires occur in an area and how they typically spread can then be used for pre-planning and designing defensible communities.

Fire history represented in this FPP uses the Fire and Resource Assessment Program (FRAP) database. FRAP summarizes fire perimeter data dating to the late 1800s but is incomplete due to the fact that it only includes fires over 10 acres in size and has incomplete perimeter data, especially before the mid-20th century (Syphard and Keeley 2016). However, the data does provide a summary of recorded fires and can be used to show whether large fires have occurred in the Project area, which indicates whether they may be possible in the future.

According to available data from CAL FIRE in the FRAP database, there have been 72 fires that have burned within 5 miles of the site since the beginning of the historical fire data record. Recorded wildfires within 5 miles range from approximately 40.6 acres to approximately 4,051 acres (1981 Colton Fire) and the average fire size is approximately 912.6 acres. The 2023 Reche Fire (approximately 435.7 acres) is the most recent fire. No fires have burned on the site according to the historical fire record. MVFD may have data regarding smaller fires (other fires less than 10 acres) that have occurred on-site that have not been included herein. Fire history for the general vicinity of the Project site is illustrated in Appendix B, *Project Vicinity Fire History Map*.

Based on an analysis of the fire history data set, specifically, the years in which the fires burned, the average interval between wildfires within 5 miles of the site was calculated to be approximately one year with intervals ranging between 0 (multiple fires in the same year) to 10 years. Based on the analysis, it is expected that there will be wildland fires within 5 miles of the site at least every 10 years and on average, every year, as observed in the fire history record. Based on fire history, wildfire risk for the site is associated primarily with wind driven wildfire burning or spotting from the northeast.

2.3 Analysis of Wildfire Risk from Adding New Development

Humans (i.e., human related activities or human created features, services, or processes) are responsible for the majority of California wildfires (Syphard et al. 2007, 2008; Romero-Calcerrada et al. 2008). Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels without proper prevention measures in place. These ignitions predominantly occur as accidents, but may also be purposeful, such as in the case of arson. Roadways are a particularly high source for wildfire ignitions due to high usage and vehicle caused fires (catalytic converter failure, overheated brakes, dragging chains, tossed cigarette, and others) (Romero-Calcerrada et al. 2008). In Southern California, and Riverside County, the population living at, working in, or traveling through the wildland urban interface is vast and provides a significant opportunity for ignitions every day. However, it is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95 percent of wildfires are controlled below 10 acres (CAL FIRE 2019).

Research indicates that the type of dense developments, like the Moreno Valley Farm Project, are not associated with increased vegetation ignitions. Syphard and Keeley (2015) summarized all wildfire ignitions included in the CAL FIRE FRAP database – dating back over 100 years. They found, in the case of one Southern California county (San Diego County), equipment-caused fires were by far the most numerous, and these also accounted for most of the area burned, followed closely by the area burned by powerline fires. This pattern is consistent beyond San Diego County and is applicable in Riverside County and nearby San Bernardino County. Ignitions classified as equipment caused frequently resulted from exhaust or sparks from power saws or other equipment with gas or electrical motors, such as lawn mowers, trimmers or tractors and associated with lower density housing. In San Diego County and Riverside County, ignitions were more likely to occur close to roads and structures, and at intermediate structure densities.

As Exhibits 1-3 illustrate, housing density directly influences susceptibility to fire because in higher density developments, there is one interface (the community perimeter) with the wildlands whereas lower density development creates more structural exposure to wildlands, less or no ongoing landscape maintenance (an intermix rather than interface), and consequently more difficulty for limited fire resources to protect well-spaced homes. The intermix includes housing amongst the unmaintained fuels whereas the proposed project converts all fuels within the footprint and provides a wide, managed fuel modification zone separating homes from unmaintained fuel and creating a condition that makes defense easier. Syphard and Keeley go on to state that “The WUI, where housing density is low to intermediate is an apparent influence in most ignition maps.” Further enforcing the conclusion that lower density housing poses a higher ignition risk than higher density communities. They also state that “Development of low-density, exurban housing may also lead to more homes being destroyed by fire” (Syphard et al. 2013). As discussed in detail throughout this FPP, the project site is a planned ignition resistant residential community designed to include professionally managed and maintained fire protection components, modern fire code compliant safety features and specific measures provided where ignitions are most likely to occur (such as roadways). Therefore, the development of the site would not be expected to materially increase the risk of vegetation ignitions.

Exhibit 1. Example of “higher density” development. Homes are ignition resistant and excludes readily ignitable vegetative fuels throughout and provides a perimeter fuel modification zone. This type of new development requires fewer fire resources to defend and can minimize the likelihood of on-site fires spreading off site.

Exhibit 2. Example of “moderate density” development. Homes are located on larger properties and include varying levels of ignition resistance and landscape / fuel modification provision and maintenance. This type of development results in a higher wildland exposure level for all homes and does not provide the same buffers from wildfire encroaching onto the site or starting at a structure and moving into the wildlands as a higher density project.

Exhibit 3. Example of "lower density" development. Homes are interspersed amongst wildland fuels, are of varying ages, and include varying levels of fuel modification zone setbacks. Homes are exposed on most or all sides by flammable vegetation and properties rely solely on owners for maintenance, are often far distances from the nearest fire station, and have minimal buffer from on-site fire spreading to wildlands.

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

As discussed above, research indicates that it is less likely for higher density developments to be impacted by wildfires than lower density developments. The same protections that starve wildfire of fuels and minimize or prevent wildfire from transitioning into a higher density community such as the Moreno Valley Farm Project, also serve to minimize or prevent on-site fires from transitioning into the wildlands. Customized project FMZs are crucial as the strategic design and placement of fuels treatments can disrupt or slow fire spread, reduce fire intensity, and facilitate fire suppression within a landscape (Braziunas et al., 2021). This is true regardless of the direction a vegetation fire may be burning – whether toward a community or from within a community. The risk of a structure being destroyed is significantly lower when defensible space is implemented on both shallow and steep properties (Syphard et al., 2014). Even if just half the landscape is treated, the percentage of houses exposed to fire can decrease from 51% to 16% (Braziunas et al., 2021). Moreover, when FMZs are designed properly, they not only protect homes but also the surrounding environment. For example, when the Tahoe Basin experienced the Angora Fire in 2007, fuel treatments had the dual effect of saving homes and increasing forest survival (Safford et al., 2009). In areas where fuel management had been conducted prior to the Angora Fire, home loss was significantly reduced in the adjacent community and 85% of the trees survived, as compared to the 22% that survived in

untreated areas (Safford et al., 2009). Fuel management treatments also facilitated the ecological benefit of reduced fire severity, including higher post-fire soil litter cover, higher herbaceous plant cover, higher diversity, and lower levels of invasive beetles (Safford et al., 2009). At a minimum, managing defensible space can reduce risk across multiple scales by damping fire risk, reducing the impact of fire, and in turn reducing annual fire risk (Braziunas et al., 2021).

Further, the requirement that all structures will include an interior fire sprinkler system significantly reduces the likelihood that a building fire spreads to the point of flashover, where a structure will burn beyond control and produce embers. Interior sprinklers are very efficient, keeping fires to the room of origin, or extinguishing the fire before the responding firefighters arrive. Similarly, the irrigated fuel modification zones are positioned throughout the development areas as well as the first zones on the perimeter of the structures within the development area. Irrigated zones include plants with high internal moisture and spacing between plants and plant groups that 1) make it difficult to ignite and 2) make it difficult for fire to spread plant to plant. Lastly, additional humans on the site result in fast detection of fires and fast firefighter response, a key in limiting the growth of fires beyond the incipient stage.

If a wildfire were to ignite from human activity today, fire detection and response could be delayed. Delayed detection would contribute to delayed response to the scene. Fire size up (determining the needed firefighting resources) and requests for additional resources, including aerial support, also are delayed in comparison to post-construction of the Project. If a hiker or mountain biker in the area were to start a fire, detection and response would be anticipated on a fast timeline due to the residents that would be living within the community with the ability to detect fires throughout the property. The quick detection and call to 911 would result in faster response from the nearby fire stations. If a fire is detected and cannot be accessed by a responding fire engine, it can be sized up and additional aerial and other support requested quickly.

2.4 Off-site Wildfire Impacts

It is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95% of wildfires are controlled below 10 acres (CAL FIRE 2019). Studies (Keeley & Syphard 2018; Syphard et al. 2007; Syphard & Keeley 2015) show the ignition resistance and fire safety awareness of the Project and its population influences the likelihood of fire ignitions and the potential for fire to spread off-site into adjacent wildland fuels and negatively impact existing communities. As the research indicates, humans can drive wildfire ignition risk, but not discussed, they can also reduce it. When fire protection is implemented at the parcel level and leverages ignition resistant building materials, infrastructure improvements, and landscape design, the wildfire risk can be significantly reduced in the surrounding environment (Newman et al., 2013). When wildfire is planned for and incorporated into the building design, such as with the Project, it can not only withstand wildfire but prevent it. This prevention benefits the Project and the surrounding areas by reducing the landscape level fire risk. Further, given the Project's multi-scaled approach to fire protection, it is unlikely that the Project would be a significant source of ignitions and result in increased off-site impacts related to wildfire, as discussed herein.

Common ignition sources in southern California are related to powerlines and vehicles (Keeley & Syphard, 2018). Powerline-based ignitions are a concern with respect to off-site wildfire impacts. The remaining highest likelihood of vegetation ignitions in the Project area would be related to existing Box Springs Road and other roads used by Project employees. However, the Project reduces this risk with fuel modification between structures and the roadways in the form of ignition-resistant landscaping and paved surfaces. Ongoing maintenance of these

ignition-resistant landscapes will continue in perpetuity as part of the Project. These efforts reduce or minimize the ability for a vehicle related spark, catalytic converter failure, or other ignition source to ignite and spread fire from the roadsides towards the Project. The Project is not expected to substantially increase the already known fire risk associated with roads and in fact the Project- and road-adjacent fuel modification would aid in reducing the preexisting risk. Interior roadways such as parking and loading areas and fire access lanes are also not expected to result in significant vehicle ignitions. The on-site roadways would comply with all fire department access requirements and be encompassed by the ignition-resistant construction of the buildings and non-combustible paved surfaces. Therefore, even if ignition were to occur on the Project interior roadways it is highly unlikely that it would spread beyond the Project site due to the level of hardscape and the adjacent fuel modifications areas.

Reducing WUI exposure can address protection of a wide range of highly valued resources and can offer protection to critical resources, habitat communities, and landscapes (Scott et al., 2016). Despite the potential for more frequent fire ignitions from developments, when developments are planned accordingly, such as the Project, the fuel availability and fuel continuity decrease, while the probability of fire suppression increases (Fox et al., 2018). This is a result of planned alterations to fuel, increased ignition resistant construction, enhanced fire protection features, higher wildfire risk awareness, and maintenance of fire protection features. The dual benefit of building a fire-hardened project, like the Moreno Valley Farm Project, is that the same features that protect the development from a wildfire also play a significant role in protecting wildlands and surrounding areas from Project-related fires.

2.4.1 Vegetation Management

A study in Southern Italy found that the ignition potential of an area was significantly influenced by landcover types and human drivers were low or inconsistent (Elia et al., 2019). Urban interfaces with shrubland-dominated vegetation were found to be more fire-prone than those with grasslands or other natural spaces (Elia et al., 2019). The Project area is predominately disturbed habitat, as the site is characterized primarily by bare soil with some patches of low-growing grass. Additionally, some trees and shrubs are dispersed throughout the site. All the existing fuel on the site, other than the designated open-space, and within FMZ areas will be converted into hardscape or ignition-resistant landscaping. The fuel conditions will be addressed through various vegetation management techniques, such as fuel modification zones (FMZs). The original intent of FMZs, also known as defensible space, was to protect natural resources from fires in developed areas and have since evolved to protecting communities and structures. In an FMZ, combustible vegetation would be removed and/or modified and partially or totally replaced with more appropriately spaced drought-tolerant, fire-resistant plants. The goal is to provide a managed area where fire spread is not facilitated toward the Project or away from the Project into wildland areas. Fuel modification works by redistributing the fire risk on a landscape and altering the interaction between fire, fuels, and weather (Cochrane et al., 2012). FMZs typically target surface fires but can also reduce the likelihood of canopy fires, lower ember cast, and have a shadow effect on the untreated landscape by lowering the probability of burning and the potential fire size (Cochrane et al., 2012). As a result, the risk of a structure being destroyed, whether from a fire from with the development or outside the development, is significantly lower when defensible space is implemented.

The Project FMZs will serve to create defensible space around the structures. Defensible space adjacent to structures also functions to limit the spread of fire from the built environment into off-site vegetation because the maintained landscapes do not readily facilitate vegetation ignition or fire spread. Implementing defensible space can reduce the likelihood of structural ignition and support landscape-level risk reduction. The FMZ areas function as fuel breaks which are crucial in reducing fire risk and facilitating effective fire prevention (Wang et al., 2021). The irrigated zone acts as a green barrier that uses specific vegetation growth, such a high-internal moisture, fire-

resistive species, to reduce fire spread (Wang et al., 2021). The high-internal moisture and spacing between plant groups make it more difficult for ignition to occur and fires to spread from plant to plant. This affects fire behavior by reducing flame lengths, slowing spread rates, and lowering fire intensity. If a fire from a structure or vehicle spreads to the irrigated zone the fire-resistive species in this zone would be less likely to ignite, reducing the likelihood of the fire spreading off-site (Wang et al., 2021). The use of irrigated areas to reduce wildfire impacts can achieve wildfire mitigation and offer wildfire protection in fire-prone areas beyond the Project site (Wang et al., 2021). Further, fuel treatments also have an ecological benefit by reducing the potential fire severity which can result in high post-fire litter cover, higher herbaceous plant cover, higher biodiversity, and lower levels of invasive pests, benefiting adjacent open space areas (Safford et al., 2009). The benefits of defensible space and FMZs are not solely limited to the built environment. Positioning the low plant density, irrigated zone directly adjacent to the development pad, and implementing defensible space provides a significant buffer between structures and open space areas. These techniques aid in preventing ignitions in the built environment but also across the larger landscape.

However, long-term protection of the development and the surrounding area is dependent on the maintenance of fuel modification as even fire-safe designs can degrade over time. To alleviate this the Project will conduct regular assessments of the FMZs. During this maintenance, dead and dying material and undesirable plants will be removed. Thinning will also be conducted as necessary to maintain plant spacing and fuel densities. This will keep the FMZs and landscaped areas in a highly fire resistive condition free of accumulated flammable debris and plants.

Fuel treatments and defensible space do more than just protect structures. When they are a component of a place-based fire-hardened design, such as the Project, they can not only serve to protect structures from wildfire but function as a buffer for natural areas and surrounding communities. These features will further reduce the potential for wildfire in open space areas and potential impacts on surrounding communities.

2.4.2 Firefighter Response

As discussed in Section 4, the Project is not anticipated to have a negative impact on response capacity given its urban designation. Further, the on-site roads would be able to provide sufficient access for fire apparatus in a high-risk area. The Project also provides water supply and fire flow which are critical resources in firefighting. The Project defensible space areas will allow firefighters to safely position themselves at the development edge and begin tactical protection efforts (Warziniack et al., 2019). This allows firefighters to not only readily protect structures and reduce the likelihood of building ignition but also gives them a safe position to respond to offsite wildfires. Using the Project's fire protection features firefighters would be able to use the Project as a tactical resource for protecting open space areas, whether it be from an on-site or off-site fires. The Project would create additional access for fire apparatuses that were not previously existing. Enhancing firefighters' ability to respond to an incident increases their ability to suppress a fire whether on-site or off-site. The presence of on-site fire resources increases response capacity and could be the difference between a small fire or a full conflagration.

2.4.3 Ignition Resistant/Noncombustible Construction

The WUI fire problem is structures lacking ignition resistant features (i.e., ember resistant vents, interior sprinklers); therefore, the best mitigation is to reduce the likelihood of building ignition occurring (Zhou, 2013). Structural characteristics play a significant role in whether a building burns, which is important in WUI environments as structures also serve as fuel (Gorte, 2011). The benefit of structure-based mitigation is that it not only lowers the on-site risk but also lowers the risk of wildfire across a landscape (Mockrin et al., 2020). In WUI areas, this is

because structures are also fuels that can spread a fire into open space. With the incorporation of ignition-resistant construction, the likelihood of structural ignition occurring within the Project area is minimized. Structure design, such as the Project's, is crucial in protecting an area against wind-driven fires. The Project will provide ignition-resistant buildings that are less susceptible to direct wildfire flames, heat, and embers than older homes with more ignition-prone construction methods. This lowers the threat from on-site fires impacting off-site areas as the structures themselves are very unlikely to function as fuel. The Project will include vent coverings to prevent ember penetration, and the Project buildings will also include NFPA 13D single-family residential automatic sprinklers. This is crucial in preventing off-site impacts as embers can also be generated by a structure fire and can be blown over the fuel modification into native fuels. Automatic sprinklers can isolate a fire to the point of origin, limit its ability to spread to the rest of the building, and even extinguish a fire before the responding firefighters arrive, thus damping the likelihood of ember production. Single-family residential sprinklers are life-safety level sprinklers that are designed to mitigate a fire to allow occupants to evacuate, but also have an extremely high success rate of controlling or suppressing interior structure fires. This also reduces impacts on fire response capacity as the automatic sprinklers will allow firefighters to focus on reducing additional ignitions beyond the point of origin. The Project provides features that not only prevent fire intrusion but prevent structures fires from escaping into off-site areas. This allows the Project to not only protect the immediate area but the surrounding environment.

2.4.4 Shelter in Place Capability

Sheltering-in-place is the practice of going or remaining indoors during or following an emergency event. This procedure is recommended if there is little time for the public to react to an incident and it is safer for the public to stay indoors for a brief time rather than travel outdoors. According to common Emergency Operations Plan language, shelter-in-place is an approach that has been used and is actively contemplated for emergencies, including wildfires. Shelter-in-place advises people to stay secure at their current location.

Consistent with the Project's approach, this tactic shall only be used if an evacuation will cause a higher potential for loss of life. Consideration should be given to assigning incident personnel to monitor the safety of citizens remaining in place. The concept of shelter-in-place is an available option in those instances where physical evacuation is impractical. Sheltering-in-place provides a safe haven within the impacted area.

This FPP provides significant evaluation and conclusions regarding the shelter-in-place capability of the Project's buildings. Among other things, the Project has been designed to include ignition-resistant structures with the use of non-combustible construction materials, effective defensible space and fuel management zones, ember protection, and other redundant structure, infrastructure, building code, and water supply and flow requirements established as containing adequate protective features to act as temporary shelters during wildfires. All the on-site structures could be utilized for temporary refuge during a wildfire at the discretion of emergency managers given the unique variables of a specific event.

Sheltering-in-place also has many advantages because it can be implemented immediately, allowing people to remain in their familiar surroundings, and providing individuals with everyday necessities such as telephone, radio, television, food, and clothing. However, the amount of time people can stay sheltered-in-place is dependent upon availability of food, water, medical care, utilities, and access to accurate and reliable information. It is not anticipated that any wildfire related shelter-in-place action would require longer than a few hours of on-site refuge.

The decision on whether to evacuate or shelter-in-place is carefully considered with the timing and nature of the incident. Sheltering-in-place is the preferred method of protection for people that are not directly impacted or in the direct path of a hazard. This will reduce congestion and transportation demand on the major transportation routes for

those that have been directed to evacuate by police or fire personnel. Like with most new developments that incorporate ignition resistant construction, wide fuel modification zones, ember protection, and fire defensibility throughout, responding fire and law enforcement personnel will be able to direct persons to temporarily refuge on-site in designated buildings in the rare situation where shelter-in-place is determined to be safer than evacuating.

Shelter-in-place at this location in the planned structures will also be an option available to emergency managers during a wildfire event. A shelter-in-place plan will be prepared and provided by the HOA to all on-site personnel and residents outlining the actions to take if a shelter in place notification is provided by emergency management sources.

The Project buildings will be constructed of ignition-resistant materials which are highly resistant to heat. Because of the ignition resistant construction, fuel modification zone setbacks and the type of lower fire intensity vegetative fuels in the vicinity of the site, sheltering in place is considered to be a safe option if a fast-moving wildfire precludes complete evacuation of the Project site. In many cases, the heat flux produced by the nearest unmaintained vegetative fuels is not at a high enough temperature to ignite a building, even if it is directly next to the building. In this case, the heat would dissipate rapidly in the provided building setbacks. The primary concern is anticipated to be with smoke and air quality rather than exposure to flames and heated air. Measures to safely refuge persons within the buildings and minimize smoke and air quality issues would be enacted in this scenario. For example, when wildfire ignites, it is common for HVAC systems to be turned off and they can be fitted with sensors that turn them off automatically when smoke is detected. This minimizes the potential for drafting smoke through the ventilation system into the buildings.

Most of the primary components of the Project's layered fire protection system are required by Fire and Building codes, because they have been evaluated in the lab and in real-time wildfires and found to result in saved structures. They are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire. They also make shelter-in-place possible as an evacuation contingency option when evacuation is not possible.

Even though current Building and Fire Codes require these measures, at one time, many of them were used as mitigation measures for buildings in fire hazard areas because they were known to reduce structure vulnerability to wildfire. These measures were adopted into the 2007 California Building Code and have been retained and enhanced in code updates since then. The following Project features are required for new development in fire hazard areas and would form the basis of the system to provide adequate access by emergency responders and provide the protection necessary to minimize structural ignitions:

- Application of the latest adopted ignition-resistant building codes;
  - Non-flammable roofs, which would be Class "A" listed and fire-rated roof assembly, installed per manufacturer's instructions, to approval of the City. Roofs would be made tight with no gaps or openings on ends or in valleys, or elsewhere between roof covering and decking, in order to prevent intrusion of flame and embers. Any openings on ends of roof tiles would be enclosed to prevent intrusion of burning debris. When provided, roof valley flashings would not be less than 0.019 inch (No. 26 gage galvanized sheet) corrosion-resistant metal installed over a minimum 36-inch-wide underlayment consisting of one layer of 72 pound ASTM 3909 cap sheet running the full length of the valley.
- Exterior wall coverings are to be non-combustible;
- Multipane glazing with a minimum of one tempered pane;
- Ember-resistant vents (recommend BrandGuard, O'Hagin, or similar vents);

- Interior, automatic fire sprinklers to code for occupancy type;
- No eaves or soffits;
- There would be no use of paper-faced insulation or combustible installation in attics or other ventilated areas;
- There would be no use of plastic, vinyl (with the exception of vinyl windows with metal reinforcement and welded corners), or light wood on the exterior;
  - Any vinyl frames to have welded corners and metal reinforcement in the interlock area to maintain integrity of the frame certified to ANSI/AAMA/NWWDA 101/I.S 2 97 requirements.
- Skylights to be tempered glass;
- Rain gutters and downspouts to be non-combustible. They would be designed to prevent the accumulation of leaf litter or debris, which can ignite roof edges;
- Doors to be of approved noncombustible construction or would be solid core wood having stiles and rails not less than 1 3/8 inches thick or have a 20-minute fire rating. Doors to comply with City Building Code;
- There would be no combustible awnings, canopies, or similar combustible overhangs;
- No combustible fences to be allowed within 5 feet of structures;
- All chimneys and other vents on heating appliances using solid or liquid fuel, including outdoor fireplaces and permanent barbeques and grills, to have spark arrestors that comply with the City Fire Code. The code requires that openings would not exceed 1/4-inch. Arrestors would be visible from the ground;
- Modern infrastructure, access roads, and water delivery system;
- Maintained FMZs

Notably, interior fire sprinklers, which would be provided in all structures (required by code since 2010), have an extremely high reliability history (NFPA 2021) of controlling fire in 96% of reported fires, and statistics indicate that fires in structures with sprinklers resulted in 82% lower property damage and 68% lower loss of life (Hall 2013). NFPA 13 and 13R fire sprinkler systems are designed for structure protection and life safety, while NFPA 13D sprinkler systems are designed for life safety. For wildland fire defense, should embers succeed in entering a structure, sprinklers provide an additional layer of life safety and structure protection.

Sheltering In Place as an Active Emergency Option at Moreno Valley Farm Project

Sheltering in place or providing temporary refuge when evacuation is considered undesirable is not a new idea. Sheltering in place has been a useful tool in the emergency management toolbox since the 1950's. In some wildfire scenarios, temporarily sheltering in a protected structure is safer than evacuating. Huntzinger (2010) states that: "If sheltering in place can provide the community with the same level of protection from an emergency incident as mass evacuation, this will be the recommended practice to use." Many civilian deaths have occurred when the population evacuated late and was exposed to wildfire on unprotected roadways (Braun, 2002, CFA 2004). By contrast, fire hardened communities that have implemented similar fire protection, setback, and building standards have fared well in fire events, making them suitable for temporary shelter. Developments constructed in accordance with modern fire-safe development standards also survived the 2003 Simi Fire, the 2008 Freeway Complex Fire, and the 2020 Silverado Fire without a single building lost. Nasiatka (2003) points out that another advantage to sheltering in place in an appropriately protected location is that there would be a substantial reduction in the number of evacuees that would need to be managed, allowing those evacuees at greater risk (i.e., in older, less protected communities) to evacuate more quickly.

2.4.5 Wildfire Risk Awareness Education

The Project includes an education awareness program that is a key piece in wildfire prevention in the area (Steffey et al., 2020). This program will provide wildfire information for the area and create greater risk awareness for residents and occupants. The wildfire education program will be facilitated by the HOA and/or Property Manager or similar entity and will disclose the potential wildfire risk and the requirements of the FPP. The educational program will also include information regarding the necessary landscape maintenance and structural-based fire protection features. Having ongoing education included in the Project creates a heightened level of wildfire risk awareness and fire protection measures. This benefits both the Project and the surrounding areas as people would be more aware of the wildfire risk and potential impacts. Further, it decreases the likelihood the Project occupants and users would cause an uncontrolled ignition, and they would be aware of what steps to take if they observe an ignition. As such the impact on off-site areas would be further lowered by reducing the probability of ignition.

As described above it is not as simple to say development in areas with high fire hazards will equate to increased wildfire risk. It is possible to develop in these areas when fire is incorporated into Project design and create a site that is not only hardened against fire but designed to prevent fires. The dual benefit of creating a development that can prevent a fire is that it offers protection to the surrounding communities and the environment. The requirements and recommendations outlined in the FPP have been designed specifically for the proposed construction in the Project's location and can significantly reduce the potential threat to off-site areas.

3 Anticipated Fire Behavior

3.1 Fire Behavior Modeling

Fire behavior modeling was conducted to document the type and intensity of a fire that would be expected adjacent to the Moreno Valley Farm Project Site, given characteristic site features such as topography, vegetation, and weather during "worst case" fire conditions (e.g., during Santa Ana winds). For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design.

Following site evaluation and vegetative fuels data collection efforts, fire behavior modeling was conducted using BehavePlus software to document the type and intensity of fire that would be expected given characteristic site features including topography, vegetation, and weather. BehavePlus provides a tabular output and was utilized to evaluate anticipated fire behavior for four scenarios located on or adjacent to the Project Site.

3.2 Modeling Background

Fire behavior modeling has been used by researchers for approximately 50 years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used for predicting fire behavior on a given landscape. That model, known as "BEHAVE," was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus, 6.0.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Marsden-Smedley and Catchpole 1995, Grabner 1997, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of BehavePlus and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling includes a high level of analysis and information detail to arrive at reasonably accurate representations of how wildfire would move through available fuels on a given site. Fire behavior calculations are based on site specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. 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. To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

1. First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is the dead fuels less than 0.25 inches in diameter. These are the fine fuels that carry fire. Fuels greater than 1 inch have little effect, while fuels greater than 3 inches have no effect on fire behavior.

2. Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within 6 feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
3. Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, creating their own weather, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
4. Fourth, fire behavior computer modeling systems are not intended for determining sufficient fuel modification zone/defensible space widths. However, it does provide the average length of the flames, which is a key element for determining defensible space distances for minimizing structure ignition.

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

3.3 Fire Behavior Modeling Analysis

Field data collection and fire behavior modeling was completed by Dudek to document the characteristic site features such as topography, vegetation, and weather that influence fire intensity. The fire behavior modeling conducted for the post-project conditions consider the implementation of hardened development areas and Fuel Modification Zones. Naturally, the areas that are converted to ignition resistant urban landscapes will result in a reduced fire risk and reduced fire intensity. Areas subject to hardscape and irrigated landscaping post-development can be expected to have flame lengths and intensity well below areas on the periphery of the community, referred to as the wildland urban interface.

Fire behavior modeling conducted on this site includes a high level of detail and analysis which results in reasonably accurate representations of how wildfire may behave within available fuels. Modeling is conducted in a GIS-based interface which provides graphical outputs of fire behavior modeling results. These outputs were utilized to portray the anticipated existing and post-development fire behavior for the Project site.

Fire behavior characteristics are an essential component in understanding fire risk. 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 et al. 2008). Although it is a somewhat subjective and nonscientific measure of fire behavior, it is imperative to fireline personnel when evaluating fireline intensity and is worth considering as a vital wildfire variable (Rothermel 1983). Fireline intensity is a measure of heat output from the flaming front and affects the potential for a surface fire to transition to a crown fire. Table 1 presents an interpretation of flame length and its relationship to fire suppression efforts.

Table 1. 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 to 8	100 to 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 to 11	500 to 1000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 6.0.0 fire behavior modeling program (Andrews, Bevins, and Seli 2004)

Tables depicting flame lengths, fireline intensities, and spread rate from the northeast of the Project site for 90th and 97th percentile weather scenarios are included in Figures 5 for pre- and post-development conditions. The fire behavior analysis results for the Project site vary depending on fuel type. As presented, wildfire behavior in the fuel types varies depending on weather conditions.

Although fire behavior models, like all models, have limitations, they have performed well in providing valuable estimated fire behavior predictions, which can be used as a tool in the decision-making process and understanding suppression capabilities. In order to make reliable estimates of fire behavior and interpret fire models, one must understand the relationship of fuels to the fire environment and recognize the variations in these fuels and have experience with wildland fires or applicable knowledge of how fire reacts in similar fuels.

3.3.1 Fire Behavior Modeling Inputs

Vegetation Inputs

Vegetation types, which were derived from the field assessment for the Project site, were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-project fire behavior changes.

Based on the anticipated pre-and post-project vegetation conditions, four different fuel models were used in the fire behavior modeling effort presented herein. Table 2 provides a description of the fuel models observed that were subsequently used in the analysis for this project. Modeled areas include shrub and grass dominated ground fuels (Fuel Models GR1 and GS2). For modeling the post-development condition, vegetation is converted into irrigated landscaping (Fuel Models GR1, and 8).

Table 2. Fuel Model Characteristics

Fuel Model	Description	Location
Pre-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Surrounding Project Site
GS2	Moderate Load, Dry Climate Grass- Shrub	Surrounding Project Site

Table 2. Fuel Model Characteristics

Fuel Model	Description	Location
Post-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Fuel Modification Zones
8	Short Needle Litter	Fuel Modification Zones

Source: Scott, JH.; Burgan, R.E. (2005) and Anderson, H.E. (1982)

Terrain Input

Terrain impacts fire spread and intensity, with steeper slopes often driving higher intensity wildfire. Terrain also impacts wind flow and speed through funneling, acceleration uphill and along ridgelines, and wind eddies on leeward hillslopes, as described, the site is relatively flat in terrain, with some undulations and a general slope trending northeast. Surrounding the Project Site is developed residential and urban. Terrain has no significance for these modeling scenarios.

Weather Inputs

BehavePlus requires weather and fuel moisture input values to model potential fire behavior. Wind and fuel moisture values were obtained from the Clark Remote Automatic Weather Station (RAWS) located roughly 5 miles south of the Project Site yet sited in similar terrain and elevation to that observed within the Project site. RAWS are equipped with sensors and instruments that automatically measure various meteorological parameters such as temperature, humidity, wind speed and direction, precipitation, solar radiation, and atmospheric pressure. Data is collected continuously at set intervals, allowing wildfire managers to understand weather conditions conducive to extreme fire behavior. These weather conditions are generally referred to as 97th percentile conditions and represent the less common yet highly hazardous Santa Ana weather conditions. These weather conditions are more commonly associated with highly destructive wildfires that may cause widespread damage to the natural and built environment.

Weather data from the Clark RAWS was examined using Fire Family Plus software from June 15 to January 15 each year between 2005 and 2025 to determine 97th percentile (peak Santa Ana), and 90th percentile (peak Summer) weather conditions. Fuel moisture and wind values used in fire behavior modelling are provided below in Table 3.

Table 3. BehavePlus Weather and Fuels Moisture Inputs.

Input	90th Percentile Value (Peak Summer Conditions)	97th Percentile Value (Peak Santa Ana Conditions)
Wind Speed	19 mph	40 mph
1-hour Fuel Moisture	2%	2%
10-hour Fuel Moisture	3%	3%
100-hour Fuel Moisture	6%	4%
Live Herbaceous Fuel Moisture	30%	30%
Live Woody Fuel Moisture	90%	60%

Source: Clark RAWS

3.3.2 Fire Behavior Modeling Scenarios

Four modeling scenarios were created and run in order to accurately display anticipated fire behavior. Two scenarios show fire behavior in existing fuel conditions and two scenarios show fire behavior in post-project conditions. There is a 90th percentile (peak summer weather conditions) and a 97th percentile (peak Santa Ana weather conditions) input for existing fuel conditions and post- project fuel conditions.

Existing fuel conditions:

1. Scenario one. Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and GS2) at 90th percentile value (peak summer conditions).
2. Scenario two. Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and GS2) 97th percentile (peak Santa Ana weather conditions).

Post- project fuel conditions:

1. Scenario three. Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and 8) 90th percentile (peak summer weather conditions).
2. Scenario four. Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and 8) 97th percentile (peak Santa Ana weather conditions).

3.3.3 Fire Behavior Modeling Results

As presented in Table 4, BehavePlus Fire Behavior Modeling Results- Existing Conditions, under peak summer (90th percentile weather), flame lengths within short to moderate grass and moderate shrub fuels (Fuel Models GR1, GS2) are approximately 16 feet. During peak Santa Ana weather conditions (97th percentile weather), flame lengths within short to moderate grass and moderate shrub fuels (Fuel Models GR1, GS2) are approximately 24 feet. Within the same fuels model description, peak summer (90th percentile weather), fireline intensity will be approximately 2,200 BTU/feet/second. While during peak Santa Ana weather conditions (97th percentile weather), fireline intensity will be approximately 5400 BTU/feet/second. The rate of spread will be approximately the same for both weather conditions at 1.2 to 1.3 MPH.

Table 4. BehavePlus Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 1: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, GS2	15.5	2206	1.3
Scenario 2: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, GS2	23.5	5406	1.2

As presented in Table 5, BehavePlus Fire Behavior Modeling Results- Post- Project Conditions, under peak summer (90th percentile weather), flame lengths within the fuel modification zone (Fuel Models GR1, 8) are approximately 3.1 feet. During peak Santa Ana weather conditions (97th percentile weather), flame lengths within the fuel

modification zone (Fuel Models GR1, 8) are approximately 3.1 feet. Within the same fuels model description (Fuel Models GR1, 8), and both weather conditions, peak summer (90th percentile weather) and peak Santa Ana weather conditions (97th percentile weather), fireline intensity is 67 BTU/feet/second. The rate of spread will be approximately the same for both weather conditions at 0.3 MPH.

Table 5. BehavePlus Fire Behavior Modeling Results – Post- Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 3: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3
Scenario 4: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3

3.4 Wildfire Behavior Summary

Given the climactic, vegetation, and topographic characteristics compiled into fire behavior modeling, the Moreno Valley Farm Project site is potentially vulnerable to wildfire starting in, burning onto, or spotting onto the site given existing conditions. Given existing conditions, a 97th percentile (Peak Santa Ana weather conditions) weather event, as presented in Table 4, would have flame lengths approximately 24 feet in height, a fireline intensity of approximately 5400 BTU/feet/second, and a spread rate of over 1 MPH.

Surrounding the proposed structures, there will be fuel modification zones as described in Section 5.4.2. This will convert the existing vegetation to defensible space. When the Project site is developed, a significant proportion of available fuels will be converted to urban, irrigated landscapes, representing a reduction in the potential ignition, and spread of wildfire. This vegetation conversion is represented in the modeling by using fuel models GR1 and GS2 for existing conditions models and using fuel Models GR1 and 8 for Post- Project Conditions. Fuel Models GR1 and 8 represent the irrigated landscapes surrounding the proposed structures in the fuel modification zones.

Given the same climactic, topographic, and anticipated post- development vegetation characteristics compiled into fire behavior modeling, the post- development Moreno Valley Farm Project Site, is significantly less vulnerable to wildfire starting in, burning into, or spotting onto the site given fuel modification zones. Given post- development conditions, a 97th percentile (Peak Santa Ana weather conditions) weather event, as presented in Table 5, would have flame lengths approximately 3 feet in height, a fireline intensity of approximately 67 BTU/feet/second, and a spread rate of over approximately 0.3 MPH.

Flame lengths, fireline intensity, and spread rate all significantly decrease from existing conditions modeling to post-project conditions modeling. As presented in Table 1, the interpretation in flame lengths and fireline intensity is severe for the existing conditions modeling, including but not limited to ineffective control efforts at the head of the fire and probable major fire runs. The interpretation of flame lengths and fireline intensity for post- development conditions are much more subdued, including but not limited to a handline holding the fire and fire can generally be attacked at the head.

Table 1. Fuel Model Input Characteristics

Fuel Model	Description	Location
Pre-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Surrounding Project Site
GS2	Moderate Load, Dry Climate Grass- Shrub	Surrounding Project Site
Post-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Fuel Modification Zones
8	Short Needle Litter	Fuel Modification Zones

Source: Scott, JH.; Burgan, R.E. (2005) and Anderson, H.E. (1982)

Table 2. Weather and Fuels Moisture Inputs

Input	90th Percentile Value (Peak Summer Conditions)	97th Percentile Value (Peak Santa Ana Conditions)
Wind Speed	19 mph	40 mph
1-hour Fuel Moisture	2%	2
10-hour Fuel Moisture	3%	3
100-hour Fuel Moisture	6%	4
Live Herbaceous Fuel Moisture	30%	30%
Live Woody Fuel Moisture	90%	60%

Source: Clark Raws

Table 3. Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 1: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, GS2	15.5	2206	1.3
Scenario 2: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, GS2	23.5	5406	1.2

Source: BehavePlus 6.0.0

Table 4. BehavePlus Fire Behavior Modeling Results – Post- Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 3: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3
Scenario 4: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3

Source: BehavePlus 6.0.0

FIGURE 5
Fire Behavior Modeling

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4 Emergency Response and Service

4.1 Emergency Response

The Project is located within the Moreno Valley Fire Department (MVFD) jurisdictional response area. The City of Moreno Valley and the County of Riverside contracts with California Department of Forestry and Fire Protection (CAL FIRE) to provide emergency services as the Riverside County Fire Department (RCFD). The MVFD provides fire, emergency medical, and rescue services from 7 fire stations (MVFD 2025). American Medical Response (AMR) provides emergency and non-emergency medical transportation (ambulance service) for northwest and southwest Riverside County; including Moreno Valley[2]. Regionally, through a cooperative agreement with CAL FIRE / RCFD provides emergency operations including firefighting, emergency medical services and hazardous material emergencies from 106 fire stations (RCFD 2021b). RCFD serves over 2.5 million residents throughout 20 cities and all unincorporated portions of Riverside County (U.S. Census Bureau, 2023a), and its population makes Riverside County the fourth most populous county in California. Figure 6 illustrates the fire station locations and Table 6 provides a summary of the location, equipment, and staffing level for the closet RCFD fire stations.

The Project lies within Battalion 9 - "Moreno Valley Battalion" response area. RCFD has automatic and mutual aid agreements with the California Rehabilitation Center (Norco), the Calimesa Fire Department, the Canyon Lake Fire Department, the Chuckwalla Valley State Prison Fire Department, the Corona Fire Department (Hazardous Material Response only), the Hemet Fire Department, the Idyllwild Fire Protection District, the March Air Reserve Base Fire Department, the Morongo Reservation Fire Department, Murrieta Fire and Rescue, the Palm Springs Fire Department, the Pechanga Fire Department, the Soboba Fire Department, the San Bernardino County Fire Protection District, the Redlands, the Yucaipa Fire Department, the Orange County Fire Authority, the Imperial County Fire Department, the Niland Fire District, the San Diego Country Fire Department, the La Paz County Fire Department (Arizona) and the Colorado River Indian Tribes Fire Department. RCFD is a member of the California Office of Emergency Services Regional Task Force 6 (CA-RTF-6). CA-RTF-6 consists of 30 personnel specially trained and equipped for large or complex Urban Search and Rescue operations.

Although the Project site is in Moreno Valley, the closest fire station is RFD Fire Station 13 (FS 13). FS 13, also known as "Sycamore Canyon", is located at 6490 Sycamore Canyon Blvd in the City of Riverside. FS 13 has one quint ladder truck, one staffed Type 1 medic engine, one cross-staffed patrol, and a utility[3]. Riverside Fire Department is in the process of staffing truck companies with 4 personnel, which would increase the staffing at RFD Station 13 to 8 personnel. MVFD Fire Station 6 (FS 6) identified as "Towngate", is located at 22250 Eucalyptus Ave in Moreno Valley and will provide secondary response to the Project site. FS 6 has one staffed Type 1 engine and one staffed medic squad[4]. RFD Fire Station 14 (FS 14), known as "Canyon Crest", is located at 725 Central Avenue in the City of Riverside and would provide additional response to the Project site. FS 14 has two Type 1 medic engines, two cross-staffed quads, and a utility. Engine 14 is cross-staffed with Cal-OES Engine 8635 and the quads are cross-staffed with Engine 14 personnel at FS 14. MVFD Fire Station 2 (FS 2) identified as "Sunnymead", located at 24935 Hemlock in Moreno Valley, will provide added response to the Project site. FS 2 has one staffed Type 1 engine and one staffed ladder truck.

2 https://www.amr.net/locations/california/riverside
3 RFD staffing and equipment: https://riversideca.gov/fire/about-contact/stations
4 MVFD staffing and equipment: https://moval.gov/departments/fire/dep-station-locations.html#tab-1

Table 6. Closest Responding Fire Stations Summary

Station	Location	Equipment	Staffing
RFD Station #13	6490 Sycamore Canyon Blvd, Riverside, California 92507	(1) Quint Truck (Ladder) (1) Type 1 Medic Engine (1) Patrol (cross-staffed) (1) Utility	4 personnel*
MVFD Station #6	22250 Eucalyptus Ave Moreno Valley, California 92553	(1) Type 1 Engine (1) Medic Squad	5 personnel
RFD Station #14	725 Central Ave, Riverside, California 92507	(2) Type 1 Medic Engines (cross-staffed) (2) Quads (cross-staffed) (1) Utility	4 personnel
MVFD Station #2	24935 Hemlock Moreno Valley, California 92557	(1) Type 1 Engine (1) Ladder Truck	7 personnel

Notes:

* The City of Riverside Fire Department is in the process of staffing truck companies with 4 personnel, which would make the staffing at RFD Station #13 a total of 8 personnel.

Within the area's emergency services system, fire and emergency medical services are also provided by other agencies. Generally, each agency is responsible for structural fire protection and wildland fire protection within their area of responsibility. However, mutual aid agreements enable non-lead fire agencies to respond to fire emergencies outside their district boundaries. In the Project area, fire agencies cooperate under a statewide master mutual aid agreement for wildland fires. There are also mutual aid agreements in place with neighboring fire agencies and typically include interdependencies that exist among the region's fire protection agencies for structural and medical responses but are primarily associated with the peripheral "edges" of each agency's boundary.

4.1.1 Emergency Response Travel Time Coverage

In an effort to understand fire department response capabilities, Dudek conducted an analysis of the travel-time response coverage from the closest responding MVFD Fire Stations. The response time analysis was conducted using travel distances that were derived from Google road data and Project development plan data. Travel times were calculated applying the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH) as well as 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) for comparison. The ISO response travel time formula discounts speed for intersections, vehicle deceleration, and acceleration, and does not include turnout time. Tables 4 and 5 present tabular results of the emergency response time analysis using the distance at speed formula and the ISO formula, respectively.

Table 7. Project Emergency Response Analysis using Speed Limit Formula

Station	Travel Distance to Project Site	Travel Time to Project Site*	Total Response Time**
RFD Station #13	1.7 miles	2 minutes, 55 seconds	4 minutes, 55 seconds
MVFD Station #6	2.1 miles	3 minutes, 36 seconds	5 minutes, 36 seconds
RFD Station #14	3.1 miles	5 minutes, 19 seconds	7 minutes, 19 seconds
MVFD Station #2	4.3 miles	7 minutes, 22 seconds	9 minutes, 22 seconds

Notes:

* Assumes travel distance and time to the Project site into the development for the respective fire station. Also assumes the application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35-mph travel speed, and does not include turnout time.

** Assumes travel distance and time to the Project site into development from the respective fire station. Also assumes the application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35-mph travel speed along with dispatch and turnout time, which can add an additional two minutes to travel time.

Table 8. Project Emergency Response Analysis using ISO Formula

Station	Travel Distance to Project Site	Travel Time to Project Site*	Total Response Time**
RFD Station #13	1.7 miles	3 minutes, 32 seconds	5 minutes, 32 seconds
MVFD Station #6	2.1 miles	4 minutes, 13 seconds	6 minutes, 13 seconds
RFD Station #14	3.1 miles	5 minutes, 55 seconds	7 minutes, 55 seconds
MVFD Station #2	4.3 miles	7 minutes, 58 seconds	9 minutes, 58 seconds

Notes:

* Assumes travel distance and time to the Project site into the development for the respective fire station. Also assumes application of the ISO formula, T=0.65+1.7(Distance), a 35-mph travel speed, and does not include turnout time.

** Assumes travel distance and time to the Project site into the development from the respective fire station. Also assumes the application of the ISO formula, T=0.65+1.7(Distance), a 35-mph travel speed, and dispatch and turnout time, which can add an additional two minutes to travel time.

The ISO response travel time formula discounts speed for intersections, vehicle deceleration, and acceleration, and does not include turnout time. As such per the ISO response travel time formula:

- RFD Station 13 is approximately 1.7 miles from the Project site and will be the closet fire station to the Project site. FS 13 can respond to an incident at the Project site within 5 minutes and 32 seconds.
- The second closest fire station is MVFD Station 6, which is approximately 2.1 miles from the Project site. FS 6 can respond to an incident at the Project site within 6 minutes and 13 seconds.
- RFD Station 14 is approximately 3.1 miles from the Project site and can respond to an incident at the Project site within 7 minutes and 55 seconds.
- MVFD Station 2 is approximately 4.3 miles from the Project site and can respond to an incident at the Project site within 7 minutes and 58 seconds.

Emergency response time target thresholds include travel time along with dispatch and turnout time, which can add two minutes to travel time. RFD Station 13 would provide an initial response as the closest fire station. As shown in Table 7 and Table 8, the total response time from RFD Station 13 to the Project meets the response time standard of 6:30 minutes according to the nationally recognized National Fire Protection Association (NFPA) 1710.

On March 7, 2017, the Riverside County Board of Supervisors (Board) received and filed RCFD's "Alternative Staffing Model Recommendation." The Alternative Staffing Model Recommendation was fiscally driven and developed by RCFD due to funding difficulties to retain 3-person engine companies. The RCFD FY 17-18 Service Alternatives report, dated March 7, 2017, recommends the following response times based on four Board Approved Land Use Classifications as described in Table 9:

Table 9. Land Use Classification Information with Staffing/Time Response Standards

Land Classification	Population Density	Fire Staffing Characteristics	Response Time
HEAVY URBAN	>700 per square mile	Land use includes large commercial and industrial complexes, large business parks, high-rise and wide rise community centers and high-density residential dwelling units of 10 to 20 units per acre.	5:00 minutes, 90% of the time
URBAN	>500 per square mile	Land use includes large commercial and industrial complexes, large business parks, high-rise and wide rise community centers and high-density residential dwelling units of 8 to 20 units per acre.	6:30 minutes, 90% of the time
RURAL	100 to 500 per square mile	Light industrial zones, small community centers and residential dwelling unit density of 2 to 8 units per acre.	10:30 minutes, 90% of the time
OUTLYING	<100 per square mile	Areas of rural mountain and desert, agricultural uses, small scale commercial, industrial, and manufacturing, service commercial, medium industrial and low-density residential dwelling units; 1 dwelling unit per acre to 1 dwelling unit per 5 acres.	17:30 minutes, 90% of the time

Source: Riverside County Fire Department FY 17-18 Service Alternatives. March 7, 2017.

It is assumed that the Project is classified as "urban," with a 6:30 minute first-in fire station response time. As previously mentioned, the closest fire station (RFD Station 13) would achieve a response time of 5 minutes and 32 seconds.

4.2 Estimated Calls and Demand for Service from the Project

Determining the potential impact associated with the Project's estimated population increase is required in order to compare how many additional calls may be realized and determine what effects they may have on the available response resources. The estimated incident call volume of the Project is based on a conservatively calculated estimate from the maximum potential number of additional persons that would be expected on site. 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.

The following estimated annual emergency call volume generated by the Project is based upon per capita data for Moreno Valley Battalion 9 calls within their jurisdiction in 2021 (RCFD 2022).

- Total population served: **209, 886**
- Total annual calls: 21,898. Per capita call generation: **.104**
- Total annual fire calls (Commercial, Multi-Family, Residential Structure, Wildland, Vehicle, Other): 712. Per capita call generation: **.003**
- Total annual medical calls: 16,481. Per capita call generation: **.079**
- Total other calls (Hazard Material, False Alarm, Traffic Collisions, Public Assist, Standby, Rescue, Miscellaneous): **4,705.** Per capita call generation: **.022**

Using the data above, the estimated annual emergency call volume for the Project site was calculated. A conservative population estimate can be calculated for the residential portion of the project by multiplying the number of bedrooms by the number of units in the proposed development. The Moreno Valley Farm Project will have 81 units with 2 bedrooms and 58 units with 3 bedrooms. It can be anticipated that the Project will add approximately 336 residents ((81 x 2) + (58 x 3) = 336 persons). Based upon this estimate, the calculated call volume by type of calls in provided in Table 10.

Table 10. Conceptual Calculated Annual Call Volume

Type of Call	Per Capita Call Generation Factor	Number of Estimated Annual Calls (336 persons)
Total Annual Fire Calls	.003	1
Total Annual Medical Calls	.079	27
Total Annual Other Calls	.022	7
Total Annual Calls	.104	35

As mentioned, the 139 townhome residential units will increase the call volume at a rate of a conservatively calculated 35 calls per year (roughly 3 calls per month). In 2021, FS 6 (5,333 calls) and 2 (4,057 calls) combined emergency response totaled 9,390 (RCFD 2021), or 15 and 11 calls per day per fire station, respectively. The level of service demand for the Project raises overall call volume for the area. For perspective, 5 calls per day are typical in an urban or suburban area. A busy fire station company would be one with 10 to 15 or more calls per day. The expected number of potential calls per month generated by the Project at full build out will be 3 calls, although the number will likely be lower than that based on the conservative nature of the population and calls per capita data used in this estimate and the impact of the future fire station.

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SOURCE: Bing Aerial Imagery 2024; OpenStreetMaps 2019; Riverside County Fire 2022

DUDEK

FIGURE 6

Closest Responding Fire Station Map

Moreno Valley Farm Preliminary Fire Protection Plan

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5 Fire Safety Requirements- Infrastructure, Building Ignition Resistance, and Defensible Space

The RCFD and MVFD Fire Code (which adopts the 2022 CFC with amendments), and 2022 CBC adopted by reference (with several modifications) governs the building, infrastructure, and defensible space requirements detailed in this FPP. Given that the MVFD is part of the broader RCFD structure, some RCFD codes and standards may be referenced as well. The Project will meet applicable codes or will provide alternative materials and/or methods, if warranted. The following summaries highlight important fire protection features.

Prior to bringing combustible materials onto the Project site, utilities shall be in place, fire hydrants operational, an approved all-weather roadway, or an approved road surface alternative in place, and interim fuel modification zones established and approved.

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

5.1 Roads

All fire access roads associated with the Project will be in compliance with the Moreno Valley Municipal Code Chapter 8.36, the 2022 California Fire Code, County Ordinance 787.10, RCFD Office of the Fire Marshal Guideline OFM-01A Fire Department Access Requirements for Commercial and Residential Development, and all other applicable codes.

5.1.1 Access

Fire apparatus access roads shall extend to within 150 feet of all portions of the facility and all portions of the exterior walls of the first story of the building. Project site access, including road widths and connectivity, will comply with the requirements of the RCFD Guideline OFM-01A to include:

- Access to the Moreno Valley Farm Project will be via Box Springs Road. Additionally, there is a secondary emergency vehicle access that connects Alley 2 to Box Springs Road west of the primary entrance into the Project site.
- Fire apparatus access roads serving the development shall be designed, constructed, and maintained to support the imposed loads of RCFD fire apparatus with a total weight of 80,000 pounds. Apparatus weight is distributed as 55,000 pounds on tandem rear axles and 25,000 pounds on the front axle. The surface shall be designed, constructed, and maintained to provide all-weather driving capabilities.
- The minimum clear width of a fire apparatus access road is 24 feet. Where a center median is installed, the required access road width of 24 feet shall be provided on at least one side of the median. The opposing access road width shall not be less than 16’ for the single directional exit. The design and placement of a raised median shall consider turning radius requirements for emergency response vehicles.

- No parking or other obstruction (e.g.: trash receptacles) are permitted on roads that are narrower than 32 feet in width. Parking on one side is permitted on a road that is at least 32 feet but less than 40 feet in width. Parking on two sides is permitted on a road 40 feet or more in width.
- Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches. If trees are located adjacent to the fire access road, place a note on the plans stating that all vegetation overhanging the fire access road shall be maintained to provide a clear height of 13 feet, 6 inches.
- The minimum inside turning radius for an access road shall be 24 feet. The minimum turning radius shall be 45 feet. As fire apparatus are unable to negotiate tight "S" curves, a 60-foot straight leg must be provided between these types of compound-turns, or the radii and/or road width must be increased accordingly.
- Interior circulation streets and parking lot roadways that are considered roadways for traffic flow through the Project site will meet fire department access requirements when serving the proposed structures.
- Private and public streets for each phase shall meet all Project approved fire code requirements, paving, and fuel management prior to combustible materials being brought to the Project site.
- CFC 504.1 specifies the installation of approved access walkways from fire access roads to exterior openings required by either the CBC or CFC. RVC may require the construction of such walkways depending upon site conditions or project parameters. These conditions include, but are not limited to, building use or occupancy, topography, vegetation, and surface conditions
    - Access walkways must be provided to all required egress doors from a building, all firefighter access doorways in buildings with high-piled storage, and the area beneath each rescue window in "R" occupancies, at a minimum. Access walkways will typically be required around the entire perimeter of a structure to facilitate control of a fire through any other available openings.
    - Access walkways must be a minimum of five feet in width.
    - Access walkways shall consist of a surface that lends itself to safe use during building evacuation, firefighting, and rescue efforts. Solid surface walkways such as concrete or asphalt are preferable, though alternative surfaces such as decomposed granite (DG), gravel, or grass may also be permissible. Ground covers and shrubs that prevent or impede laddering of structures are not permitted to be planted within access walkways. Where the grade itself presents a slip or fall hazard, an access walkway with a slip-resistant surface and/or stairway must be provided.
    - Firefighter access to and emergency egress from required openings must remain free and unobstructed at all times.

5.1.2 Fire Lane Marking

Areas designated as a fire lane require an acceptable method of marking that shall be approved prior to installation. The following methods are acceptable means of identifying designated fire lanes for public and private roads according to RCFD Guideline OFM-01A:

- Specific areas designated by RVC as fire lanes shall be marked with red curbs. In addition, all entrances from public streets into the area marked with fire lanes shall be posted with approved fire lane entrance signs. This option is generally preferred by the RVC. NOTE: Other uniquely shaped spaces may be required to be designated as a FIRE LANE to prevent obstruction. This may be accomplished by outlining the FIRE LANE portion of the area with red paint and adding additional diagonal red markings within the designated area.

- "Fire Lane—No Parking" signs shall be posted immediately adjacent to each designated fire lane and at intervals not to exceed 75 feet. In addition, all entrances from public streets into the area marked with fire lanes shall be posted with fire lane entrance signs.

5.1.3 Maximum Dead-End Road Length

Dead-end roads in excess of 150 feet shall be designed and constructed with an approved cul-de-sac bulb turnaround or approved hammerhead. Turnarounds shall meet the turning radius requirements identified in Appendix D, *Minimum Turnaround and Hammerhead Dimensions* of the RCFD Guideline OFM-01A, *Fire Department Access Requirements for Commercial and Residential Development.* The minimum cul-de-sac radius is 45 feet with no parking allowed. Parking is allowed if the radius is increased by 8 feet. Dead end fire apparatus access roads shall not exceed: 600 feet within a Very High OR High Fire Hazard Severity Zone; 800 feet within a Moderate Fire Hazard Severity Zone; or 1320 feet within all other areas.

5.1.4 Grade

For fire apparatus access roads, a maximum of 6% (4 degrees) grade change is allowed for the initial 25 feet of approach or departure. The grade for access roads shall not exceed 14% (8 degrees). Cross-slope shall not be greater than 2.5% (1.43 degrees) for paved access roads.

5.1.5 Width and Clearance

Fire apparatus access roads shall be of an appropriate width and clearance to facilitate the ingress and egress of engines. The width and clearance of fire access roads associated with the Project shall comply with the following requirements identified in RCFD Guideline OFM-01A, *Fire Department Access Requirements for Commercial and Residential Development:*

- The minimum clear width of a fire apparatus access road is 24 feet. Where a center median is installed, the required access road width of 24 feet shall be provided on at least one side of the median. The opposing access road width shall not be less than 16' for the single directional exit. The design and placement of a raised median shall consider turning radius requirements for emergency response vehicles.
- No parking or other obstruction (e.g.: trash receptacles) are permitted on roads that are narrower than 32 feet in width. Parking on one side is permitted on a road that is at least 32 feet but less than 40 feet in width. Parking on two sides is permitted on a road 40 feet or more in width.
- Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches. If trees are located adjacent to the fire access road, place a note on the plans stating that all vegetation overhanging the fire access road shall be maintained to provide a clear height of 13 feet, 6 inches.

5.1.6 Gates

Gates on private roads are permitted, but subject to the Moreno Valley Municipal Code Chapter 8.36 and RCFD Guideline OFM-01A, *Fire Department Access Requirements for Commercial and Residential Development,* including:

- Existing or proposed gates and barriers crossing fire apparatus access roads must be shown on the plans. Information such as the location, type of gate (e.g., swinging, sliding), dimensions, and method of operation (manual, electric) must also be provided.

- Gated Entries located for egress and ingress of vehicles shall not be less than 24 feet clear width on not less than one side of a center median. The vertical clearance shall not be less than 13 feet 6 inches, including landscaping and/or trees or other obstructions. Roads leading up to and beyond the guard house or gate shall meet standard fire lane width requirements. Additional vehicle access gates located elsewhere on commercial property shall be a minimum of 24 feet in width.
- The minimum inside turning radius is 24 feet with an outside radius of 45 feet for both the exterior and the interior approach to the gate.
- Gates and barriers shall be located a minimum of 46 feet from any major street.
- New motorized gates shall be provided with means to be automatically opened remotely by emergency vehicle (MVMC 8.36.030C, Ordinance 787.10).

Manually Operated Gate and Other Barrier Designs

- Permanent or removable bollards are generally not permitted (CFC 503.4).
- For gates and barriers that are not used on a frequent basis or those that are located such that they have a reasonable likelihood of being blocked by vehicles, vegetation, furniture, or other obstructions (e.g., secondary fire department vehicle ingress/egress points, gates accessed from plazas), permanent signage constructed of 18-gauge steel or equivalent shall be attached on each face of the gate or barrier that reads “FIRE LANE—NO PARKING.”
- Manually operated gates and barriers shall have Knox padlocks, or weather-resistant Knox key boxes. The key box shall be placed four to five feet above the road surface at the right side of the access gate in a conspicuous location that is readily visible and accessible. The key box must be clearly labeled “FIRE DEPT” (CFC 506).

Electrically Operated Gates and Barriers

- Electric gate openers shall comply with UL 325. In the event of loss of normal power to the gate operating mechanism, it shall be automatically transferred to a fail-safe mode allowing the gate to be pushed open by a single firefighter without any other actions, knowledge, or manipulation of the operating mechanism being necessary and without the use of battery back-up power; this shall be noted on the plan. The manufacturer’s specification sheet demonstrating compliance with this method of operation during power loss shall be provided or scanned directly onto the plan. Should the gate be too large or heavy for a single firefighter to open manually, a secondary source of power by means of an emergency generator or a capacitor with enough reserve to automatically and immediately open the gate upon loss of primary power shall be provided.
- The gate control for electronic gates shall be operable by a Knox emergency override key switch (with dust cover). The key switch shall be placed between 42” and 48” above the road surface at the right side of the access gate within two feet of the edge of the road. The key switch shall be readily visible and unobstructed from the fire lane leading to the gate. The key switch shall be clearly labeled “FIRE DEPT.”
- Upon activation of the key switch, the gate shall open and remain open until returned to normal operation by means of the key switch. Where a gate consists of two leaves, the key switch shall open both simultaneously if operation of a single leaf on the ingress side does not provide for the width, turning radii, or setbacks necessary for fire apparatus to navigate the vehicle entry point. Note this requirement on the plan.

- The key switch shall be labeled with a permanent red sign with not less than ½" contrasting letters reading "FIRE DEPT" or with a "Knox" decal.
- New motorized gates shall also be equipped with optical receivers to allow emergency response personnel to remotely open the gate when the emergency vehicle approaches the gate. The receiver shall be located to maximize signal reception from an approaching RVC apparatus. Devices shall be compatible with RVC preemption devices. A functional test of the automatic opening equipment, witnessed by RVC-OFM is required prior to final acceptance.
- Gate or barrier locks shall be reviewed and approved prior to their installation on any new and/or existing access gate or barrier.

5.1.7 Key Boxes

Knox devices shall be provided where necessary to ensure that immediate access for firefighting, rescue, and other emergency purposes is possible. Knox equipment locations shall be shown on access plans. The Project will comply with RCFD Guideline OFM-01A, including:

- At a minimum, Knox devices shall be provided for the following locations:
  - Gates along the paths of firefighter travel from the fire lane to all points along the perimeter of the structure;
  - Gates to pool and recreation enclosures;
  - Building gates or doors leading to interior courtyards containing rescue windows;
  - Exterior doors to buildings, rooms containing main fire alarm panels, annunciators, and/ or fire suppression systems;
  - Doors and gates to other areas identified by RVC-OFM.
- Knox boxes or switches shall be located adjacent to and clearly visible from the gate or door served. They shall be securely mounted to a wall or fence at a height of 6 feet above grade in a location that is easily accessible to firefighters. Where the potential for vandalism or tampering is significant, key boxes may be mounted higher with RVC-OFM approval. Boxes and switches are not required to be electronically monitored; if they are, they shall not initiate an alarm signal that requires a response by the fire department.
- The key used to unlock the gate or door shall be kept in the key box. When the key unlocks more than the individual adjacent gate or door, a label or tag shall be attached to the key identifying the gates or doors it operates. Where multiple gates or doors are served by a single box, two or more copies of the key(s) are recommended so that a copy will be available to each engine/ truck company responding to the site. NOTE: All keys must have an address tag attached.
- Electromagnetically or electromechanically locked pedestrian gates and doors shall be equipped either with a Knox box containing a key to open the lock or, if the door lock cannot be operated with a key from the exterior, a Knox key switch shall be provided adjacent to the door. Where key switches are provided, the door or gate lock shall remain disengaged until the key switch is returned to the "normal" closed or locked position.

5.1.8 Premises Identification

Approved numbers or addresses shall be placed on the front elevation of all new or existing buildings in such a position that is plainly visible and legible from the street or road on which the property is addressed. Addresses shall not be located where they have the potential of being obstructed by signs, awnings, vegetation, or other building/site elements. An address monument at the vehicle entrance or other location clearly visible and legible from the public road may be provided in lieu of an address on the structure where only a single building with a single street address is present and no other structures are accessible from the fire apparatus access road serving that structure (CBC 501.2, CFC 505.1). Identification of roads and structures will comply with RCFD Guideline OFM-01A as follows:

- The numbers/ letters shall be a minimum of 12" for structures up to 25 ft. in height. Address numbers must be a minimum of 24" when the building exceeds 25 ft., The numbers shall have a minimum 1/2-inch stroke. When a building contains multiple addresses, an address range may be posted on the structure.
- Buildings that are set back from the primary roads more than 150 feet or otherwise not visible from the public road, shall have a monument provided as approved by RVC-OFM.
- Numbers for new buildings shall be internally or externally illuminated, to be visible at night. This requirement also applies to monuments. NOTE: Reflective type numbers may be acceptable for a single lot residential development project, when specifically approved by RVC–OFM.
- Where it is unclear as to which street a building is addressed to (e.g., a building is accessed only from a street other than the one it is addressed to; multiple main entrances to the site or building itself front different streets), the name of the street shall also be identified as part of the posted address.
- For multi-unit buildings, Suite/apartment 6" numbers/ letters shall be placed on or adjacent to the primary entrance for each suite/apartment and any other door providing access to fire department personnel during an emergency. Multiple residential and commercial units having entrance doors not visible from the street or road shall, in addition, have approved numbers grouped for all units within each structure and positioned to be plainly visible from the street or road.
- For multi-building clusters, approved numbers or addresses shall be placed on the front elevation(s) of all buildings that form the cluster. If all building addresses are not clearly visible or legible from the public road serving the structures, an address monument shall also be provided at the entry point(s) to the site indicating the range of addresses accessible from that entrance.

5.2 Fire Protection Systems

5.2.1 Water Supply

The Eastern Municipal Water District (EMWD) serves Riverside County and would serve the Project once completed. Proposed water lines would be constructed in locations throughout the site. Final location and size of water lines and appurtenances would be approved by the Riverside County Public Works and Community Services Division. The water supply for the Project will be capable of supplying the required fire flow for fire protection and sized according to the applicable codes and design standards. An MVFD official will be notified prior to a water supply test or provided with approved documentation before approval of the water supply system (CFC Section 507.4). Fire protection water supply shall comply with CFC Section 507 and RCFD Guideline OFM-01B, *Fire Department Water Supply and Fire Hydrant Requirements for Commercial & Residential Development.*

5.2.2 Hydrants

Fire Hydrants shall be located along fire access roadways and adjacent to each structure, as determined by the MVFD Fire Marshal and current fire code requirements to meet operational needs. Fire Hydrants will be consistent with applicable codes and RCFD Guideline OFM-01B, *Fire Department Water Supply and Fire Hydrant Requirements for Commercial & Residential Development*, including:

- Hydrants shall be located at street intersections for both public and private streets. Hydrants must be located no more than three feet from the edge of a fire apparatus access road and cannot be located in areas where they will be visually or operationally obstructed (behind fences or walls, in bushes, behind parking spaces, etc.). Clearance shall be provided to a distance no less than three feet from the perimeter of the hydrant.
- The hydrant outlets must face the fire apparatus access road. Where all of the outlets cannot face the fire access road (e.g., the hydrant is located in a landscape peninsula or island in a parking lot; the hydrant has three outlets), the 4" outlet(s) shall take precedence.
- Hydrants shall be located at least 40 feet from the building(s) it serves. Where it is impractical to locate hydrants 40 feet from adjacent structures, hydrant spacing shall be reduced by 50% to provide alternative hydrants for use by fire department personnel responding to an emergency. Fire hydrants may be located closer provided that nearby walls do not contain openings and the hydrant is not otherwise located where it can be rendered inoperable due to damage from collapsed walls, debris, or excessive heat.
- Hydrants with a primary function of connection to a Fire Engine for the purpose of pumping an FDC shall be located so that a hose line running between the hydrant, fire engine, and the fire department connection(s) (FDCs) does not exceed 100 feet. This is commonly accomplished by using a public fire hydrant. In addition, consideration should be given to avoid configurations in which hose lines have to cross driveways, obstruct roads, or fire lanes, or otherwise interfere with emergency vehicle response and evacuation of a site, when possible.
- Hydrants and fire department connections should not be located where apparatus staged at these appurtenances would then encroach on minimum fire apparatus turning radii unless alternative routes are available.
- If vehicles can approach the hydrant from more than one direction, the hydrant shall be protected by four bollards of concrete-filled pipe four inches in diameter and mounted in concrete in a square around the hydrant. The bollards need to be spaced a minimum of three feet from the perimeter of the hydrant. The bollards must be placed so that their location does not impede access to or use of the hydrant. Two bollards may protect hydrants that can be approached from only one side. Hydrants may not require protection by bollards if they are located such that the potential for collision is minimal or if they are sufficiently protected by a standard concrete curb at least six inches in height.
- Blue reflective pavement markers ("blue dots") shall be used to identify fire hydrant locations. Blue reflective markers used for any other purpose should be removed. Markers shall be placed six inches from the edge of the painted centerline or from the approximate center of streets without a painted centerline on the side nearest the hydrant.
- Public hydrants shall be painted Chrome Yellow, or any color (other than red) as specified by the local water purveyor or City Ordinance
- The residential standard for fire hydrants require one four inch outlet, and one two and one-half (2 ½) inch outlet (MVMC 8.36.030F, Ordinance 787.10).

5.2.3 Fire Sprinklers

All structures, of any occupancy type, will be protected by an automatic, internal fire sprinkler system as required in the adopted fire code. Fire sprinklers systems shall be in accordance with MVFD, and National Fire Protection Association (NFPA) Standard 13D. Fire sprinkler plans for each structure will be submitted and reviewed by MVFD for compliance with the applicable fire and life safety regulations, codes, and ordinances as well as compliance with RCFD Technical Policy 14-001, included below. Actual system design is subject to final building design and the occupancy types in the structure.

- Automatic fire sprinkler system risers shall not be obstructed in any manner. If a system riser is to be concealed by means of a wall, soffit, column, or other building construction, it shall be provided with eighteen (18) inch clearance to each side and to the front of the system riser. Access shall be provided by means of a door with the minimum dimensions two (2) feet six (6) inches in width by six (6) feet eight (8) inches in height from the exterior of the building directly to the riser as approved by the fire code official.

5.3 Ignition Resistant Construction and Fire Protection Systems

All new structures within the Project site will be constructed to Fire Code standards. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the 2022 CBC (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at elevated levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. Appendix E, *Ignition-Resistant Construction Requirements* provides a summary of the requirements for ignition resistant construction.

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

5.4 Defensible Space and Vegetation Management

WUI fire protection requires a systematic approach, which includes the components of infrastructure and water, structural safeguards (addressed in the FPP), and adequate defensible space setbacks. A vital component of a fire protection system for this Project is the provision for ignition-resistant landscapes. A fuel modification zone (FMZ) is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought-tolerant, fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures.

Cohen (1995) performed structure ignition fire research studies that suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid Structure Ignition Assessment Modeling results indicate that a 20-foot-high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas a 70-foot-high flame requires about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). For this fire study example, bare wood was used, which is more combustible unlike the ignition-resistant construction of the Project. For the Project, assuming up to 25-foot flame lengths, the 100-foot minimum of fuel modification is more than sufficient.

Based on the modeled extreme weather flame lengths for the Project site once developed and FMZs are in place, wildfire behavior would be reduced as the wildfire burns into the FMZs and is starved of fuels. The properties adjacent to the Project site would remain unaltered and retain the fire behavior of existing conditions.

The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining "defensible space" distances for providing firefighters with room to work and minimizing structure ignition. The Project does not achieve 100 feet of fuel modification onsite; however, the adjacent properties, including the park to the northeast, provide offsite FMZ equivalencies.

5.4.1 Riverside County/Cal Fire Defensible Space/ Fuel Modification Zone Standards

Defensible space, coupled with property hardening, is essential to improve a building's chance of surviving a wildfire. Defensible space is the buffer created between a building and grass, trees, shrubs, or any wildland area that surrounds it. This space is needed to slow or stop the spread of wildfire, and it helps protect buildings from catching fire—either from embers, direct flame contact, or radiant heat. Proper defensible space also provides firefighters with a safe area to work in, to defend the buildings. The purpose of this section is to document MVFD's standards and make them available for reference. MVFD's Fire Code is consistent with the 2022 California Fire Code (Section 4907 — Defensible Space), Government Code 51175 – 51189, and Public Resources Code 4291, which require that fuel modification zones be provided around every building that is designed primarily for human habitation or use within an SRA or a LRA VHFHSZ.

A typical fuel modification installation requires a 100-foot-wide fuel modification zone consisting of a 5-foot-wide ignition resistant Zone 0, a 25-foot wide irrigated Zone 1 and a 70-foot wide thinning Zone 2 measured from the exterior of the building extending outwards towards undeveloped areas. Based on modeling and analysis of the Project area to assess its unique fire risk and fire behavior, it was determined that the Moreno Valley Farm Project will comply with Zone 1 requirements onsite and will achieve an offsite FMZ equivalent on adjacent properties. The FMZ, when properly maintained, along with other fire hazard reducing features, will effectively minimize the potential for structure ignition from direct flame impingement or radiant heat within the Project area. Assembly Bill 3074,N passed into law in 2020, requires a third zone for defensible space. This law requires the Board of Forestry and Fire Protection to develop the regulation for a new ember-resistant zone (Zone 0) within 0 to 5 feet of the home by January 1, 2023. The intensity of wildfire fuel management for a traditional FMZ varies within the 100-foot perimeter of the structure, with more intense fuels' reduction occurring closer to the structure. A Fuel Modification Plan shall be reviewed and approved by a MVFD Fire Safety Specialist for consistency with defensible space and fire safety guidelines.

To ensure long-term identification and maintenance, a fuel modification area shall be identified by a permanent zone marker meeting the approval of MVFD. All markers will be located along the perimeter of the fuel modification area at a minimum of 500 feet apart or at any direction change of the fuel modification zone boundary. This applies only to the on-site FMZ areas and would not be provided off-site on roadways and similar landscapes that are providing FMZ equivalent. FMZs will be maintained on at least an annual basis or more often as needed to maintain the fuel modification buffer function.

5.4.2 Project-Specific Fuel Modification Zones

The area between the exterior of the buildings and the property lines will be either irrigated landscaping or non-combustible paved surfaces in the form of roads, walkways, and parking spots. The Project will comply with the FMZ requirements onsite, specifically meeting the requirements for Zone 0 and Zone 1. In addition to the Project being compatible with the FMZs onsite, the Project benefits from the existing adjacent offsite areas in order to meet the 100-foot FMZ requirement. This is possible since the adjacent off-site areas are already compatible with FMZ requirements, as mandated by Moreno Valley. More specifically, the adjacent offsite areas are required to be maintained through the City of Moreno Valley's Weed Abatement program. This program requires that all weeds, grass, brush, or other combustible vegetation be completely cleared on all parcels, including alleys, parkway strips, or unimproved public easements abutting the property, that are less than five acres in size (City of Moreno Valley n.d.). With the Weed Abatement program, no landscaping work is required offsite, rather, the well-maintained adjacent areas will provide an offsite FMZ equivalent for the Project in order to comply with Riverside County's 100-foot FMZ requirement. Figure 7 demonstrates that the Project will provide Zone 0 around each structure and Zone 1 up to the Property line. Off-site FMZs are mapped to demonstrate which off-site areas fall within the 100 feet, and their FMZ-equivalent, compliant condition, though there is no obligation on the Project to maintain those areas. To further explain the concept of off-site FMZs in terms of reciprocity, the Project provides benefit to the existing adjacent land uses by maintaining Project landscape and aids in those structures meeting their 100 feet requirement, though there is no obligation on the adjacent ownership to maintain the Project landscaping.

In addition to the Weed Abatement program and off-site FMZ equivalency, a six-foot concrete masonry unit (cmu) wall will be installed on the northern property line of the Project site. The 6-foot-tall, heat-deflecting wall will provide additional deflection for the Project. When buildings are set back from slopes, and a wall is placed at the top of slope, flames spreading up those slopes are deflected vertically and over the structure where cooling occurs, reducing the effects of convective heat on the structure. If a structure cannot be setback adequately, or where the slope is less than 30%, a noncombustible wall can help deflect the flames from the structure (NFPA 2013). The structure set back is important to avoid heat and/or flame intersection with the structure. The heat-deflecting wall will be used as an enhancement to FMZs and defensible space. The landscape walls would provide a vertical, non-combustible surface in the line of heat, fumes, and flame travel up the slope. Once these fire byproducts intersect the wall, they are deflected upward or, in the case where lighter fuels are encountered, they are quickly consumed, heat and flame are absorbed or deflected by the wall, and the fuels burn peaks out within a short (30 seconds to 2 minutes) time frame (Quarles and Beall 2002).

The landscaping requirements for each fuel modification zone are described below. These standards are pursuant to the codes referenced in Section 5.4.1 and spacing requirements are also well described in the General Guidelines for Creating Defensible Space published by CAL FIRE in 2006. Figure 7 demonstrates the conceptual FMZs based on the land use area.

Zone 0: Ember-Resistant Zone (Non-combustible zone from exterior structure wall to 5 feet)

The Ember-Resistant Zone is applicable site-wide and is measured from the exterior wall of the structure outward to 5-feet (horizontal). The ember-resistant zone is designed to keep fire or embers from igniting materials that can spread the fire to the structure.

The Ember-Resistant Zone includes the following key components:

- The use of hardscaping like gravel, pavers, concrete, and other non-combustible materials. No combustible bark or mulch.
- Remove all dead and dying weeds, grass, plants, shrubs, trees, branches, and vegetative debris (leaves, needles, cones, bark, etc.); check the roofs gutters, decks, porches, and stairways.
- Remove all branches within 10 feet of any chimney or stovepipe outlet.
- Relocate pallets, firewood, and lumber to be a minimum 30 feet or more from the structure.
- Replace combustible fencing, gates, and other structures within this zone to non-combustible materials.
- Remove vegetation and items that could catch fire from around and under decks, balconies, and stairs.
- Relocate garbage and recycling containers outside this zone when possible.
- Relocate vehicles outside this zone when possible.

Zone 1: Lean, Clean and Green Zone (Fully irrigated zone extending from Zone 0 outward to 30 feet from exterior of structure or to the property line)

Zone 1 extends 30 feet from buildings, structures, decks, or to the property line, whichever is closer. Zone 1 includes the following key components:

- Irrigated by the automatic or manual system to maintain healthy, high moisture content, fire-resistant vegetation.
- Remove all dead plants, grass, and weeds.
- Remove dead or dry leaves and pine needles from yard, roof, and rain gutters.
- Remove branches that hang over your roof and keep dead branches 10 feet away from chimneys.
- Trim trees regularly to keep branches a minimum of 10 feet from other trees.
- Relocate pallets, firewood, and lumber to be a minimum 30 feet or more from the structure unless completely covered in a fire-resistant material.
- Remove or prune flammable plants and shrubs near windows.
- Remove vegetation and items that could catch fire from around and under decks, balconies, and stairs.
- Create separation between trees, shrubs, and items that could catch fire such as patio furniture, wood piles, and swing sets.
- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers (not exceeding 4 inches in height), and spaced shrubs and trees. No shrubs shall exceed 6 feet in height. Plants in Zone 1 shall be inherently highly fire-resistant and spaced appropriately, Plants shall be on the approved fuel modification plant list (See Appendix F, County of Riverside California Plant Friendly List) or given special approval by an MVFD official.
- New trees shall be planted and maintained so that the tree's drip line at maturity is a minimum of 10 feet from any combustible structure.
- Create horizontal space between shrubs and trees. Horizontal spacing depends on the slope of the land and the height of the shrubs or trees. Given that the Project will generally be less than 20% slopes, horizontal spacing should be 2x's the height of shrubs and trees should be separated so that their drip lines at maturity are a minimum of 10 feet apart.

- Create vertical spacing between grass, shrubs, and trees. Vertical spacing includes removing all branches at least 6 feet from the ground and/or maintaining at least 3x the height of a shrubs separation from the lowest tree branch or 10 feet, whichever is greater. Lack of vertical space can allow a fire to move from the ground to the brush to the treetops like a ladder, leading to more intense fire closer to the structure.
- Prohibited plant species (See Appendix F, County of Riverside California Plant Friendly List) shall not be planted within any fuel modification zone for the Project.
- Vines and climbing plants shall not be allowed on any structure.
- "Outbuildings" and Liquid Propane Gas (LPG) storage tanks shall have the following minimum clearance: ten feet (10 ft.) of clearance to bare mineral soil and no flammable vegetation for an additional ten feet (10 ft.) around their exterior.

Zone 2: Reduce Fuel Zone (Thinning Zone extending from the outer edge of Zone 1 outward to 100 feet from exterior of structure)

Zone 2 extends from Zone 1 to 100 feet from the exterior of the buildings. As applied to the Project, Zone 2 will be an offsite equivalent FMZ, meaning the off-site adjacent areas already meet these requirements through the Moreno Valley Weed Abatement program. No landscaping work is required offsite, rather this section is for reference. Zone 2 includes the following key components:

- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers (not exceeding 4 inches in height, except as approved by the MVFD), and spaced shrubs and trees. No shrubs shall exceed 6 feet in height.
- Create horizontal space between shrubs and trees. Horizontal spacing depends on the slope of the land and the height of the shrubs or trees. Given that the Project will generally be less than 20% slopes, horizontal spacing should be 2x's the height of shrubs and trees should be separated so that their drip lines at maturity are a minimum of 10 feet apart.
- Create vertical spacing between grass, shrubs, and trees. Vertical spacing includes removing all branches at least 6 feet from the ground and/or maintaining at least 3x the height of a shrubs separation from the lowest tree branch or 10 feet, whichever is greater. Lack of vertical space can allow a fire to move from the ground to the brush to the treetops like a ladder, leading to more intense fire closer to the structure.
- Shrub groupings are permitted when at least 30 feet from the exterior of the structure but shall have a maximum 10-foot aggregate diameter and be a minimum of 15 feet from other groupings.
- New trees not classified as fire-resistant vegetation, such as conifers, palms, pepper trees and eucalyptus species, shall be permitted provided the tree is planted and maintained so that the tree's drip line at maturity is a minimum 30 feet from any combustible structure.
- Remove all fallen leaves, needles, twigs, bark, cones, and small branches (they may be permitted to a depth of 3-inches). All vegetation will be maintained free of dead or dying material.
- All exposed wood piles must have a minimum of 10 feet clearance, down to bare mineral soil or other non-combustible surfaces, in all directions.
- Irrigation systems are not required if the zone entirely consists of native plants.
- Annual grasses and weeds shall not exceed a height of 4-inches.
- "Outbuildings" and Liquid Propane Gas (LPG) storage tanks shall have the following minimum clearance: ten feet (10 ft.) of clearance to bare mineral soil and no flammable vegetation for an additional ten feet (10 ft.) around their exterior.

5.4.3 Ongoing Infrastructure/FMZ Maintenance

Vegetation management, i.e., assessment of fuel modification zone condition and removal of dead and dying and undesirable species; as well as thinning as necessary to maintain specified plant spacing and fuel densities, shall be completed annually by May 1 of each year and more often as needed for fire safety. The individual property owners shall be responsible for all fuel modification vegetation management on their lots in compliance with the plan and the MVFD requirements. The Project's HOA and/or Property Manager or similar entity shall be responsible for all vegetation management in all communal areas of the Project site, including onsite Fuel Modification Zone 0 and Zone 1. The Project's HOA and/or Property Manager or similar entity will assure lots comply with the plan initially and on an ongoing basis. Chapter 7A requirements for ongoing maintenance of fire-resistive building materials and fire sprinkler systems will be maintained to a code-complying level, as-approved in this or similar documents, in perpetuity. Additionally, the Project's HOA and/or Property Manager or similar entity shall be responsible for ensuring long-term funding and ongoing compliance with all provisions of the FPP, including vegetation planting, onsite fuel modification, and maintenance requirements on all communal areas and roadsides.

Maintenance of FMZ's and Defensible Space is a vital component for the long-term fire safety of the Project. maintenance obligations will be as follows:

- All future plantings shall be in accordance with RCFD fuel modification requirements.
- The MVFD will review landscape plans and provide corrections where necessary so that they are in compliance with MVFD standards.
- Changing landscaping in communal areas or individual lots will be reviewed by the MVFD and approved prior to installation.

Project's HOA and/or Property Manager:

- The Project's HOA and/or Property Manager will maintain the access roads within the Development Footprint adjacent to open space areas.
- The Project's HOA and/or Property Manager will be required to annually maintain the onsite FMZs (or as needed).
- The Project's HOA and/or Property Manager will maintain all communal areas, including trees planted along internal roadways and in other areas throughout the Project.

5.5 Pre-Construction Requirements

Per MVFD and CAL FIRE, a fuel modification plan (Figure 7) shall be submitted and have preliminary approval prior to any subdivision of land; or, have final approval prior to the issuance of a permit for any permanent structure used for habitation; where, such structure or subdivision is located within areas designated as a Fire Hazard Severity Zone within State Responsibility Areas or Very High Fire Hazard Severity Zone within the Local Responsibility areas. An on-site inspection must be conducted by the MVFD and final approval of the fuel modification plan issued prior to a certificate of occupancy being granted by the building code official.

Prior to bringing lumber or combustible materials onto the Project site, improvements within the active development area shall be in place, including utilities, operable fire hydrants, an approved, temporary roadway surface, and construction phase fuel modification zones established. These features will be approved by the fire department or their designee prior to combustibles being brought on-site.

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SOURCE: Bing Imagery 2024; OpenStreetMaps 2019

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FIGURE 7

Fuel Modification Plan

Moreno Valley Farm Preliminary Fire Protection Plan

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6 Wildfire Education Program

The HOA and/or Property Manager or similar entity of the Moreno Valley Farm Project will be provided an initiative-taking educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation (RCFD, 2020). Additionally, management of on-site entities occupying the site's structures will be required to register for emergency alerts via the Alert Moval messaging system (https://moreno-valley.ca.us/alert/index.html). Personnel and employees will be strongly encouraged to also register to receive emergency alerts.

6.1 Recognition for Fire Safety and Maintaining Fire Insurance

Insurance companies have begun to assess communities against guidelines above and beyond the fire code and local standards documented within this FPP. Due to the heightened standard assessed by the insurance industry, homeowners and communities have been dropped from insurance or have experienced rate increases despite complying with the minimum codes and standards.

The Firewise USA program administered by NFPA is a certification program for communities to gain recognition for the fire-wise design and maintenance of their community. Firewise USA began in 2019 with seven sites that were challenged to improve the fire resilience of their communities through a focused approach to active wildfire risk reduction. This is done through a collaborative framework created to empower neighbors to get organized and take action to reduce wildfire risk at a local level. The program has grown to include over 1.5 million residents living in Firewise USA communities (Firewise USA, n.d.a). The insurance industry, due to Department of Insurance Regulation #REG-2020-00015, is required to recognize the Firewise certification and consider it when it comes to determining if a community is insurable; cuts to insurance premiums have been made based on this certification. Given the established framework of Firewise USA, its direct mention in regulatory language, and its existing adoption by multiple insurance companies, it can be reasonably anticipated that more companies will require the same certification from customers that attempt to pursue discounted policies.

There are several requirements to become a Firewise USA community and multiple living documents must be prepared. Firewise USA communities must have a minimum of 8 dwelling units and a maximum of 2,500, meaning the proposed Project, in its entirety, would be able to participate in the program (Firewise USA, n.d.b). To become certified, a board or committee of volunteers made up of residents and partners such as a representative of the local FD would first need to be formed. A community wildfire risk assessment (CWRA) would then need to be completed, either independently or with assistance from a third-party consultant such as Dudek. The CWRA would need to be updated at least every five years. From the CWRA, a three-year action plan would be created that prioritizes risk reduction actions to be taken within the community and would need to be updated at least every three years. Every year, a worksheet would need to be filled out compiling the volunteer hours performed towards the goals outlined in the three-year action plan. One volunteer hour is required to be performed per dwelling unit within the community, or an investment of monetary equivalent in mitigation efforts can be made in lieu of volunteer hours (Firewise USA, n.d.b).

In addition to the Firewise certification, the community can hire a qualified individual such as Dudek to assess the community regularly to document compliance with not only the fire code but the insurance industry minimums. Wildfire Risk Assessments have proven valuable in helping communities maintain fire insurance or even apply for reduced premiums, given that the insurance industry evaluates fire resistant features above and beyond what the fire code requires.

7 Conclusion

This FPP for the infill Moreno Valley Farm Project provides guidance for vegetation maintenance for the landscaped areas on the Project site. As described, vegetation maintenance measures will be provided on all landscaped areas of the proposed Project. The requirements and recommendations provided in this FPP have been designed specifically for the Project. This analysis and its fire protection justifications are supported by fire science research, results from previous wildfire incidents, and fire agencies that have approved these concepts. The system of fire protection provided for the Project site includes a redundant layering of code-compliant, fire-resistant construction materials and methods that have been shown through post-fire damage assessments to perform extremely well against wildfire and ember storm conditions. It is Dudek's professional opinion that this Project, like any project built to the most recent fire safety code requirements, will not be vulnerable to fire losses experienced by older, less ignition resistant projects and the Project is considered to represent a low wildfire risk to its occupants based on its ability to provide for evacuations. It is necessary to understand that Projects occurring within fire hazard severity zones and wildland urban interface areas with higher potential fire hazards represent lower overall fire safety risk when the buildings and community are built to ignition resistant levels as required by code. Conversely, older communities that do not include the ignition resistant strategies may occur in a location that represents lower potential fire hazards outside of a fire hazard severity zone or wildland urban interface but may actually be at higher overall fire risk due to the vulnerabilities inherent in their construction.

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

Note that this is a conceptual plan, which provides enough detail for MVFD's preliminary approval. Detailed plans, such as improvement plans and building permits, demonstrating compliance with the concepts in the FPP and with City and County Fire Code requirements, would be submitted to MVFD at the time they are developed. Fire is a dynamic and somewhat unpredictable occurrence and as such, this FPP does not guarantee that a fire will not occur or will not result in injury, loss of life, or loss of property. There are no warranties, expressed or implied, regarding the suitability or effectiveness of the recommendations and requirements in this FPP, under all circumstances.

The Project's developers, contractors, engineers, and architects manage the proper implementation of the concepts and requirements set forth in the FPP. Homeowners and the Project's HOA and/or Property Manager or similar entity are also responsible for maintaining their structures and lots, including fuel modification and landscape, as required by this FPP, the MVFD, and as required by the City and County Fire Codes. Alternative methods of compliance with this FPP can be submitted to the fire authority for consideration.

It will be extremely important for all homeowners, the Project's HOA and/or Property Manager or similar entity and occupants to comply with the recommendations and requirements described and required by the FPP on their property. The responsibility to maintain the fuel modification and fire protection features required for the Project site lies with the homeowners, the Project's HOA, and/or Property Manager or similar entity. Said responsible party would oversee ongoing education and maintenance of the communal areas, and the MVFD would enforce the vegetation management requirements detailed in this FPP. Such requirements would be made a part of deed encumbrances and CC&Rs for each lot, as appropriate.

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

The goal of the fire protection features, both required and those offered beyond the Codes, provided for the Project is to provide the structures with the ability to survive a wildland fire with little intervention of firefighting forces. Preventing ignition to structures results in a reduction of the exposure of firefighters and residents to hazards that threaten personal safety. It will also reduce property damage and losses. Mitigating ignition hazards and fire spread potential reduces the threat to structures and can help the fire department optimize the deployment of personnel and apparatus during a wildfire. The analysis in this FPP provides support and justifications for acceptance of the proposed fuel modification zones for the proposed Project Development Footprint based on the site-specific fire environment.

This plan is intended to outline the generally accepted protocols which it is predicted will be designed and as appropriate, refined by MVFD at the appropriate time(s) into the final site-specific plan for the Moreno Valley Farm Project. Inasmuch as fire is a dynamic and often unpredictable occurrence, it cannot be guaranteed that, despite precautionary measures, a fire will not occur or that it will not result in injury, loss of life, or damage to or loss of property. No warranties expressed or implied are made herein, notwithstanding that the goal remains to identify a suite of appropriate measures calculated, to the extent feasible under the circumstances, which would mitigate the potential for such injury or damage. Although the MVFD may determine to recommend, or mandate, particular ameliorative measures in advance, the responsibility to react to and implement suitable fire protection features required for the Project site lies with the homeowners. In the event the Project's HOA and/or Property Manager or similar entity undertakes ongoing education and maintenance of the communal areas, this would be additive and support the common mission.

Likewise, the MVFD may elect to develop and/or implement enforcement of vegetation management requirements. It is common to plan for these contingencies by adopting a "Ready, Set, Go" stance on emergency response (whether fire, earthquakes, flooding, chemical spills, etc.) and on dislocation or evacuation, along with other components discussed below, where appropriate. Experience garnered from other situations tends to support that "shelter-in-place" may be, but is not always, the preferred option. Fire and/or law enforcement officials may, during an emergency, determine that it is safer to temporarily refuge residents on-site. Again, where evacuation is ordered, ideally it will align with pre-established evacuation decision-tree points. In some communities, community meetings and even drills are considered beneficial to augment the preparedness of owners, occupants, workers, and other potentially affected persons within the community for an incident that could occur with little or no warning.

Limitation On Reliance or Dependence Upon Report

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

Dudek expressly disavows, does not assume any responsibility for, nor will be liable for any claims, losses, or damages associated with any matters that are the subject of this or other reports it prepares or contributes to respecting this Project, however characterized (including without limitation as sounding in tort, breach of contract, misrepresentation by act or omission, failure to adhere to applicable standards of professionalism, statutory liability, etc.), whether in law or equity, whether known or unknown, and whether actual or contingent, excepting only Dudek's direct client, as to which the limitation of liability provisions in the contract between Dudek and its client shall govern

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Appendix A

Representative Project Photograph Log

MORENO VALLEY FARM (5/14/2025)
ATTACHMENT 1
PHOTO LOG

PHOTO LOCATION KEY

Picture 1: IMG 0398 Taken at the southwest corner of the Project site along Box Springs Road looking northeast over the Project area. The Project site is relatively flat with a slight slope upwards towards the north. Vegetation in the southern portion of the Project site is sparse grass, shrubs, and trees.

Picture 2: IMG 0399 Taken at the southwest corner of the Project site looking east across the southern perimeter along Box Springs Road. The Project site is relatively flat with a slight slope upwards towards the east. Vegetation in the southern portion of the Project site is mostly shrubs and trees.

Picture 3: IMG 0402 Taken at the southwest corner of the Project site along Box Springs Road looking southwest away from the Project site. There is a slight slope downwards towards the west. Vegetation offsite includes a few trees. RV dealership to the southwest.

Picture 4: IMG 0429 Taken at the southeast corner of the Project site along Box Springs Road looking north across the Project site. Topography slopes upwards towards the north. Majority of the Project site is bare soil.

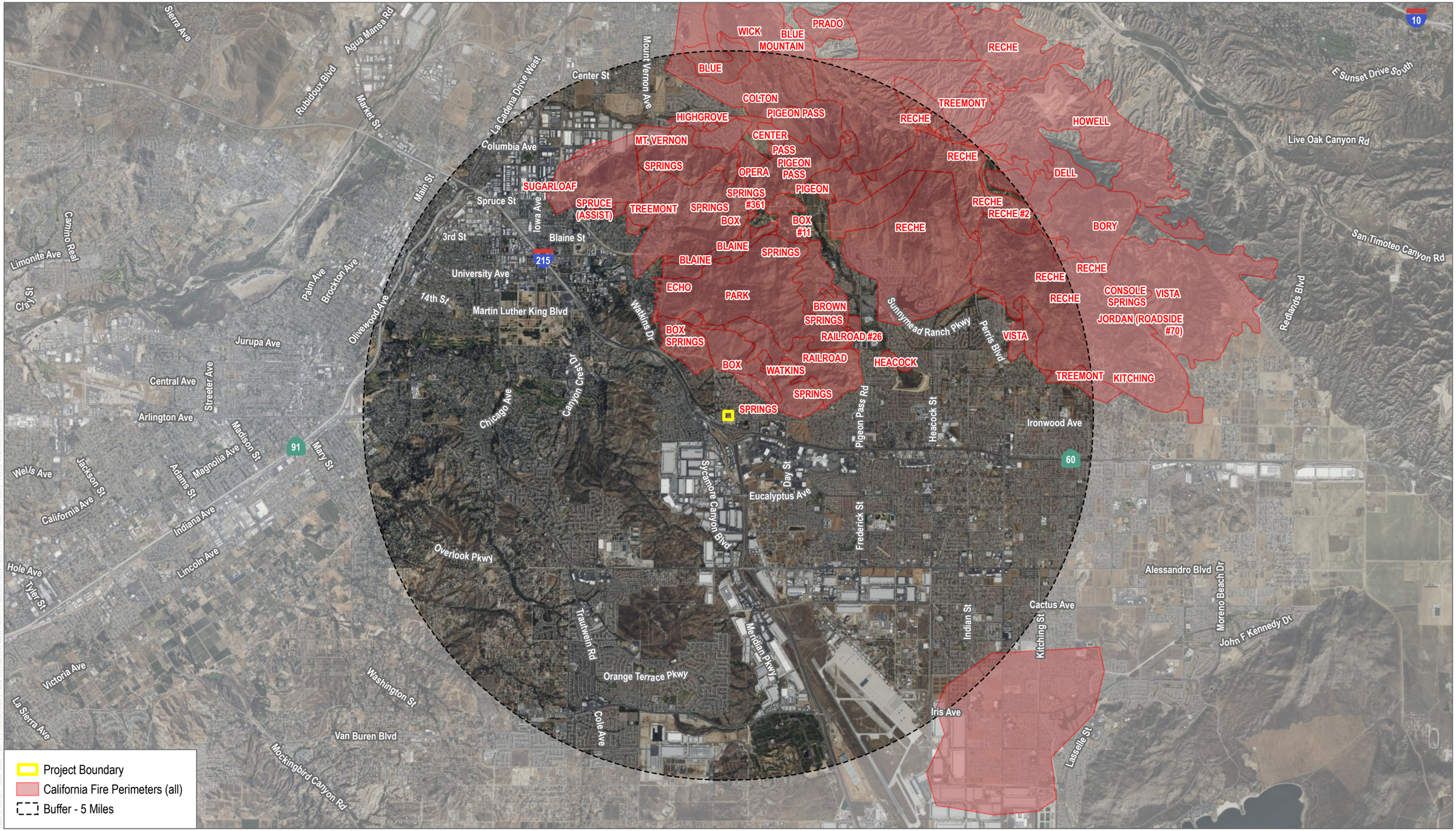
Picture 5: IMG 0443 Taken at the northeastern corner of the Project site looking southwest across the Project site. The Project site is relatively flat with a slight hill that runs through the middle of the Project site. Vegetation onsite is sparse, consisting mostly of small patches of grass, with the majority of the ground being bare soil.

Picture 6: IMG 0476 Taken in the middle of the Project site looking northeast across the Project site. Project site is relatively flat, with a slight slope downwards towards the north. Vegetation in the northeastern portion of the Project site includes some tall shrubs and trees, but the majority of the ground is bare soil. Note a park southeast of the Project site with well-maintained grass, residential neighborhood to the southeast, and the Box Springs Mountain Reserve in the distance.

Picture 7: IMG 0454 Taken at the middle of the northern boundary of the Project site looking west across the northern perimeter. Topography slopes downwards towards the north. Vegetation in the northern portion of the Project site includes some tall shrubs and trees, but it mostly consists of small patches of grass, with the majority of the ground being bare soil.

Picture 8: IMG 0466 Taken at the middle of the western boundary of the Project site looking north across the western perimeter. Topography slopes downwards towards the north. Vegetation in the northwestern portion of the Project site includes some tall shrubs and trees, but it mostly consists of small patches of grass, with the majority of the ground being bare soil.

Appendix B
Project Vicinity Fire History



SOURCE: Bing Imagery 2024; OpenStreetMaps; CalFire 2025

DUDEK

N

0 3,000 6,000 Feet

APPENDIX **B**

Fire History

Moreno Valley Farm Preliminary Fire Protection Plan

Appendix C

BehavePlus Fire Behavior Analysis Summary

1 BehavePlus Fire Behavior Modeling History

Fire behavior modeling has been used by researchers for approximately 50 years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used for predicting fire behavior on a given landscape. That model, known as "BEHAVE," was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus, 6.0.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Marsden-Smedley and Catchpole 1995, Grabner 1997, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of BehavePlus and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling includes a high level of analysis and information detail to arrive at reasonably accurate representations of how wildfire would move through available fuels on a given site. Fire behavior calculations are based on site specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. 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. To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

1. First, it must be realized that the fire model describes fire behavior only in the flaming front. The primary driving force in the predictive calculations is the dead fuels less than 0.25 inches in diameter. These are the fine fuels that carry fire. Fuels greater than 1 inch have little effect, while fuels greater than 3 inches have no effect on fire behavior.
2. Second, the model bases calculations and descriptions on a wildfire spreading through surface fuels that are within 6 feet of the ground and contiguous to the ground. Surface fuels are often classified as grass, brush, litter, or slash.
3. Third, the software assumes that weather and topography are uniform. However, because wildfires almost always burn under non-uniform conditions, creating their own weather, length of projection period and choice of fuel model must be carefully considered to obtain useful predictions.
4. Fourth, fire behavior computer modeling systems are not intended for determining sufficient fuel modification zone/defensible space widths. However, it does provide the average length of the flames, which is a key element for determining defensible space distances for minimizing structure ignition.

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

2 Modeling Inputs

2.1 Vegetation (Fuels)

Vegetation types, which were derived from the field assessment for the Project Site, were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-project fire behavior changes.

Based on the anticipated pre-and post-project vegetation conditions, four different fuel models were used in the fire behavior modeling effort presented herein. Table 1 provides a description of the fuel models observed that were subsequently used in the analysis for this project. Modeled areas include shrub and grass dominated ground fuels (Fuel Models GR1 and GS2). For modeling the post-development condition, vegetation is converted into irrigated landscaping (Fuel Models GR1, and 8).

Table 1. Fuel Model Characteristics

Fuel Model	Description	Location
Pre-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Surrounding Project Site
GS2	Moderate Load, Dry Climate Grass- Shrub	Surrounding Project Site
Post-Project Conditions		
GR1	Short, Sparse, Dry Climate Grass	Fuel Modification Zones
8	Short Needle Litter	Fuel Modification Zones

Source: Scott, JH.; Burgan, R.E. (2005) and Anderson, H.E. (1982)

2.2 Topography

Topography impacts fire spread and intensity, with steeper slopes often driving higher intensity wildfire. Topography also impacts wind flow and speed through funneling, acceleration uphill and along ridgelines, and wind eddies on leeward hillslopes, as described, the site is relatively flat in terrain, with some undulations and a general slope trending northeast. Surrounding the Project site is developed residential and urban. Terrain has no significance for these modeling scenarios.

2.3 Weather Analysis

BehavePlus requires weather and fuel moisture input values to model potential fire behavior. Wind and fuel moisture values were obtained from the Clark Remote Automatic Weather Station (RAWS) located roughly 5 miles south of the Project Site yet sited in similar terrain and elevation to that observed within the Project site. RAWS are equipped with sensors and instruments that automatically measure various meteorological parameters such as temperature, humidity, wind speed and direction, precipitation, solar radiation, and atmospheric pressure. Data is collected continuously at set intervals, allowing wildfire managers to understand weather conditions conducive to extreme fire behavior. These weather conditions are generally referred to as 97th percentile conditions and represent the less common yet highly hazardous Santa Ana weather conditions. These weather conditions are more commonly associated with highly destructive wildfires that may cause widespread damage to the natural and built environment.

Weather data from the Clark RAWS was examined using Fire Family Plus software from June 15 to January 15 each year between 2005 and 2025 to determine 97th percentile (peak Santa Ana), and 90th percentile (peak Summer) weather conditions. Fuel moisture and wind values used in fire behavior modelling are provided below in Table 2.

Table 2. BehavePlus Weather and Fuels Moisture Inputs.

Input	90th Percentile Value (Peak Summer Conditions)	97th Percentile Value (Peak Santa Ana Conditions)
Wind Speed	19 mph	40 mph
1-hour Fuel Moisture	2%	2%
10-hour Fuel Moisture	3%	3%
100-hour Fuel Moisture	6%	4%
Live Herbaceous Fuel Moisture	30%	30%
Live Woody Fuel Moisture	90%	60%

Source: Clark RAWS

3 Fire Behavior Modeling Efforts

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the proposed Project site. Four modeling scenarios were creating to run in order to accurately display anticipated fire behavior. Two scenarios show fire behavior in existing fuel conditions and two scenarios show fire behavior in post-project conditions. There is a 90th percentile (peak summer weather conditions) and a 97th percentile (peak Santa Ana weather conditions) input for existing fuel conditions and post- project fuel conditions. The results of the modeling effort included anticipated values for surface fires flame length (feet), rate of spread (mph), and fireline intensity (Btu/ft/s). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2008). Fireline intensity is a measure of heat output from the flaming front and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts (Rothermel and Rinehart 1983). Spotting distance is the distance a firebrand or ember can travel down wind and ignite receptive fuel beds. Two pre-Project and two post-Project fire modeling

scenario locations were selected to better understand the different fire behavior that may be experienced on or adjacent to the site based on slope and fuel conditions; these fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

Pre-Project Conditions

- **Scenario 1.** Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and GS2) at 90th percentile value (peak summer conditions).
- **Scenario 2.** Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and GS2) 97th percentile (peak Santa Ana weather conditions).

Post-Project Conditions

- **Scenario 3.** Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and 8) 90th percentile (peak summer weather conditions).
- **Scenario 4.** Fire flaming front approaching the northeast of the project area. (Fuel Models GR1 and 8) 97th percentile (peak Santa Ana weather conditions).

4 Fire Behavior Modeling Results

The results presented in Tables 3 and 4 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

As presented in Table 3, BehavePlus Fire Behavior Modeling Results- Existing Conditions, under peak summer (90th percentile weather), flame lengths within short to moderate grass and moderate shrub fuels (Fuel Models GR1, GS2) are approximately 16 feet. During peak Santa Ana weather conditions (97th percentile weather), flame lengths within short to moderate grass and moderate shrub fuels (Fuel Models GR1, GS2) are approximately 24 feet. Within the same fuels model description, peak summer (90th percentile weather), fireline intensity will be approximately 2,200 BTU/feet/second. While during peak Santa Ana weather conditions (97th percentile weather), fireline intensity will be approximately 5400 BTU/feet/second. The rate of spread will be approximately the same for both weather conditions at 1.2 to 1.3 MPH.

Surrounding the proposed structures, there will be fuel modification zones as described in Section 1. This will convert the existing vegetation to form defensible space. When the Project site is developed, a significant proportion of available fuels will be converted to urban, irrigated landscapes, representing a reduction in the potential ignition, and spread of wildfire. This vegetation conversion is represented in the modeling by using fuel models GR1 and GS2 for existing conditions models and using fuel Models GR1 and 8 for Post- Project Conditions. Fuel Models GR1 and 8 represent the irrigated landscapes surrounding the proposed structures in the fuel modification zones.

As presented in Table 4, BehavePlus Fire Behavior Modeling Results- Post- Project Conditions, under peak summer (90th percentile weather), flame lengths within the fuel modification zone (Fuel Models GR1, 8) are approximately 3.1 feet. During peak Santa Ana weather conditions (97th percentile weather), flame lengths within the fuel modification zone (Fuel Models GR1, 8) are approximately 3.1 feet. Within the same fuels model description (Fuel Models GR1, 8), and both weather conditions, peak summer (90th percentile weather) and peak Santa Ana weather conditions (97th percentile weather), fireline intensity is 67 BTU/feet/second. The rate of spread will be approximately the same for both weather conditions at 0.3 MPH.

Flame lengths, fireline intensity, and spread rate all significantly decrease from existing conditions modeling to post-project conditions modeling. As presented in Table 5, the interpretation in flame lengths and fireline intensity is severe for the existing conditions modeling, including but not limited to ineffective control efforts at the head of the fire and probable major fire runs. The interpretation of flame lengths and fireline intensity for post- development conditions are much more subdued, including but not limited to a handline holding the fire and fire can generally be attacked at the head.

Table 3. BehavePlus Fire Behavior Modeling Results - Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 1: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, GS2	15.5	2206	1.3
Scenario 2: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, GS2	23.5	5406	1.2

Table 4. BehavePlus Fire Behavior Modeling Results – Post- Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[1])
Scenario 3: 90th percentile value (peak summer weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3
Scenario 4: 97th percentile value (peak Santa Ana weather conditions).			
Fuel Model: GR1, 8	3.1	67	0.3

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 3 and 4:

Surface Fire:

- **Flame Length (feet):** The flame length of a spreading surface fire within the flaming front is measured from midway in the active flaming combustion zone to the average tip of the flames.
- **Fireline Intensity (Btu/ft/s):** Fireline intensity is the heat energy release per unit time from a one-foot wide section of the fuel bed extending from the front to the rear of the flaming zone. Fireline intensity is a function of rate of spread and heat per unit area, and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames.

- **Surface Rate of Spread (mph):** Surface rate of spread is the "speed" the fire travels through the surface fuels. Surface fuels include the litter, grass, brush and other dead and live vegetation within about 6 feet of the ground.

The information in Table 5 presents an interpretation of the outputs for the four fire behavior variables related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 3 and 4. Identification of modeling run location is presented graphically in Figure 5 of the FPP.

Table 5. Fire Suppression Interpretation

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

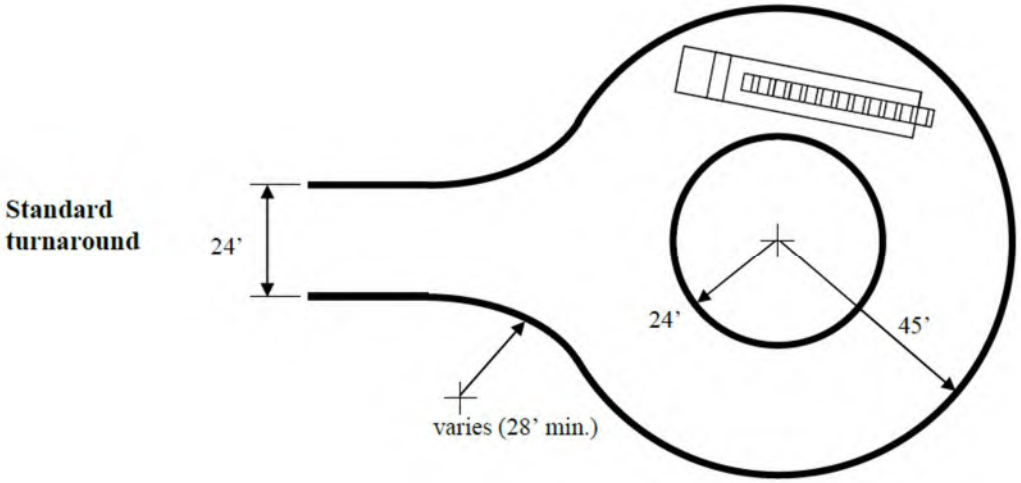
Appendix D

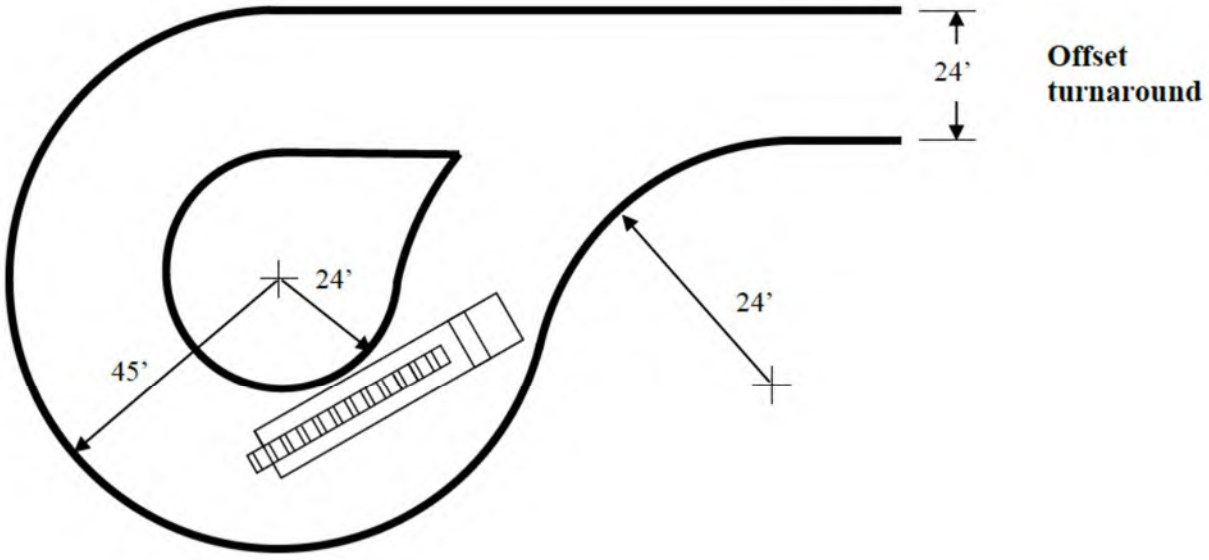
Minimum Turnaround and Hammerhead Dimensions

Riverside County Fire Department Guideline OFM-01A
Fire Department Access Requirements for Commercial & Residential Development

ATTACHMENT 7 (2 Pages)
Minimum Turnaround and Hammerhead Dimensions

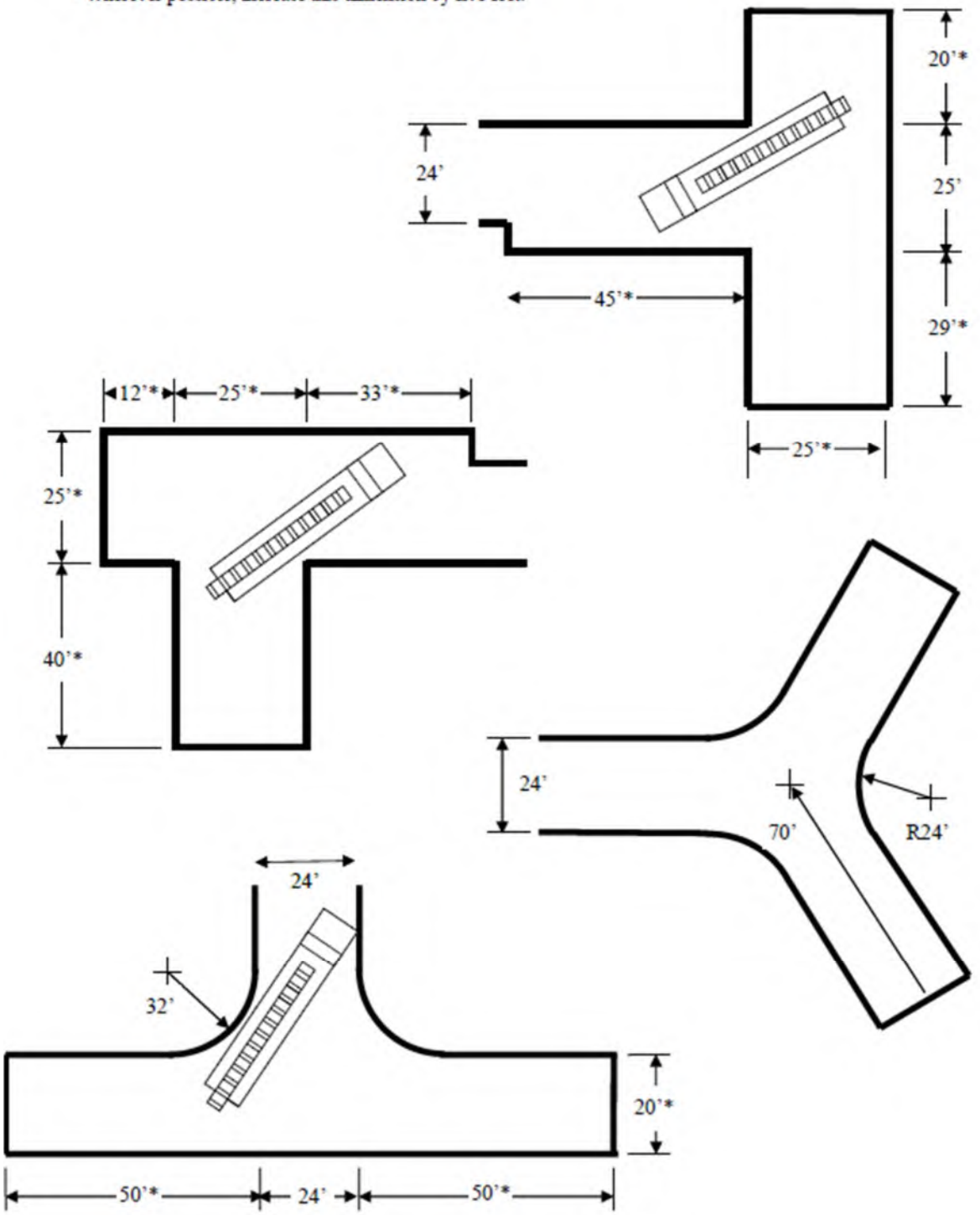
NOTE: Parking is <u>not</u> permitted in these turnarounds at the dimensions shown.





NOTE: Parking is not permitted in any of these hammerheads at the dimensions shown.

* Wherever possible, increase this dimension by five feet.



Appendix E

Ignition-Resistant Construction Requirements

As of the date of this fire protection plan, the following are the requirements for ignition resistant construction for The Proposed Project, including requirements under Chapter 7A of the California Building Code (CBC). In addition, exterior building construction including roofs, eaves, exterior walls, doors, windows, decks, and other attachments must meet the most current CBC Chapter 7A ignition resistance requirements at the time of building permit application.

1. All structures will be built with a Class A roof assembly, including a Class A roof covering. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.
2. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be fire stopped with approved materials or have one layer of minimum 72 pound mineral-surfaced non-perforated cap sheet complying with ASTM D 3909 installed over the combustible decking. However, openings on barrel tiles or similar roof coverings, must be fire stopped (bird stopped) with approved materials to prevent the accumulation of debris, bird nests, etc. between the tiles and decking material.
3. When provided, exposed valley flashings shall be not less than 0.019-inch (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide underlayment consisting of one layer of minimum 72 pound mineral-surfaced non-perforated cap sheet complying with ASTM D 3909 running the full length of the valley.
4. All rain gutters, down spouts and gutter hardware shall be constructed from metal or other non-combustible material to prevent wildfire ignition along eave assemblies.
5. All chimney, flue or stovepipe openings attached to a fireplace, stove, or other solid or liquid fuel burning equipment or device shall be equipped with an approved spark arrester. An approved spark arrester is defined as a device intended to prevent sparks from escaping into the atmosphere and constructed of nonflammable materials, having a 12-gauge minimum thicknesses with openings no greater than ½ inch, or other alternative material the MVFD determines to provide equal or better protection. It shall be installed to be visible for the purposes of inspection and maintenance.
6. The exterior surface materials shall be non-combustible, including hard or ignition resistant, such as stucco. In all construction, exterior walls shall extend from the top of the foundation to the roof and terminate at 2-inch nominal solid blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.
7. All eaves, fascias, and soffits will be enclosed (boxed) with non-combustible materials. This shall apply to the entire perimeter of each structure. Eaves of heavy timber construction are not required to be enclosed as long as attic venting is not installed in the eaves. For the purposes of this section, heavy timber construction shall consist of a minimum of 4"x 6" rafter tails.
8. Paper-faced insulation shall be prohibited in attics or ventilated spaces.
9. Automatic interior fire sprinklers for multi-family residential buildings shall be installed according to the National Fire Protection Association (NFPA) 13R requirements.
10. Roof vents, dormer vents, gable vents, foundation ventilation openings, ventilation openings in vertical walls, or other similar ventilation openings shall be louvered and covered with 1/16-inch, noncombustible, corrosion-resistant metal mesh or other approved material that offers equivalent protection.
11. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall not exceed 144 square inches per opening and shall be covered with 1/16" inch mesh corrosion-resistant metal screen or other approved material that offers equivalent protection. Ventilation louvers and openings may be incorporated as part of access assemblies.

12. No attic ventilation openings or ventilation louvers shall be permitted in soffits, in eave overhangs, between rafters at eaves, or in other overhanging areas.
13. All fences and gate assemblies (fences, gates, and fence posts) attached or within five feet of a structure shall be of non-combustible material or pressure-treated exterior fire-retardant wood.
14. All projections (exterior balconies, decks, patio covers, unenclosed roofs and floors, and similar architectural appendages and projections) or structures less than five feet from a building shall be of non-combustible material, one-hour fire resistive construction on the underside, heavy timber construction, pressure-treated exterior fire- retardant wood or ignition resistant construction. When such appendages and projections are attached to exterior fire- resistive walls, they shall be constructed to maintain same fire-resistant standards as the exterior walls of the structure.
15. Accessory structures attached to buildings with habitable spaces and projections shall be in accordance with Chapter 7A of the CBC.
16. Detached accessory structures located less than 50 feet from a building containing habitable space shall be constructed in accordance with Chapter 7A of the CBC.
    - **Exception:** Accessory structures less than 120 square feet in floor area located at least 30 feet from a building containing a habitable space.
17. Exterior doors shall be approved non-combustible construction, solid core wood and shall conform to the performance requirements of standard SFM 12-7A-1 or shall be of approved noncombustible construction, or solid core wood having stiles and rails not less than 1⅜ inches thick with interior field panel thickness no less than 1¼ inches thick, or shall have a fire-resistance rating of not less than 20 minutes when tested according to National Fire Protection Association (NFPA) 252.
18. All glass or other transparent, translucent or opaque glazing materials, that is used in exterior windows, including skylights, or exterior glazed door assemblies shall be constructed of multipane glazing with one tempered pane meeting the requirements of Section 2406 (2016 CBC) Safety Glazing.
19. Vinyl window assemblies are deemed acceptable if the windows have the following characteristics:
    - Frame and sash are comprised of vinyl material with welded corners.
    - Metal reinforcements in the interlock area.
    - Glazed with insulating glass, annealed or tempered (one layer of which must be tempered glass).
    - Frame and sash profiles are certified in AAMA Lineal Certification Program.
    - Certified and labeled to ANSI/AAMA/NWWDA 101/LS2-97 for Structural Requirements.

Appendix F

County of Riverside California Friendly Plant List

County Of Riverside California Friendly Plant List

WUCOLS III (Water Use Classification of Landscape Species)	
WUCOLS Region Sunset Zones	**WUCOLS Region Sunset Zones**
1	2,3,14,15,16,17
2	8,9
3	22,23,24
4	18,19,20,21
5	11
6	13

WUCOLS III Water Usage/ Average Plant Factor Key
H-High (0.8) **M**-Medium (0.5) **L**-Low **(.2) VL**-Very Low (0.1)

* Water use for this plant material was not listed in WUCOLS III, but assumed in comparison to plants of similar species
** Zones for this plant material were not listed in Sunset, but assumed in comparison to plants of similar species
*** Zones based on USDA zones

‡ The California Friendly Plant List is provided to serve as a general guide for plant material. Riverside County has multiple Sunset Zones as well as microclimates within those zones which can affect plant viability and mature size. As such, plants and use categories listed herein are not exhaustive, nor do they constitute automatic approval; all proposed plant material is subject to review by the County. In some cases where a broad genus or species is called out within the list, there may be multiple species or cultivars that may (or may not) be appropriate. The specific water needs and sizes of cultivars should be verified by the designer.

Site specific conditions should be taken into consideration in determining appropriate plant material. This includes, but is not limited to, verifying soil conditions affecting erosion, site specific and Fire Department requirements or restrictions affecting plans for fuel modifications zones, and site-specific conditions near MSHCP areas. The designer is ultimately responsible to be familiar with project areas and conditions, and to specify appropriate plants.

Useful information regarding plants that have invasive qualities, including a 'Watchlist' of potentially invasive plants that are new to the region or have not been sufficiently studied, can be found at the website for the California Invasive Plant Council (Cal-IPC) http://www.cal-ipc.org/. Additional references and possible resources can be found at the end of this document.

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Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Trees																		
Acacia aneura	Mulga	/	?	?	?	/	L	8, 9, 12-24	15'-20'	15'-20'	✓	✓		N		✓	✓	✓
Acacia farnesiana	Sweet Acacia	?	?	L	L	/	L	13-24	20'	15'-20'	✓	✓		N			✓	✓
Acacia salicina	Willow Acacia	L	L	L	M	/	M	8, 9, 12-24	20'-40'	15'	✓	✓		N		✓	✓	✓
Acacia stenophylla	Shoestring Acacia	VL	L	L	L	/	L	8, 9, 12-24	30'	20'	✓	✓		N			✓	✓
Aesculus californica	California Buckeye	VL	VL	VL	L	/	/	3-10, 14-24	10'-20'	30'	✓	✓			✓			
Agonis flexuosa	Peppermint Tree	L	/	L	M	/	/	15-17, 20-24	25'-35'	15'-30'	✓	✓					✓	✓
Albizia julibrissin	Silk Tree	L	L	M	M	M	M	4-23	40'	40'	✓	✓						
Arbutus unedo	Strawberry Tree	L	L	L	L	M	M	8-24	8'-35'	8'-35'	✓	✓	✓			✓	✓	✓
Bauhinia forficate	Brazilian butterfly tree	M	M	M	M	/	/	9, 12-23	20'	20'	✓	✓					✓	✓
Bauhinia variegata (purpurea)	Purple orchid tree	M	/	M	M	/	M	13, 18-24	20'-35'	20'-35'	✓	✓					✓	✓
Bauhinia X blakeana	Hong Kong orchid tree	M	/	M	M	/	M	13, 19, 21, 23, 24	20'	20'	✓	✓					✓	✓
Beaucarnea recurvata	Bottle Palm	/	/	L	L	/	L	13, 16-24	15'-20'	6'-8'								
Brachychiton populneus	Bottle Tree	L	L	L	L	M	M	12-24	30'-50'	30'	✓	✓						
Brahea armata	Blue Hesper Palm	L	?	M	?	?	?	10, 12-17, 19-24	20'-40'	12'-25'	✓	✓	✓					
Brahea edulis	Guadalupe Palm	L	?	L	L	L	L	12-24	30'	15'	✓	✓	✓					
Butia capitata	Pindo Palm	L	L	L	L	L	L	8, 9, 12-24	10'-20'	10'-15'		✓						
Caesalpinia cacalaco	Cascalote	?	?	?	?	/	L	12, 13, 21-24	20'	20'	✓	✓					✓	✓
Callistemon citrinus	Lemon Bottlebrush	L	L	L	L	/	M	8, 9, 12-24	10'-15'	10'-15'	✓	✓				✓	✓	✓
Callistemon viminalis	Weeping Bottlebrush	L	L	M	M	/	M	6-9, 12-24	20'-30'	15'	✓	✓				✓	✓	✓
Calocedrus decurrens	Incense Cedar	M	M	M	M	M	/	2-12, 14-24	75'-90'	10'-15'		✓						

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Cassia surattensis	Yellow Cassia	?	?	L	L	?	?	19-24	6-8'	6-8'	✓	✓						
Cassia leptophylla	Gold Medallion Tree	L	L	M	M	/	/	15, 16, 20-24	20'-25'	30'	✓	✓						
Cedrus deodara	Deodar Cedar	L	M	L	M	M	M	3b-10, 14-24	80'	40'		✓						
Ceratonia siliqua	St. John's Bread, Carob Tree	L	L	L	L	/	L	9, 13-16, 18-24	20'	20'		✓	✓					
Cercis occidentalis	Western Redbud	VL	VL	L	L	/	/	2-24	10'-18'	10'-18'	✓	✓	✓			✓	✓	✓
Chamaerops humilis	Mediterranean Fan Palm	VL	VL	VL	L	M	M	4-24	20'	20'	✓	✓						
Chilopsis linearis	Desert Willow	VL	VL	VL	L	M	M	3b, 7-14, 18-23	15'-30'	10'-20'	✓	✓			✓	✓	✓	✓
Chitalpa tashkentensis	Chitalpa	L	M	L	L	L	M	3-24	20'-30'	20'-30'	✓	✓					✓	✓
Chorisia speciosa	Floss Silk Tree	L	/	L	L	/	M	12-24	30'-60'	30'-60'	✓	✓						
Cinnamomum camphora	Camphor Tree	M	/	M	M	/	M	8, 9, 12-24	50'	60'	✓	✓						
Cotinus coggyria	Smoke Tree	L	L	L	L	L	/	2-24	12'-15'	12'-15'	✓	✓						
Cupaniopsis anacardioides	Carrot Wood	M	/	M	M	/	/	16-24	40'	30'	✓	✓						
Cupressus arizonica	Arizona Cypress	L	M	L	L	M	M	7-24	40'	20'	✓	✓						
Cupressus sempervirens	Italian Cypress	L	M	L	L	M	M	4-24	60'	5'-10'	✓	✓						
Dalbergia sissoo	Sissoo Tree	/	/	/	/	/	M	13, 19, 21-24	25'-50'	35'-50'		✓						
Dracaena draco	Dragon Tree	L	/	VL	L	/	/	16, 17, 21-24	20'	20'		✓						
Eriobotrya deflexa	Bronze Loquat	M	M	M	M	/	M	8-24	15'-30'	15'-30'	✓	✓	✓			✓	✓	✓
Erythrina americana (E. coralloides)	Naked Coral Tree	/	/	L	L	/	/	12, 13, 19-24	30'	30'		✓	✓					
Erythrina X sykesii	Sykes Coral Tree	/	/	L	L	/	/	19-24	24'-30'	24'-30'		✓	✓					
Erythryna X bidwillii	Coral Tree	L	L	L	L	/	/	8, 9, 12-24	24'-30'	24'-30'		✓	✓					
Eucalyptus citriodora																		

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Eucalyptus microtheca	Coolibah Tree		L	L	L	M	M	5, 6, 8-24	30'-60'	24'-54'	✓	✓		N				
*Eucalyptus papuana**	Ghost Gum	L	L	L	L	M	M	5, 6, 8-24	30'-54'	24'-45	✓	✓		N				
Eucalyptus polyanthemos	Silver Dollar Gum	L	L	L	L	M	M	5, 6, 8-24	30'-75'	15'-45'	✓	✓		N				
Eucalyptus torquata	Coral Gum	L	L	L	M	/	M	5, 6, 8-24	18'-36'	15'-30'	✓	✓		N				
Ficus microcarpa	Indian Laurel Fig	M	/	M	M	/	M	9, 13, 16-24	60'	75'								
*Fraxinus greggii**	Little Leaf Ash	M	M	M	M	M	M	10-13	25'	20'	✓	✓			✓			
Fraxinus uhdei	Shamel Ash	M	M	M	M	H	H	9, 12-24	25'-80'	20'	✓	✓		N				
Fraxinus o. 'Raywood'	Raywood Ash	M	M	M	M	M	M	2b-9, 12-24	25'-35'	25'	✓	✓						
Fraxinus velutina	Arizona Ash	M	M	M	M	M	M	3b-24	30'-50'	30'-40	✓	✓			✓			
Geijera parviflora	Australian Willow	M	M	L	M	M	M	8, 9, 12-24	25'-30'	20'	✓					✓	✓	✓
Ginkgo biloba	Maidenhair Tree	M	M	M	M	M	?	A3, 1-10, 12, 14-24	35'-50'	15'-25'	✓	✓	✓					
Gleditsia triacanthos	Honey Locust	L	L	M	L	L	L	1-16, 18-20	35'-70'	25'-35'	✓	✓	✓					
Jacaranda mimosifolia	Jacaranda	M	M	M	M	/	M	12, 13, 15-24	25'-40'	15'-30'	✓	✓						
Juglans californica	S. Califonia Black Walnut	M	/	L	L	/	/	18-24	15'-30'	15'-30'		✓	✓					
Juniperus californica	California Juniper	L	L	L	M	M	M	3, 6-12, 14-24	10'-40'	10'-40'	✓	✓						
Juniperus scopulorum 'Tolleson's Weeping'	Tolleson's Weeping Juniper	L	L	M	M	M	M	1-24	20'	10'		✓					✓	✓
Koelreuteria bipinatta	Chinese Flame Tree	M	M	M	M	/	M	8-24	20'-40'	20'-40'	✓	✓						
Koelreuteria paniculata	Golden Rain Tree	M	M	L	L	M	M	A2, 2-24	20'-35'	25'-40'	✓	✓						
Lagerstroemia indica	Crape Myrtle	L	L	M	M	M	M	7-10, 12-14, 18-21	25'	25'	✓	✓	✓			✓	✓	✓
Lagunaria patersonii	Primrose Tree	L	/	L	L	/	/	13, 15-24	20'-50'	40'		✓						

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Laurus nobilis 'Saratoga'	Sweet Bay	L	L	L	L	M	M	5-9, 12-24	12'-40'	12'-40'	✓	✓					✓	✓
*Leucanea retusa**	Golden Ball Lead Tree	/	L	L	L	M	M	10-13	12'-20'	12'-20'	✓	✓				✓	✓	✓
Liquidambar styraciflua (seedless var.)	Sweet Gum	M	M	M	M	M	/	3-9, 14-24	60'	20'-25'	✓		✓					
Lyonothamnis floribundus	Catalina Ironwood	L	/	VL	L	/	/	14-17, 19-24	20'-35'	15'		✓	✓					
Lysiloma microphylla var. *thornberi*	Desert Fern (feather bush)	?	/	L	L	/	M	12-24	12'-15'	12'-15'	✓	✓				✓	✓	✓
Magnolia grandiflora	Magnolia Species	M	M	M	M	/	H	4-12, 14-24	Varies	Varies	✓							
Melaleuca linariifolia	Flax Leaf Paper Bark	L	L	L	L	/	/	9, 13-24	20'-30'	20'-25'	✓	✓	✓					
Melaleuca quinquinervia (M. vir. *Rubifolia)*	Cajeput Tree	L	L	M	M	/	M	9, 12, 13, 15-17, 20-24	20'-40'	15'-25'	✓	✓	✓					
Nerium oleander	Oleander (Tree Form)	L	L	L	L	M	M	8-16, 18-24	20'	12'	✓	✓				✓	✓	✓
Olea europaea 'Swan Hill'	Fruitless Olive	VL	VL	L	L	M	M	8, 9, 11-24	25'-30'	25'-30'	✓	✓		N				✓ ✓
Olneya tesota	Ironwood	/	/	/	/	L	L	8, 9, 11-14, 18-23	15'-30'	15'-30'	✓	✓						
Parkinsonia floridum (Cercicium floridum)	Blue Palo Verde	VL	VL	VL	L	/	L	8-14, 18-20	35'	30'	✓	✓	✓					
Parkinsonia microphyllum (C. microphyllum)	Little Leaf Palo Verde	/	VL	VL	L	/	L	8-14, 18-20	20'	20'	✓	✓						
Parkinsonia praecox (Cercidum praecox)	Sonoran Palo Verde	/	L	VL	L	/	L	12, 13, 18-20	20'	20'	✓	✓						
Phoenix canariensis	Canary Island Date Palm	L	L	L	L	M	M	8, 9, 11-24	60'	50'	✓	✓	✓	N				
Phoenix dactylifera	Date Palm	L	L	L	L	M	M	8, 9, 11-24	80'	20'-40'	✓			N				
Pinus attenuata	Knobcone Pine	L	L	L	L	/	/	2-10, 14-21	20'-80'	20'-25'	✓	✓						

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Pinus brutia (eldarica)	Calabrian Pine	L	L	L	L	M	M	6-9, 12-24	30'-80'	15'-25'	✓	✓						
Pinus canariensis	Canary Island Pine	L	L	L	M	M	M	8,9, 12-24	50'-80'	20'-35'	✓	✓						
Pinus coulteri	Coulter Pine	L	L	L	L	M	/	3-10, 14-23	30'-80'	20'-40'		✓						
Pinus eldarica	Afghan Pine	L	L	L	L	M	M	7-9, 11-24	30'-40'	20'-30'	✓	✓			✓	✓	✓	✓
Pinus edulis	Pinyon Pine	L	L	VL	L	L	/	1-11, 14-21	10'-20'	8'-16'		✓						
Pinus halepensis	Aleppo Pine	L	L	L	L	L	L	7-9, 11-24	30'-60'	20'-40'		✓						
Pinus monophylla	Single Leaf Pinyon Pine	L	/	L	L	L	/	2-12, 14-21	10'-25'	10'-15'		✓						
Pinus sabiniana	Gray Pine	VL	VL	VL	L	/	/	3-10, 14-21	40'-80'	30'-50'		✓						
Pistacia chinensis	Chinese Pistache	L	L	M	M	M	M	4-16, 17, 18-23	30'-60'	30'-60'		✓						
Pithecellobium flexicaule	Texas Ebony	?	?	/	?	/	L	10 - 13	15'-30'	15'-20'	✓	✓					✓	✓
Pittosporum phyloraeoides	Willow Pittosporum	M	M	L	L	/	M	8, 9, 12-24	12'-20'	10'-15'	✓	✓	✓			✓	✓	✓
Platanus acerifolia	London Plane Tree	M	M	M	M	H	H	2-24	40'-80'	30'-40'	✓		✓		✓			
Platanus racemosa	California Sycamore	M	M	M	M	H	H	4-24	30'-80'	20'-50'	✓		✓		✓			
Platanus wrightii	Arizona Sycamore	M	?	M	M	H	H	8-12	80'	55'	✓				✓			
Podocarpus gracilior (Afrocarpus gracilior)	Fern Pine	M	M	M	M	?	M	8, 9, 13-24	20'-60'	10'-20'	✓							
Podocarpus henkelii	Long Leafed Yellow Wood	M	H	M	M	M	/	8, 9, 14-24	30'-50'	15'-20'	✓							
Podocarpus macrophyllus	Yew Pine	M	M	M	M	M	M	4-9, 12-24	15'-50'	6'-15'	✓							
Populus fremontii	Fremont Cottonwood	M	M	M	M	H	H	1-12, 14-21	40'-60'	30'	✓		✓		✓			
Prosopis alba	Argentine Mesquite	/	L	L	L	M	M	10-13, 18-24	50'	50'	✓	✓		N				
Prosopis chilensis	Chilean Mesquite	/	L	L	L	L	L	10-13	50'	50'	✓	✓		N				

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Prosopis glandulosa	Honey Mesquite	/	L	L	L	L	L	10-13, 18-24	30'-50'	30'-50'	✓	✓		N				
*Prosopis juliflora**	Arizona Mesquite	/	L	L	L	L	L	10-13, 18-24	30'-35'	30'-35'	✓	✓		N				
*Prosopis Phoenix**	Phoenix Mesquite	/	L	L	L	L	L	10-13, 18-24**	20'-30'	20'-30'		✓		N				
Prosopis pubescens	Screwbean Mesquite	/	L	L	L	M	M	10-13, 18-24	30'-35'	30'-35'	✓	✓		N				
Prosopis velutina	Velvet Mesquite	/	L	L	L	M	M	10-13, 18-24	30'-35'	30'-35'	✓	✓		N				
Prunus caroliniana	Carolina Laurel Cherry	L	L	M	M	M	M	5-24	20'-30'	15'-25'	✓	✓	✓				✓	✓
Prunus cerasifera	Purple Leaf Plum	L	M	M	M	M	M	3-22	25'-35'	25'-35'	✓	✓					✓	✓
Prunus ilicifolia	Hollyleaf Cherry	L	L	VL	VL	/	/	5-9, 12-24	10'-25'	10'-25'	✓	✓	✓					✓
Prunus ilicifolia lyonii	Catalina Cherry	L	L	L	L	/	/	5-9, 12-24	45'	30'		✓	✓			✓	✓	✓
Punica granatum	Pomegranate	L	L	M	M	M	M	5-24	8'-10'	8'-10'		✓						
Pyrus Calleryana	Callery Pear	M	M	M	M	M	M	2b-9, 14-21	50'	50'	✓	✓						
Quercus agrifolia	Coast Live Oak	VL	VL	L	L	/	M	7-9, 14-24	20'-70'	20'-70'	✓	✓	✓		✓			
Quercus chrysolepis	Canyon Live Oak	VL	L	L	L	/	/	3-11, 14-24	20'-60'	20'-60'		✓	✓		✓			
Quercus engelmanii	Mesa Oak	/	L	L	L	/	/	7-9, 14-24	40'-50'	80'-100'		✓	✓		✓			
Quercus ilex	Holly Oak	L	L	L	L	M	M	4-24	30'-60'	30'-60'	✓	✓	✓		✓			
Quercux kelloggii	California Black Oak	L	M	/	M	/	/	6-7, 9, 14-21	30'-80'	30'-80'			✓					
Quercus lobata	Valley Oak	L	L	/	M	/	/	3b-9, 11-24	70'	70'		✓	✓		✓			
Quercus suber	Cork Oak	L	L	L	L	L	L	5-16, 18-24	30'-60'	30'-60'	✓	✓	✓		✓			
Quercus virginiana	Southern Live Oak	M	M	M	M	M	M	4-24	40'-80'	80'-100'	✓	✓	✓		✓			
Quercus wislizeni	Interior Live Oak	VL	VL	VL	VL	M	/	7-9, 14-16, 18-21	30'-75'	30'-75'		✓	✓		✓			
Rhaphiolepis indica 'Majestic Beauty'	Majestic Beauty Hawthorn	L	L	M	M	M	M	8-10, 12-24	20'-25'	8'-10'	✓	✓				✓	✓	✓

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Rhus lancea	African Sumac	L	L	L	L	M	M	8, 9, 12-24	20'-30'	20'-35'	✓	✓	✓					
*Robinia neomexicana**	Desert Locust	L	L	L	L	M	M	2, 3, 7-11, 14, 18-24	6'-30'	6'-30'	✓	✓						
Robinia x ambigua	Locust	L	L	L	L	M	M	2-24	40'-50'	20'	✓	✓						
Sabal 'Riverside'	Riverside Palmetto	/	/	M	M	/	/	12-17, 19-24	20'	10'		✓				✓	✓	✓
Salix gooddingii	Black Willow, Goodding's Willow	H	H	H	H	H	H	1-10, 16-24, 26***	15'-30'	15'-30'					✓			
Salix laevigata	Red Willow	H	H	H	H	H	H	1-10, 16-24, 26***	10'-25'	10'-25'					✓			
Salix lasiolepis	Arroyo Willow	H	H	H	H	H	H	1-10, 16-24, 26***	10'-20'	10'-20'					✓			
Sambucus mexicana	Mexican Elderberry	L	L	L	L	M	M	2-24	10'-30'	8'-20'	✓	✓			✓			
Schinus molle	California Pepper Tree	VL	L	VL	L	M	M	8, 9, 12-24	25'-40'	25'-40'		✓		N				
Syagrus romanzoffianum	Queen Palm	L	M	M	M	M	M	12, 13, 15-17, 19-24	50'	20'-25'	✓							
Tecoma stans	Yellow Bells (Tree Form)	/	/	L	L	/	L	12, 13, 21-24	25'	10'-20'		✓				✓	✓	✓
Tipuana tipu	Tipu Tree	M	/	M	M	/	/	12-16, 18-24, H1, H2	25'-40'	30'-60'	✓	✓						
Trachycarpus fortunei	Windmill Palm	L	M	M	M	/	M	4-24	30'	10'	✓	✓						
Tristania conferta (Lophostemon conferta)	Brisbane Box	M	/	M	M	/	/	15-17, 19-24	30'-45'	25'	✓	✓						✓
Tristaniopsis laurina	Water Gum	M	/	M	M	/	/	15-17, 19-24; H1, H2	45'	50'	✓	✓						
Ulmus parvifolia	Chinese Elm	M	M	M	M	M	M	3-24	40'-60'	50'-70'	✓	✓		N				
Umbellularia california	California Laurel	M	M	M	M	/	/	4-9, 14-24	20'-25'	20'-25'		✓						
Vitex agnus-castus	Monk's Pepper Tree	L	L	L	M	M	M	4-24, H1, H2	8'-10'	8'-10'	✓	✓		N				

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Washingtonia filifera	California Fan Palm	L	M	L	L	M	M	8-24, H1, H2	60'	20'	✓	✓						
Washingtonia robusta	Mexican Fan Palm	L	M	L	L	M	M	8-24	100'	10'	✓	✓		N				
Shrubs																		
Abelia grandiflora	Glossy Abelia	M	M	M	M	M	M	4-24	8'	5'		✓						
Acacia craspedocarpa	Leather Leaf Acacia	?	?	?	?	L	L	8, 9, 12-24	8'-10'	5'-10'		✓		N				
Acanthus mollis	Grecian Urn Plant	M	M	M	M	/	M	5-24	4'-5'	4'-5'								
Adenostoma fasciculatum	Chamise	VL	VL	VL	VL	/	/	6-9, 14-24	5'-12'	5'-12'	✓	✓						
Aloysia triphylla	Lemon Verbena	L	L	L	L	L	L	9, 10, 12-21	6'	6'	✓	✓						
*Alyogyne hakeifolia***	Red Centered Hibiscus	/	/	L	L	/	/	13-17, 20-24	5'-8'	5'-8'	✓	✓						
Alyogyne huegelii	Blue Hibiscus	L	L	L	L	/	L	13-17, 20-24	5'-8'	5'-8'	✓	✓						
*Ambrosia deltoidea***	Bursage	?	?	?	?	L	L	8-16, 18-24	1'-2'	1'-3'	✓	✓						
*Ambrosia dumosa***	White Bursage	?	?	/	/	L	L	8-16, 18-24	2'-3'	2'-3'	✓	✓						
Anisacanthus spp.	Desert Honeysuckle	?	?	L	L	L	L	8-13, 18-23	4'	4'	✓	✓						
Arctostaphylos densiflora	Sonoma Manzanita	VL	L	L	L	/	/	7-9, 14-21	5'-6'	7'	✓	✓	✓					
Arctostaphylos edmundsii	Little Sur Manzanita	VL	L	L	L	/	/	6-9, 14-24	3'	12'	✓	✓	✓					
Artemisia californica	California Sagebrush	VL	L	L	L	L	L	7-9, 14-24	1 1/2'-5'	4'-7'	✓	✓			✓			
Atriplex hymenelytra	Desert Holly	VL	VL	VL	VL	L	VL	3, 7-14, 18, 19	1'-3'	3'	✓	✓		N	✓			
Atriplex lentiformis	Quail Bush	VL	VL	VL	VL	L	VL	3, 7-14, 18, 19	3'-10'	6'-12'			✓					
Atriplex lentiformis breweri	Brewer Saltbush	VL	VL	VL	VL	L	VL	8, 9, 12-24	5'-7'	6'-8'		✓	✓					
*Baccharis emoryi***	Emory's Baccharis	M	M	M	M	/	/	4-9, 16-24, 26***	6'-9'	3'-6'			✓					
Baccharis hybrid 'starn'	Thompson Baccharis	L	L	L	L	L	L	7-24	3'	4-5'	✓	✓						

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Baccharis pilularis	Coyote Brush	L	L	L	L	/	/	5-11, 14-24	8"-24"	6'	✓	✓	✓					
*Baccharis salicifolia***	Mulefat	M	M	M	M	/	/	1-10, 16-24, 26***					✓		✓			
Baccharis sarathroides	Desert Broom	VL	L	VL	L	L	L	7-24	5'	5'	✓	✓						
Berberis thunbergii	Japanese Barberry	L	L	L	L	L	M	A3, 2b-24	4'-6'	4'-6'	✓	✓			✓			
Bougainvillea spp.	Bougainvillea	L	L	L	L	/	M	5, 6, 12-17, 19, 21-24	3'-6'	3'-6'	✓	✓	✓					
Buddleia marrubiifolia	Wooly Butterfly Bush	?	L	?	L	/	L	10-13, 18-24	5'	5'	✓	✓						
Buxus microphylla japonica	Japanese Boxwood	M	M	M	M	M	M	3b-24	4'-6'	4'-6'	✓	✓						
Buxus sempervirens	Common Boxwood	M	M	M	/	M	M	3b-6, 15-17	15'-20'	15'-20'	✓	✓						
Caesalpinia gilliesii	Desert Bird of Paradise	L	L	L	L	M	M	8-16, 18-24	10'	8'	✓	✓						
Caesalpinia mexicana	Mexican Poinciana	?	/	?	L	/	L	12-16, 18-24	10'-12'	6'-8'	✓	✓						
Caesalpinia pulcherrima	Dwarf Poinciana	L	L	M	M	/	M	12-16, 18-23	10'	10'	✓	✓						
Calliandra californica	Baja Fairy Duster	/	/	VL	L	/	L	10-24	5'	5'-6'	✓	✓	✓					
Calliandra eriophylla	Fairy Duster	/	/	VL	VL	/	L	10-24	3'	4'-5'	✓	✓	✓					
*Calliandra inaequilatera**	Red/Pink Powder Puff								12'-15	10'-12								
Callistemon viminalis 'Little John'	Weeping Bottlebrush	L	L	M	M	/	M	6-9, 12-24	3'	3'	✓	✓						
Calocephalus brownii	Cushion Bush	L	/	L	L	/	L	16, 17, 19, 21-24	3'	3'	✓	✓						
Calycanthus occidentalis	Spice Bush	L	L	M	M	/	/	4-9, 14-24	4'-12'	4'-12'	✓	✓			✓			
Carissa macrocarpa	Natal Plum	L	/	M	M	/	M	22-24; H2	5'-7'	5'-7'	✓	✓						
Carpenteria californica	Bush Anemone	L	L	L	M	/	/	5-9, 14-24, 31	6'-8'	4'-5'	✓	✓			✓			

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Ceanothus spp.	California Wild Lilac	L	L	L	L	L	/	5-9, 14-24	3'-15'	3'-15'	✓	✓			✓			
Cercocarpus betuloides	Mountain Ironwood	VL	VL	VL	VL	VL	/	3, 5, 7-10, 13-24	5'-12'	5'-12'	✓	✓						
*Cercocarpus minutiflorus***	San Diego Mountain Mahogany	L	/	VL	VL	/	/	3, 5, 7-10, 13-24	5'-12'	5'-12'	✓	✓						
Chamelaucium uncinatum	Geraldton Wax Flower	L	L	L	M	/	M	8, 9, 12-24	6'-8'	6'-8'	✓	✓						
Cistus spp.	Rockrose	L	L	L	L	L	L	6-9, 14-24	3'-6'	3'-6'	✓	✓	✓					
Cocculus laurifolius	Cocculus	M	M	M	M	/	M	8, 9, 12-24	25'	25'	✓	✓						
Convolvulus cneorum	Bush Morning Glory	L	L	L	L	L	L	7-9, 12-24	2'-4'	2'-4'	✓	✓						
Convolvulus mauritanicus (C. sasbatius)	Ground Morning Glory	L	L	L	L	M	M	4-9, 12-24	1'-2'	3'	✓	✓						
Cordia boissieri	Texas Olive	?	?	?	L	L	L	8-24	12'	8'-10'	✓	✓						
Cordia parvifolia	Little Leaf Cordia	?	?	L	L	/	L	8-14, 18-24	12'	8'-10'	✓	✓						
Correa spp.	Austrailian Fuchsia	L	L	L	L	/	M	14-24	2'-5'	2'-5'	✓	✓						
Cotoneaster adpressus praecox	Creeping Cotoneaster	L	L	L	M	M	M	2-24	6'	6'	✓	✓		N	✓			
Cotoneaster apiculatus	Cranberry Cotoneaster	L	L	L	M	M	M	A3, 2-24	3'	6'	✓	✓		N	✓			
*Cotoneaster buxifolius***	Cotoneaster Buxifolius	L	L	L	M	M	M	2-24	3'	6'	✓	✓		N	✓			
Cotoneaster congestus (C. micro. gla.)	Pyrenees Cotoneaster	L	L	L	M	M	M	3b-24	3'	3'	✓	✓		N	✓			
Cotoneaster glaucophyllus	Bright Bead Cotoneaster	?	M	?	?	?	?	7-8	5'	5'	✓	✓		N	✓			
Cotoneaster parneyi	Parney Cotoneaster	L	L	L	L	L	L	4-24	8'	10'	✓	✓		N	✓			
Cotoneaster salicifolius	Willowleaf cotoneaster	L	L	L	M	M	M	3b-24	15'-18'	15'-18'	✓	✓		N	✓			
Crassula spp.	Crassula	L	L	L	L	/	L	8, 9, 12-24	1'-4'	1'-4'								

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Cuphea llavea	Bat-Faced Cuphea	M	?	?	?	/	/	16-24	2'-3'	3'	✓	✓						
Dalea bicolor	Dalea	/	/	L	L	/	M	10-13	8'	5'-6'	✓	✓						
Dalea pulchra	Bush Dalea	?	?	?	?	?	L	12,13	8'	5'	✓	✓						
Dendromecon harfordii	Island Bush Poppy	VL	L	VL	L	/	/	7-9, 14-24	8'-20'	8'-20'	✓	✓						
Dendromecon rigida	Bush Poppy	VL	L	VL	L	/	/	4-12, 14-24	4'-8'	4'-6'	✓	✓						
Diosma pulchrum	Breath of Heaven	M	M	M	M	M	M	7-9,14-24	5'	5'	✓	✓						
Dodonaea viscosa	Hopbush	L	L	L	M	/	M	7-24	10'-15'	10'-15'	✓	✓		N				
Echium fastuosum	Pride of Madeira	L	L	L	L	/	M	14-24	5'-6'		✓	✓						
Elaeagnus pungens	Silverberry	L	L	L	L	L	L	4-24	10'-15'	10'-15'	✓	✓						
Encelia californica	Brown Eyed Susan	/	/	VL	L	/	L	7-16, 18-24	3'	4'	✓	✓						
Encelia farinosa	Brittlebush	/	/	VL	L	L	L	8-16, 18-24	3'	4'	✓	✓						
Eremophila maculata	Red Eremophila	L	L	L	L	L	L	8,9, 13-24	3'	6'	✓	✓						
Eriogonum fasciculatum	California Buckwheat	L	L	VL	L	L	L	7-9, 12-24	1'-3'	4'	✓	✓						
Escallonia species	Escallonia	M	M	M	M	/	M	4-9, 14-24	3'-15'	3'-15'	✓	✓						
Euonymus japonicus spp.	Euonymous	L	L	M	M	M	M	4-20	8'-10'	6'	✓	✓						
Euryops pectinatus	Shrub Daisy	L	L	L	L	M	M	8, 9, 12-24	3'-6'	3'-6'	✓	✓						
Fallugia paradoxa	Apache plume	/	?	VL	VL	L	L	2-23	4'-6'	5'	✓	✓						
Feijoa sellowiana (Acca sellowiana)	Pineapple Guava	L	L	L	M	/	M	6-9, 12-24	10'-25'	10'-25'	✓	✓						
Forestiera neomexicana	Desert Olive	?	?	L	L	L	L	1-3, 7-24	12'-18'	12'	✓	✓						
Fremontodendoron spp.	Flannel Bush	VL	VL	VL	L	/	/	4-24	20'	12'	✓	✓	✓					
Galvezia speciosa	Island Bush Snapdragon	L	L	VL	L	?	M	14-24	3'	5'	✓	✓	✓					
Garrya elliptica	Coast Silk Tassel	L	L	L	M	/	/	4-9, 14-24	10'-20'	10'-20'	✓	✓	✓					

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Grevellia 'Noellii'	Noel's Grevellia	L	L	L	L	/	M	8, 9, 12-24	4'	4'-5'	✓	✓						
Grewia occidentalis	Lavender Star Flower	M	M	M	M	/	M	8, 9, 12-24	6'-10'	6'-10'	✓	✓						
Hakea laurina	Sea Urchin Tree	L	L	L	L	/	/	9, 12-17, 19-24	10'-25'	9'-30'	✓	✓	✓					
Hakea suaveolens	Sweet Scented Hakea	L	L	L	L	/	/	9, 12-17, 19-24	10'-20'	10'-20'	✓	✓	✓					
Hebe 'Veronica Lake'	Veronica Lake Hebe	M	M	M	M	/	/	14-24	3'	3'	✓	✓						
Heteromeles arbutifolia	Toyon	VL	VL	L	L	/	/	5-9, 14-24	6'-10'	6'-10'	✓	✓	✓					
Heuchera sanguinea	Coral Bells	M	M	M	M	M	M	A1-A3, 1-11, 14-24	1'-2'	1'-2'	✓	✓						
Hibiscus rosa-sinensis	Hibiscus	M	M	M	M	/	H	9, 12-16, 19-24	8'-15'	5'-8'	✓	✓						
Ilex cornuta 'Burfordii'	Burford Holly	L	M	M	M	M	M	3-24	15'	10'	✓	✓						
Ilex vomitoria	Yaupon	L	M	L	L	M	M	3-9, 11-24	15'-20'	10'-15'	✓	✓						
Juniperus chinensis X pfitzeriana	Pfitzer Juniper	L	L	L	M	M	M	A2, A3, 1-24	5'-6'	10'-12'	✓	✓						
Juniperus chinensis 'Torulosa'	Hollywood Juniper	L	L	L	M	M	M	1-24	15'	10'	✓	✓						
Justicia californica	Chuparosa	M	/	VL	L	L	M	10-14, 18-24	6'	6'	✓	✓						
Justicia spicigera	Mexican Honeysuckle	/	?	L	L	/	L	12-24	3'	4'	✓	✓						
Lantana camara	Bush Lantana	L	L	L	L	/	M	8-10, 12-24	6'	6'	✓	✓	✓	N				
Lantana montevidensis (gold cultivars)	Trailing Lantana	L	L	L	L	/	M	8-10, 12-24	2'	6'	✓	✓	✓	N				
Larrea tridentata	Creosote Bush	VL	VL	VL	L	L	L	7-14, 18-21	8'	8'	✓	✓	✓					
Lavandula species	Lavender	L	L	L	L	M	M	2-24, varies	2'-6'	2'-6'	✓	✓						

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								per species										
Lavatera assurgentiflora	Tree Mallow	L	M	L	L	/	M	14-24	12'	12'	✓	✓						
Lavatera bicolor (L. maritima)	Calironia Tree Mallow	L	L	M	M	?	?	6-9, 12-24	8'	4'	✓	✓						
Leonotis leonurus	Lion's Tail	L	L	L	L	M	M	8-24	6'	6'	✓	✓						
Leptospermum laevigatum	Australian Tea Tree	L	L	L	L	/	/	14-24	30'	30'	✓	✓						
Leptospermum scoparium spp.	New Zealand Tea Tree	M	M	M	M	/	/	14-24	4'-12'	4'-8'	✓	✓						
Leucophyllum species candidum	Texas Sage, Silverleaf	L	L	L	L	L	L	7-24	4'-8'	4'-8'	✓	✓						
Ligustrum japonicum 'Texanum'	Texas Privet	M	M	M	M	M	M	4-24	12'	8'	✓	✓						
Lobelia laxiflora	Mexican Bush Lobelia	?	?	VL	VL	?	M	7-9, 12-24	3'	6'	✓	✓						
Lonicera nitida	Box Honeysuckle	L	M	/	M	/	/	4-9, 14-24	11’	10'	✓	✓			✓			
*Lycium fremontii***	Wolfberry	/	L	L	L	L	L	8-16, 18-24	9'	9'	✓	✓						
Mahonia species	Oregon Grape	M	M	M	M	M	M	2-12, 14-24	5'-12'	5'-6'	✓	✓	✓					
*Malacothamnus fasciculatus***	Mesa Bushmallow	VL	L	VL	L	/	/	7-24	4'-6'	4'-6'	✓	✓	✓		✓			
Melaleuca nesophila	Pink Melaleuca	L	L	L	L	/	/	13, 16-24	20'	20'	✓	✓	✓					
Mimulus aurantiacus	Sticky Monkey Flower	L	L	L	L	/	/	7-9, 14-24	4 1/2'	4 1/2'	✓	✓	✓					
Myrica californica	Pacific Wax Myrtle	L	L	L	M	/	/	4-9, 14-24	30'	30'	✓	✓			✓			
Myrsine africana	African Boxwood	L	L	L	M	/	/	8, 9, 14-24	8'	6'	✓	✓						
Myrtus communis	Common Myrtle	L	L	L	M	M	M	8-24	6'	5'	✓	✓						
Nandina domestica species	Heavenly Bamboo	L	L	L	M	M	M	4-24	8'	4'	✓	✓						
Nerium oleander	Oleander	L	L	L	L	M	M	8-16, 18-24	20'	12'	✓	✓						
Philadelphus mexicanus	Evergreen Mock Orange	L	M	M	M	M	M	8, 9, 14-24	6'	6'	✓	✓						

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Phlomis fruticosa	Jerusalem Sage	L	L	L	L	M	M	3b-24	4'	4'	✓	✓						
Photinia serratifolia (P. serrulata)	Chinese Photinia	M	M	/	M	M	M	4-16, 18-22	30'	30'	✓	✓	✓					
Photinia x fraseri	Fraser's Photinia	M	M	M	M	M	M	3b, 4-24	15'	15'	✓	✓	✓					
Pittosporum tobira and hybrids	Tobira / Japanese Mock Orange	L	M	M	M	M	M	8-24	15'	15'	✓	✓	✓					
Plecostachys serpyllifolia (Helichrysum)	Straw Flower	L	L	L	L	M	M	8, 9, 14-24	1 1/2'	3'	✓	✓						
Plumbago auriculata (campense)	Cape Plumbago	L	M	M	M	/	M	8, 9, 14-24	6'	10'		✓	✓	N				
Polygala dalmasiana	Sweet Pea Shrub	L	M	M	M	/	/	8, 9, 14-24	5'	5'		✓						
Potentilla gracilis (P. fruticosa)	Cinquefoil	M	M	/	/	M	/	A1-A3, 1-11, 14-21	2'-4'	2'-4'	✓	✓			✓			
Prunus caroliniana	Laurel Cherry	L	L	M	M	M	M	5-24	10'-25'	8'-25'	✓	✓	✓					
Prunus ilicifolia	Hollyleaf Cherry	L	L	VL	VL	/	/	5-9, 12-24	10'-25'	10'-25'	✓	✓	✓					
Punica granatum 'Nana'	Dwarf Pomegranate	L	L	M	M	M	M	5-24, H1	3'	6'	✓	✓	✓					
Pyracantha species	Firethorn	L	L	L	M	M	M	4-24	4'-10'	4'-10'	✓	✓	✓					
Rhamnus californica	Coffeeberry	L	L	VL	L	/	M	3a-10, 14-24	15'	8'	✓	✓	✓					
Rhamnus crocea	Redberry	L	L	VL	L	/	M	7, 14-24	3'	6'	✓	✓			✓			
Rhaphiolepis indica	Indian Hawthorn	L	L	M	M	M	M	8-10, 12-24	5'	6'	✓	✓	✓					
Rhus integrifolia	Lemonade Berry	L	L	VL	L	/	/	8, 9, 14-17, 19-24	10'	10'	✓	✓	✓					
Rhus laurina	Laurel Sumac	VL	L	VL	L	/	/	8, 9, 14-17, 19-25	15'	15'	✓	✓	✓					
Rhus ovata	Sugar Bush	L	L	VL	L	M	M	9-12, 14-24	10'	10'	✓	✓	✓					

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Rhus trilobata	Squawbush	L	L	L	L	L	/	1-12, 14-21	5'	5'	✓	✓	✓					
Ribes aureum	Golden Currant	L	L	L	L	L	/	A2, A3, 1-12, 14-23	6'	6'	✓		✓		✓			
Ribes indecorum	White Flowering Currant	L	L	L	L	L	/	7-9, 11, 14-24	9'	6'	✓	✓	✓					
Ribes malvaceum	Chaparral Currant	VL	VL	VL	L	/	/	6-9, 14-24	5'	5'	✓	✓	✓					
Ribes sanguineum	Red Flowering Currant	L	L	L	M	/	/	A3, 4-9, 14-24	12'	12'	✓	✓	✓		✓			
Ribes speciousum	Fuchsia Flowering Gooseberry	L	L	L	M	/	/	7-9, 14-24	8'	10'	✓	✓	✓					
Ribes viburnifolium	Evergreen Current	L	L	L	M	/	/	5, 7-9, 13-17, 19-24	3'-6'	12'		✓	✓		✓			
Romneya coulteri	Matilija Poppy	VL	VL	VL	L	/	/	4-12, 14-24	6'-8'	6'-8'	✓	✓	✓					
Rosa banksiae	Lady Bank's Rose	L	L	M	M	M	M	4-24	12'-20'	12'-20'		✓						
*Rosa californica***	California Wild Rose	L	L	L	L	/	/	4-24	3'-9'	3'-9'	✓	✓	✓		✓			
Rosmarinus officinalis 'Tuscan Blue'	Tuscan Blue Rosemary	L	L	L	L	M	M	4-24	7'	3'	✓	✓						
*Rubus ursinus***	Pacific Blackberry	L	L	M	?	?	?	4-6, 14-17	10'-20'	10'-20'	✓				✓			
Ruellia brittoniana	Mexican Barrio Ruellia	M	?	L	?	M	L	8, 9, 12-24	3'	1 1/2'	✓							
Ruellia californica	Sonoran Desert Ruellia	?	?	VL	VL	/	L	12, 13	4 1/2'	4 1/2'	✓	✓						
*Russelia equisetiformis**	Coral Fountain	/	L	M	M	M	M	14, 19-24	5'	5'	✓	✓						
*Russelia polyedra**	Wild Coral Fountain	/	L	M	M	M	M	14, 19-24	5'	5'	✓	✓						
Salvia apiana	White Sage	VL	L	VL	VL	L	L	7-9, 11, 13-24	5'	5'	✓	✓						
Salvia argentea	Silver Sage	L	L	L	L	?	?	1-24	10'	2’	✓	✓	✓					
Salvia clevelandii and hybrids	Salvia	L	L	VL	L	L	L	8, 9, 12-24	5'	8'	✓	✓	✓					

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Salvia greggii and hybrids	Autumn Sage	L	L	L	L	M	M	8-24	4'	4'	✓	✓	✓					
Salvia leucantha	Mexican Bush Sage	L	L	L	L	/	M	12-24	4'	6'	✓	✓	✓					
Salvia leucophylla	Purple Sage	L	/	L	L	/	M	8, 9, 14-17, 19-24	5'	5'	✓	✓	✓					
Salvia mellifera	Black Sage	L	L	L	L	/	M	7-9, 14-24	6'	5'	✓	✓	✓					
Sambucus mexicana	Mexican Elderberry	L	L	L	L	M	M	2-24	30'	20'	✓	✓			✓			
Santolina chamaecyparissus (S. incana)	Lavender Cotton	L	L	L	L	L	L	2-24	2'	3'	✓	✓						
Santolina rosmarinifolia (S. virens)	NCN	L	L	L	L	L	L	3-9, 14-24	2'	3'	✓	✓						
Sarcococca ruscifolia	Fragrant Sweet Box	L	M	M	M	/	/	4-9, 14-24	6'	7’	✓	✓						
Senna artemesioides (Cassia art.)	Feathery Cassia/Senna	L	L	L	L	L	L	8, 9, 12-16, 18-23	3'-6'	3’	✓							
*Senna oliogophylla (Cassia oliogophylla)**	Outback Senna	L	L	L	L	L	L	12-24	5'	5'	✓							
Senna nemophila (Cassia nemophila)	Desert Cassia	/	?	L	L	L	L	12-24	5'	5'	✓	✓						
Senna phyllodenia (*Cassia phyllodenia*)	Silver Senna/Cassia	?	?	L	L	L	L	12-24	6'	6'	✓	✓						
Senna spectabilis (*Cassia excelsa*)**	Senna/Cassia spectabilis	?	?	L	L	?	?	12-24	6'	6'	✓	✓						
Senna sturtii (Cassia sturtii)	Sturt's Cassia/Senna	/	/	L	L	L	L	12-24	6'	4’	✓	✓						
Shepherdia argentea	Silver Buffalo Berry	L	?	VL	VL	?	?	1-3, 7, 10	12'	12'	✓	✓						
Simmondsia chinensis	Jojoba	VL	VL	VL	VL	L	L	7-24	6'	6'	✓	✓	✓					
Solanum rantonnetii (Lycianthus rant.)	Blue Potato Bush	M	M	M	M	/	M	12, 13, 15-24	8'-12'	6'-10'	✓	✓						

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Solanum xantii	Purple Nightshade	L	L	L	L	/	L	7-9, 11, 14-24	3'	3'	✓	✓						
Sollya heterophylla	Austrailian Bluebell Creeper	L	L	L	L	/	/	8, 9, 14-24	3'	5'	✓	✓						
Sophora arizonica	Arizona Sophora	L	L	L	L	M	M	10-13	10'	10'	✓	✓						
Sophora secundiflora	Texas Mountain Laurel	L	L	L	L	M	M	8-16, 18-24	25'	15'	✓	✓						
Sphaeralacea ambigua	Desert Mallow	L	L	L	L	/	L	3, 7-24	4'	3'	✓	✓	✓					
Spiraea douglasii	Western Spiraea	M	M	M	M	M	M	1-9, 14-21	6'	6'	✓	✓			✓			
Spiraea japonica	Spirea	M	M	M	M	M	M	A2, A3, 2-10, 14-21	6'	6'	✓	✓			✓			
Symphoricarpos albus	Snow Berry	L	L	L	L	?	/	A3, 1-11, 14-21	2'-6'	2'-6'	✓	✓						
Tagetes lemmonii	Mountain Marigold	L	L	L	L	M	M	8-10, 12-24	6'	6'	✓	✓						
*Tecoma alata**	Orange Bells	M	M	L	L	/	M	12, 13, 21-24	8'	5'	✓	✓						
*Tecoma garrocha**	Argentine Tecoma	M	M	L	L	/	M	12, 13, 21-24	5'	5'	✓	✓						
Tecoma stans cultivars	Yellow Bells (Shrub Forms)	M	M	L	L	/	M	12, 13, 21-24	10'	8'	✓	✓						
Tecomaria capensis	Cape Honeysuckle	M	M	M	M	/	M	12, 13, 20-24	8'	5'		✓						
Teucrium chamaedrys	Germander	L	L	L	L	M	M	2-24	1'	2'	✓	✓						
Teucrium fruticans	Bush Germander	L	L	L	L	/	M	4-24	8'	8'	✓	✓	✓					
Teucrium marum	Cat Thyme	L	L	L	L	?	?	3-9, 14-24	1 1/2'	1 1/2'	✓	✓						
Vauquelinia californica	Arizona Rosewood	L	?	/	/	M	M	10-13	20'	15'	✓	✓						
*Vauquelinia corymbosa angustifolia**	Chihuahuan Rosewood	L	?	/	/	M	M	10-13	20'	15'	✓	✓						
Viburnum japonicum	Viburnum	M	M	M	M	M	/	5-10, 12, 14-24	15'	12'	✓	✓						

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Viburnum suspensum	Sandankwa Viburnum	M	M	M	M	M	M	12-24	10'	10'	✓	✓						
*Viguiera deltoidea**	Goldeneye	/	/	VL	L	L	L	10-24	3'	3'	✓	✓						
Westringia fruticosa (rosmariniformis)	Coast Rosemary	L	L	L	L	/	M	8, 9, 14-24	3'	3'	✓	✓						
Westringia longifolia	Coast Rosemary	L	?	L	?	/	M	8, 9, 14-24	3'	2'	✓	✓						
Xylosma congestum	Shiny Xylosma	L	L	M	M	M	M	8-24	10'	10'	✓	✓	✓					
Accents / Grasses																		
Agapanthus species	Lily of the Nile	M	M	M	M	/	M	6-9, 12-24	1 1/2'-5'	1'-2'	✓							
Agave species	Agave	L	L	L	L	/	L	10, 12-24 varies per species	1'-10'	1'-10'	✓	✓	✓					
*Aleopecurus pratensis***	Yellow Foxtail Grass	?	?	M	?	?	?	7-9, 14-24	2'	2'	✓	✓			✓			
Aloe species	Aloe	L	L	L	L	/	L	8, 9, 12-24	1'-3'	1'-3'	✓	✓	✓					
Anigozanthos cultivars (A. flavidus)	Kangaroo Paw	L	L	L	L	/	M	15-24	5'	2'-3'	✓							
Asclepias subulata	Desert Milkweed	L	L	L	L	L	L	1-24	3'-6'	2'-3'	✓	✓	✓					
Bouteloua gracilis	Blue Grama Grass	L	L	?	?	M	?	1-3, 7-11, 14, 18-21	1 1/2'-2'	1’	✓	✓						
Calamagrostis acutiflora	Feather Reed Grass	L	?	M	M	?	?	2b-24	2'-3'	2'-3'	✓	✓			✓			
Carex species (non-native)	Sedge	M	M	M	M	/	M	varies per species	1'-3'	1'-3'	✓			N				
Carex species (native)	Sedge	M	M	M	M	/	M	varies per species	1'-3'	1'-3'	✓				✓			
Carnegiea gigantea	Saguaro	/	/	VL	L	/	L	12, 13, 18-21	50'	18"-8'	✓		✓					
Cephalocerus spp.	Old Man Cactus	VL	/	VL	L	L	L	13, 21-24	15'-45'	12"-5'	✓	✓	✓					

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Cereus peruvianus	Peruvian Apple Cactus	/	?	L	L	?	L	13, 16, 17, 21-24	10'	15'	✓	✓	✓					
Chamaerops humilis	Mediterranean Fan Palm	L	L	M	M	M	M	4-24	20'	20'	✓	✓						
Chondropetalum tectorum	Cape Rush	H	?	M	?	?	?	8, 9, 14-24	3'-5'	4'-6'	✓				✓			
Clivia miniata	Kaffir Lily	M	M	L	M	/	M	12-17, 19-24	2'	2'								
Cordyline australis	Giant Dracaena	L	M	L	M	M	M	5, 8-11, 14-24	20'-30'	6'-12'	✓	✓						
Cycas revoluta	Sago Palm	M	M	M	M	M	M	8-24	2'-10'	2'-6'	✓							
Dasylirion species	Desert Spoon	VL	/	L	L	L	L	10-24	5'	5'	✓	✓	✓					
Deschampsia caespitosa	Tufted Hair Grass	L	L	L	L	/	/	2-24	1'-2'	2'	✓				✓			
*Deschampsia flexuosa**	Crinkled Hair Grass	L	L	L	L	/	/	2-24	2'	1'	✓				✓			
*Distichlis spicata 'Stricata'***	Salt Grass	M	M	M	M	M	M	7-9, 14-24	2'	1'	✓				✓			
Dietes bicolor	Fortnight Lily	L	L	M	M	/	M	8, 9, 12-24	2'-3'	1'-2'	✓							
Dietes iridioides (vegeta)	African iris	L	L	M	M	/	M	8, 9, 12-24	3'	3'	✓							
*Dudleya lanceolata***	LiveForever	L	L	VL	L	L	L	7-24	1'-2'	1'-2'	✓	✓	✓					
Echeveria elegans	Hens and Chickens	L	L	L	L	/	M	8, 9, 12-24	4"	8"	✓							
Echinocactus grusonii	Golden Barrel Cactus	VL	VL	L	L	/	L	12-24	4’	2 1/2'	✓	✓	✓					
*Eleocharis macrostachya***	Spike Rush	M	M	M	M	M	M	7-9, 14-24	1'-2'	1'-2'	✓				✓			
Elymus magellanicus	Magellan Wheatgrass	L	L	L	L	M	M	3-6, 14-17, 21-24	1 1/2'	1 1/2'	✓				✓			
*Ephedra viridis**	Morman Tea	L	L	L	L	L	L	1-3, 7-24	3'-4'	3'-4'	✓	✓	✓					
Esposta lantana	Peruvian Old Man Cactus	?	?	L	L	L	L	12-24	8'	2'	✓	✓	✓					
Euphorbia characias wulfenii	no common name	L	L	L	L	?	?	4-24	4'	4'	✓	✓	✓					
Euphorbia ingens, **	Candelabra Tree	L	L	L	L	?	?	4-25	8'	4'	✓	✓	✓					

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Euphorbia milii	Crown of Thorns	/	L	L	L	/	L	13, 21-24	1'-4'	1 1/2'	✓	✓	✓					
Euphorbia rigida	Euphorbia	/	L	VL	/	/	L	4-24	2'	3'-5'	✓	✓	✓					
Euphorbia tirucallii	Pencil Tree (milk bush)	/	/	VL	/	/	L	13, 23, 24	20'	6'		✓	✓					
Ferocactus spp.	Barrel Cactus	VL	VL	VL	L	L	L	8-24	8'-9'	3"	✓	✓	✓					
Festuca (ovina) *glauca*	Blue Fescue	L	L	M	M	M	M	1-24	1'	10"	✓	✓						
Festuca idahoensis	Fescue	VL	L	?	?	?	?	1-10, 14-24	14"	10"	✓				✓			
Fouquieria splendens	Ocotillo	L	/	VL	L	L	L	10-13, 18-20	5'-10'	8'-25'	✓	✓	✓					
Helictotrichon sempervirens	Blue Oat Grass	L	L	M	M	M	M	1-12, 14-24	2'-3'	2'-3'	✓	✓			✓			
Hemerocallis hybrids	Day Lily	M	M	M	M	M	M	1-24, H1, H2	6'	2'-3'	✓							
Hesperaloe funifera	Coahuilan Hesperaloe	/	/	VL	L	L	L	12, 13	6'	6'-8'	✓	✓	✓					
Hesperaloe parviflora	Red / Yellow Yucca	/	/	VL	L	L	L	2b, 3, 7-16, 18-24	3'-4'	3'-4'	✓	✓	✓					
Imperata cylindrica rubra	Japanese Blood Grass	H	H	M	M	?	M	2b-24	1'-2'	1’	✓				✓			
Iris douglasiana	Douglas Iris	L	L	M	M	H	/	4-9, 14-24	1'-2'	1’	✓				✓			
*Juncus acutus***	Spiny Rush	H	H	M	M	?	?	4-9, 14-24	1'	1’	✓				✓			
Juncus patens	California Gray Rush	H	H	M	M	?	?	4-9, 14-24	2'	2'	✓				✓			
Kalanchoe thyrsiflora	Paddle Plant	L	L	L	L	/	M	13, 17, 21-24	1'-3'	1'-3'								
Kniphofia triangularis (K. galpinii)	Coral Poker	M	M	L	L	/	M	2-9, 14-24	2'	2'	✓	✓	✓					
Kniphofia uvaria	Red Hot Poker	M	M	L	L	/	M	2-9, 14-24	2'	2'	✓	✓	✓					
Leymus condensatus	Giant Wild Rye	VL	VL	M	M	?	?	7-12, 14-24	9'	6'	✓				✓			
*Leymus triticoides***	Creeping Wild Rye	VL	VL	M	M	?	?	7-12, 14-24	3'	3'	✓				✓			
Lilium paradalinum	Leopard Lily	M	M	M	M	M	M	4-7, 14-17	4'-8'	4'	✓				✓			

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*Liriope gigantea***	Giant Lilyturf	M	M	M	M	M	M	2B-10, 14-24	3'	2'	✓							
Liriope muscari	Big Blue Lilyturf	M	M	M	M	M	M	2B-10, 14-24	1 1/2'	1'	✓							
Milium effusum 'Aureum'	Bowles Golden Grass	M	?	?	?	?	?	3b-9, 14-17	2'	2'	✓				✓			
Miscanthus sinensis	Japanese Silver Grass	H	H	M	M	M	M	2-24	2'-6'	2'-6'	✓	✓			✓			
Miscanthus transmorrisonensis	Evergreen Miscanthus	H	H	M	M	M	M	2-24	2'-3'	3'-4'	✓	✓			✓			
Muhlenbergia capillaris	Pink Muhly (Hairy awn muhly)	L	?	M	?	M	M	4-24	3'	6'		✓	✓		✓			
Muhlenbergia dumosa	Bamboo Muhly	L	?	M	M	M	M	8-24	3'-6'	3'-6'	✓	✓			✓			
Muhlenbergia emersleyi	Bull Grass	M	?	?	?	?	M	2-24	1 1/2'	3'-4'	✓	✓	✓		✓			
*Muhlenbergia lindheimeri**	Muhly Grass	L	?	M	M	M	M	6-24	4'-5'	4'-5'		✓	✓		✓			
Muhlenbergia rigens	Deer Grass	L	M	L	M	M	M	4-24	4'	4'	✓	✓	✓					
Nolina species	Grass Tree, Nolina	VL	VL	VL	VL	L	L	varies per species	3'-25'	3'-12'	✓	✓	✓					
Opuntia species	Prickly Pear, Cholla	VL	VL	VL	L	L	L	varies per species	1'-15'	1'-15'	✓	✓	✓					
Pachycereus marginatus	Mexican Fence	/	?	L	L	/	L	13, 16, 17, 21-24	25'	12'	✓	✓	✓					
Panicum virgatum	Switch Grass	M	?	?	?	?	?	1-11, 14-23	4'-7'	2'-4'	✓	✓			✓			
Penstemon parryi	Parry's Beardtongue	L	L	L	L	L	L	10-13	3'	2'		✓	✓					
*Penstemon superbus***	Superb Beardtongue	L	L	L	L	L	L	10-13	2'-3	2'		✓						
Phoenix roebelenii	Pigmy Date Palm	L	/	M	/	M	M	13, 16, 17, 22-24	6'-10'	6'-8'	✓	✓						
Phormium tenax	New Zealand Flax	L	L	L	M	/	M	7-9, 14-24	1'-9'	1'-5'	✓	✓						

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Portulacaria afra	Elephants Food	L	L	L	L	/	L	8, 9, 12-24	12'	12'	✓	✓						
Romneya coulteri	Matilija Poppy	VL	VL	VL	L	/	/	4-12, 14-24	6'-8'	15'	✓	✓	✓					
Scirpus cernuus	Fiber Optics Plant	H	H	H	H	H	H	7-24	2'	2'	✓				✓			
*Scirpus maritimus***	Bulrush	M	M	M	M	M	M	7-24	2'	2'	✓				✓			
Sedum species	Various Sedum	L	L	L	L	L	L	8, 9, 12, 14-24 (per species)	2"-18"	6"-24"	✓	✓	✓					
Senecio cineraria	Dusty Miller	L	L	L	L	/	M	4-24, H1	2'-3'	2'-3'	✓	✓						
Senecio mandraliscae	Blue Chalk Sticks	/	/	L	M	/	M	12, 13, 16, 17, 21-24	1'-1 1/2'	2'	✓	✓						
Sisyrinchium bellum	Blue-Eyed Grass	VL	VL	L	L	M	M	4-9, 14-24	4"-2'	6"-2'	✓				✓			
Sisyrinchium californicum	Yellow-eyed Grass	M	M	M	M	M	M	4-9, 14-24	6"-2'	8"-10"	✓				✓			
*Spartina pectinata**	Praire Cord Grass	M	M	M	M	M	M	1-9, 14-24	5'	3'	✓				✓			
Stenocereus thurberi (Lemaireocereus)	Organpipe Cactus	/	/	VL	L	/	L	12-24	15'-20'	12’	✓	✓	✓					
Strelitzia nicolai (protected areas only)	Giant Bird of Paradise	M	/	M	M	/	M	22-24	5'-30'	5'-30'	✓							
Strelitzia reginae (protected areas only)	Bird of Paradise	M	M	M	M	/	M	22-24	5'-6'	5'-6'	✓							
Trichostema lanatum	Woolly Blue Curls	VL	VL	VL	L	/	M	14-24	3'-5'	4'-8'	✓	✓						
Tulbaghia violacea	Society Garlic	M	M	M	M	/	M	13-24	1'-2'	1'-2'	✓							
Yucca species	Yucca, Joshua Tree	L	L	L	L	L	L	varies per species	3'-30'	5'-30'	✓	✓	✓					
GROUNDCOVER																		
Acacia redolens 'Desert Carpet'	Trailing Acacia	L	L	L	L	L	L	13, 18, 19, 23	24"	15'	✓	✓	✓	N				
Achillea tomentosa	Yarrow Woolly	L	L	L	L	M	M	A1-A-3, 1-24	6"	18"	✓	✓	✓					

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*Anemposis californica***	Yerba Mansa	?	?	?	?	H	H	7-9, 14-24	6"	1’	✓	✓	✓		✓	✓	✓	
Aptenia 'Red Apple'	Red Apple	L	L	L	L	/	H	12, 13, 15-17, 21-24	6"	2’	✓	✓	✓	N				
Arctostaphylos 'Emerald Carpet'	Emerald Carpet Manzanita	VL	L	L	L	/	/	6-9, 14-24	8"-14"	8"-14"	✓	✓	✓					
Arctostaphylos hookeri	Monterey Manzanita	VL	L	L	L	/	/	6-9, 14-24	4'	6'	✓	✓	✓					
Arctostaphylos 'Pacific Mist'	Pacific Mist Manzanita	VL	L	L	L	/	/	7-9, 14-24	2 1/2'	10’	✓	✓	✓					
Artemisia arborescens 'Powis Castle'	Powis Castle Artemisia	VL	L	L	L	L	L	7-9, 14-24	3'	6’	✓	✓	✓					
*Artemisia douglasiana***	Mugwort	VL	L	L	L	L	L	7-9, 14-24	2'	2'	✓		✓		✓	✓	✓	
Artemisia pycnocephala	Sandhill Sage	VL	L	L	L	L	L	4, 5, 7-9, 14-17, 19-24	2'	3’	✓	✓	✓					
Atriplex semibaccata	Creeping Salt Bush	VL	VL	VL	VL	L	VL	8-10, 12-24	1'	6’	✓	✓	✓	N				
Baccharis 'Centennial'	Centennial Baccharis	VL	L	VL	L	L	L	7-24	3'	4'-5'	✓	✓	✓		✓	✓	✓	
Baccharis pilularis	Dwarf Coyote Bush	L	L	L	L	/	/	5-11, 14-24	8"-36"	6'-9'	✓	✓	✓		✓	✓	✓	
Baileya multiradiata	Desert Marigold	?	?	?	L	L	L	1-3, 7-23	1 1/2'	1 1/2'	✓	✓	✓					
Calystegia macrocarpa, **	Morning Glory	L	L	M	M	/	/	7-9, 14-24	2'	10'	✓	✓			✓	✓	✓	
Carissa macrocarpa (compact variteies)	Natal Plum	L	/	M	M	/	M	22-24	1'-3'	3'-5'	✓	✓						
Ceanothus griseus var. *horizontalis*	Carmel Ceanothus	VL	L	VL	L	L	/	5-9, 14-24	1/2'-2 1/2	15'	✓	✓	✓					
Cephalophyllum 'Red Spike'	Red Spike Ice Plant	L	L	L	L	/	L	8, 9, 11-24	3"-5"	15"-18"	✓	✓						
*Chrysactinia mexicana**	Damianita Daisy	L	L	L	L	L	L	10-13, 18-24	2'	2'	✓	✓						
Cistus corbariensis	White Rockrose	L	L	L	L	L	L	6-9, 14-24	3'-4'	3'-4'	✓	✓						

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Cistus salviifolius	Sage Leaf Rockrose	L	L	L	L	L	L	6-9, 14-24	2'	6'	✓	✓						
Convolvulus sabatius	Ground Morning Glory	L	L	L	L	M	M	7-9, 14-24	1'-2'	3’	✓	✓						
Coprosma x kirkii	Coprosma	L	L	M	M	/	/	14-24	1'-3'	4'-6'	✓	✓	✓					
Coprosma petriei 'Verde Vista'	Verde Vista Coprosma	L	L	M	M	/	/	8, 9, 14-24	1'-3'	4'-6'	✓	✓	✓					
Cotoneaster (compact varieties)	Cotoneaster	L	L	L	M	M	M	2-24 (varies per species)	1'-3'	6'-15'	✓	✓	✓	N				
Dalea capitata 'Sierra Gold'	Sierra Gold Dalea	?	?	?	?	L	L	10-13	8"	3'	✓	✓						
Dalea greggii	Trailing Indigo Bush	?	/	L	L	L	L	10-13	1 1/2'	6'	✓	✓						
*Dodecatheon clevelandii**	Shooting Star	M	M	M	M	M	M	7-9, 14-24	2'	2'	✓				✓			
Drosanthemum floribundum	Rosea Ice Plant	L	L	L	L	/	L	14-24	6"	5’	✓	✓		N				
Duchesnea indica	Indian Mock Strawberry	M	M	M	M	/	M	1-24	12”	3’	✓	✓	✓					
Dymondia margaretae	Dymondia	L	L	L	L	/	/	15-24	2"-3"	20”	✓	✓						
*Dyssodia pentachaeta***	Golden Dyssodia	?	M	?	?	M	M	10-13	6"	1’	✓	✓	✓					
Erigeron glaucus	Beach Aster	L	/	M	M	/	/	4-6, 15-17, 22-24	1’	1 1/2'	✓	✓	✓					
Euphorbia rigida	Gopher Plant	L	L	L	L	L	L	4-24	2'	3-5'	✓							
Gazania rigens hybrids	Gazania	M	M	M	M	M	M	8-24	6"-10"	3'-4'	✓	✓		N				
Helleborus orientalis	Lenten Rose	M	M	M	M	/	/	2b-10, 14-24	1'	2'-3'	✓				✓			
Heuchera micrantha	Alum Root	M	M	M	M	M	M	1-10, 14-24	2'-3'	**2'-3'**	✓		✓		✓			
*Hymenoxys acaulis***	Angelita Daisy	?	?	?	?	/	,	11-24	1'	1'	✓	✓						
*Iva hayesiana***	Poverty Weed	VL	VL	VL	L	/	/	4-9, 14-24	1'	3’	✓				✓			
Juniperus (compact varieties)	Juniper	L	L	L	M	M	M	A1-A-3, 1-24	6"-36"	6'-10'	✓							

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Keckiella antirhinnoides	Yellow Penstemmon	?	?	L	L	/	/	7-9, 12-24	4'	3'	✓	✓						
Keckiella cordifolia	Heart-Leaved Penstemmon	?	?	V	L	/	/	7-9, 12-24	5'	5'	✓	✓						
Lampranthus spectabilis	Trailing Ice Plant	L	L	L	L	/	L	12-24	1'	1 1/2'-2'	✓	✓		N				
Lonicera japonica 'Halliana'	Hall's Japanese Honeysuckle	M	M	L	L	M	M	1-24	18"	15'	✓	✓		N				
Lupinus species	Lupine	M	M	M	M	M	M	7-24	1 1/2'	1 1/2'	✓		✓		✓			
Mahonia repens	Creeping Mahonia	L	L	L	M	M	/	2b-9, 14-24	1'	3'	✓	✓	✓					
Maleophora species	Orange, Yellow Ice Plant	L	L	L	L	/	L	11-24	6"-12"	6'	✓	✓						
Melampodium leucanthum	Blackfoot Daisy	L	L	L	L	/	L	2, 3, 10-13	1'	1'	✓	✓						
*Mimulus guttatus***	Seep Monkey Flower	H	H	H	H	/	/	7-9, 14-24	1'	1'	✓				✓			
Myoporum 'Pacificum'	Pacific Myoporum	L	L	L	M	/	/	16-24	2'	30'	✓	✓	✓	N				
Myoporum parvifolium	Prostrate Myoporum	L	L	L	L	/	M	8, 9, 12-24	3"-6"	9'	✓		✓	N				
Oenothera caespitosa	White Evening PrimroseBaja Evening Primrose	L	?	/	L	L	L	1-3, 7-14, 18-21	8"-12"	2'	✓	✓						
Oenothera stubbei	Baja Evening Primrose	L	L	L	L	L	L	10-14, 18-24	5"	4'	✓	✓						
Osteospermum fruticosum	Trailing African Daisy	L	L	L	L	/	M	8, 9, 12-24	6"-12"	2'-4'	✓	✓		N				
Pelargonium species	Ivy Geranium	M	M	M	M	/	M	8, 9, 12-24; A2, A3	1'	5’	✓							
Penstemon baccharifolious	Del Rio	?	?	?	?	L	L	10-13	1 1/2'	1 1/2'	✓	✓						
Pyracantha hybrids	Firethorn species	L	L	L	M	M	M	8, 9, 12-24	30"-36"	3'-10'	✓	✓	✓					
Rosmarinus officinalis 'Prostratus'	Prostrate Rosemary	L	L	L	L	M	M	4-24	2'	8'	✓	✓	✓					
Sarcococca hookerana humilis	Sweet Box	L	M	M	M	/	/	4-9, 14-24	1 1/2'	8'	✓	✓						

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Satureja douglasii	Yerba Buena	L	?	M	?	?	?	4-9, 14-24	6"	3'	✓				✓			
Stachys byzantina	Lamb's Ear	L	L	M	M	/	M	1-24	1 1/2'	10’	✓	✓						
*Stachys coccinea**	Texas Betony	L	L	M	M	/	M	7-10, 12-24	1 1/2'	1 1/2'	✓	✓						
Symphoricarpus mollis	Snow Berry	L	L	?	?	?	/	2-10, 14-24	1 1/2'	1 1/2'	✓	✓						
Teucrium cossonii	Majorcan Germander	VL	L	L	L	/	L	7-9, 14-24	8"	1 1/2'	✓	✓						
Thymus species	Thyme	M	M	M	M	M	M	1-24	1'-3'	2'-3'	✓	✓						
Trachelospermum asiaticum	Asiatic Jasmine	M	M	M	M	M	M	6-24	18"	5'	✓							
Trachelospermum jasminoides	Star Jasmine	M	M	M	M	M	M	8-24	2'	10’	✓							
Tradescantia pallida	Purple Heart Plant	L	/	M	M	H	H	12-24	1 1/2'	3’	✓	✓						
Verbena species	Verbena	L	L	L	L	/	M	varies per species	12"-18"	3'-4'	✓	✓						
Wedelia trilobata	Wedelia	?	?	H	/	/	?	12-13, 21-24	1 1/2'-2'	6’	✓							
Zauschneria californica (*Epilobium* calif.)	California Fuchsia	L	L	VL	L	M	M	2-11, 14-24	6"	3'-4'	✓		✓		✓			
VINES																		
Antigonon leptopus	Queens Wreath	M	/	L	L	/	L	12, 13, 18-24	40'									
Bougainvillea species	Bougainvillea	L	L	L	L/	M	M	5, 6, 12-17, 19, 21-24	15'-30'									
Campsis radicans	Common Trumpet Creeper	L	L	M	M	M	M	1-21	40'									
Cissus incisa	Texas Grape Ivy	L	M	M	M	/	M	16-24	30'-50'									
Cissus trifoliata	Native Grape Ivy	?	/	?	?	?	L	10-13	30'									
Clematis armandii	Evergreen Clematis	M	M	M	M	M	M	4-9, 12-24	15'-20'									
*Clematis texensis**	Scarlet Clematis	M	M	M	M	/	M	2b-11, 14-24	6'-10'									

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Distictis buccinatoria	Blood Red Trumpet Vine	M	M	M	M	/	M	8, 9, 14-24	20'-30'									
Ficus pumila	Creeping Fig	M	M	M	M	M	M	8-24	40'-60'									
Gelsemium sempervirens	Cariolina Jasmine	L	L	M	M	/	M	4-24	20'									
Hardenbergia violacea	Lilac Vine	M	M	M	M	/	M	8-24	10'									
Hedera canariensis	Algerian Ivy	M	M	M	M	M	M	5-9, 12-24	20'	Not for use near MSHCP								
Hedera helix	English Ivy	M	M	M	M	M	M	3-24	20'	Not for use near MSHCP								
Lonicera hildebrandiana	Giant Burmese Honeysuckle	M	M	M	M	M	M	9, 14-17, 19-24	30'									
Lonicera japonica	Japanese Honeysuckle	M	M	L	L	M	M	1-24	30'	Not for use near MSHCP								
Lonicera sempervirens	Trumpet Honeysuckle	M	M	/	M	M	M	2-24	10'-20'									
Macfadyena unguis-cati	Cat's Claw Vine	L	L	L	L	L	L	8-24	25'-40'									
Mandevilla hybrida	Mandevilla	M	/	M	M	/	M	21-24	15'-20'									
Mascagnia lilacina	Lavendar Orchid Vine	?	?	?	?	?	M	12-24	15'-20'									
Mascagnia macroptera	Yellow Orchid Vine	?	?	?	?	?	M	12-24	15'									
Merremia aurea	Yellow Morning Glory	?	?	?	?	/	M	12-24	25'									
Pandorea jasminoides	Bower Vine	M	/	M	M	/	/	16-24	20'-30'									
Parthenocissus quinquefolia	Virginia Creeper	M	M	M	M	M	M	A2, A3, 1-24	20'									
Parthenocissus tricuspidata	Boston Ivy	M	M	M	M	M	M	1-24	20'									
Podranea ricasoliana	Pink Trumpet Vine	/	M	M	M	/	M	9, 12, 13, 19-24	20'									
Polygonum aubertii	Silver Lace Vine	L	L	L	L	M	M	A1-A3, 1-24	15'-20'	Not for use near MSHCP								
Rosa banksiae	Lady Bank's Rose	L	L	M	M	M	M	4-24	20'									
Vigna caracalla	Snail Vine	M	/	M	M	/	M	12-24	10'-20'									
Vitis californica	California Wild Grape	L	M	VL	L	M	M	4-24	30'									

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Vitis girdiana	Desert Grape	L	M	L	L	M	M	4-24	30'									
Wisteria floribunda	Japanese Wisteria	M	M	M	M	M	M	2-24	15'-30'									
Wisteria sinensis	Chinese Wisteria	M	M	M	M	M	M	3-24	15'-30'									
Turf																		
Cynodon dactylon cultivars	Bermuda	60% of Eto						5-10, 12-24	*Requires over-seeding of Perennial Rye during dormancy.									
Paspalum vaginatum	Seashore Paspalum	60% of Eto						17, 24, H2										
Stenotaphrum secundatum	St. Augustine	60% of Eto						12, 13, 18-24										
Zoysia 'Victoria'	Victoria Zoysiagrass	60% of Eto						8, 9, 12-24										
Buchloe dactyloides	UC Verde' Buffalograss	60% of Eto						1-3,10,11										
Plants Not Allowed In Riverside County																		
Lobularia maritima	Sweet Alyssum																	
Oenothera speciosa	Mexican Evening Primrose																	
Pennisetum spp.	Fountain Grass																	
Plants Not Allowed In Coachella Valley Mshcp																		
Acacia spp.	Acacia (all species except native cat claw																	
Arundo donax	Giant Reed or Arundo Grass																	
Atriplex semibaccata	Australian Saltbush																	
Avena barbata	Slender Wild Oat																	
Avena fatua	Wild Oat																	
Brassica tournefortii	African or Saharan Mustard																	
Bromus madritensis ssp. *Rubens*	Red Brome																	
Bromus tectorum	Cheat Grass or Downy Brome																	
Cortaderia jubata [syn. C. atacamensis]	Jubata Grass or Andean Pampas Grass																	
Cortaderia dioica [syn. C. selloana]	Pampas Grass																	
Descurainia sophia	Tansy Mustard																	

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Eichhornia crassipes	Water Hyacinth																	
Elaegnus angustifolia	Russian Olive																	
Foeniculum vulgare	Sweet Fennel																	
Hirschfeldia incana	Mediterranean or Short-pod Mustard																	
Lepidium latifolium	Perennial Pepperweed																	
Lolium multiflorum	Italian Ryegrass																	
Nerium oleander	Oleander																	
Nicotiana glauca	Tree Tobacco																	
Oenothera berlandieri	Mexican Evening Primrose																	
Olea europea	European Olive Tree																	
Parkinsonia aculeata	Mexican Palo Verde																	
Pennisetum clandestinum	Kikuyu Grass																	
Pennisetum setaceum	Fountain Grass																	
Phoenix canariensis	Canary Island Date Palm																	
Phoenix dactylifera	Date Palm																	
Ricinus communis	Castorbean																	
Salsola tragus	Russian Thistle																	
Schinus molle	Peruvian Pepper Tree or California Pepper																	
Schinus terebinthifolius	Brazilian Pepper Tree																	
Schismus arabicus	Mediterranean Grass																	
Schismus barbatus	Saharan Grass, Abu Mashi																	
Stipa capensis	No Common Name																	
Tamarix spp. (all species)	Tamarisk or Salt Cedar																	
Taeniatherum caput-medusae	Medusa-head																	
Tribulus terrestris	Puncturevine																	
Vinca major	Periwinkle																	
Washingtonia robusta	Mexican fan palm																	
Yucca gloriosa	Spanish Dagger																	

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Plants Not Allowed In The Citrus / Vineyard Policy Areas																		
Aleurites fordii	Tung																	
Althaea spp.	Hollyhock																	
Amaranthus hybridus. A. spinosus	Pigweed																	
Ambrosia spp.	Ragweed																	
Arbutus unedo	Strawberry Tree																	
Asclepias spp.	Milkweed																	
Aspargus officinalis	Aspargus																	
Bauhinia purpurea	Orchid Tree																	
Betula spp.	Birch																	
Bouganvillea spp.	Bouganvillea																	
Buxus spp.	Boxwood																	
Camellia Japonica	Camellia																	
Campsis radicans	Trumpet Creeper																	
Cassia /Senna occidentalis, C. tora	Coffeeweed																	
Catalpa bignonioides	Catalpa																	
Ceratonia spp.	Carob																	
Cercis spp.	Redbud																	
Chenopodium spp.	Lambsquarter																	
Cinnamomum camphora	Camphor Tree																	
Citrus spp.	Citrus																	
Cottoneaster spp.	Cotoneaster																	
Cupaniopsis anacardioides	Carrotwood																	
Elaeagnus spp.	Elaeagnus																	
Engeron canadensis	Horseweed																	
Eriobotrya japonica	Loquat																	
Erythrina caffra	Coral tree																	
Escallonia spp.	Escallonia																	
Eucalyptus spp.	Eucalyptus																	
Euonymus spp.	Euonymus																	

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Eupatorium capillifolium	Dogfennel																	
Eupatorium perfoliatum	Boneset																	
Ficus spp.	Fig																	
Fraxinus spp.	Ash																	
Gelsemium sempervirens	Trumpet Flower																	
Ginkgo biloba	Maidenhair Tree																	
Gossypium spp.	Cotton																	
Hardenbergia spp.	Hardenbergia																	
Helianthus spp.	Sunflower																	
Hibiscus spp.	Okra																	
Hibiscus spp.	Hibiscus																	
Ilex spp.	Holly																	
Ilex vomitoria	Yaupon																	
Jasminum mesnyi	Japanese Jasmine																	
Juglans spp.	Walnut																	
Lactuca canadensis	Lettuce, wild																	
Lagerstroemia spp.	Crape Myrtle																	
Ligustrum spp.	Privet																	
Liquidambar styraciflua	Sweetgum																	
Macadamia spp.	Macadamia																	
Magnolia spp.	Magnolia																	
Malus sylvestris	Apple																	
Malva spp.	Mallow																	
Melaleuca spp.	Bottlebrush																	
Melia azedarach	Chinaberry																	
Monarda fistulosa	Wild Bergamot																	
Myoporum spp.	Myoporum																	
Nandina domestica	Heavenly Bamboo																	
Nerium spp.	Oleander																	
Nicotiana spp.	Tree Tobacco																	
Nyssa sylvatica	Blackgum																	
Oenothera laciniata	Evening-Primrose																	

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Persea spp.	Avacado																	
Philodendron spp.	Philodendron																	
Photinia spp.	Photinia																	
Pinus spp.	Pine																	
Pittosporum spp.	Pittosporum																	
Platanus spp.	Sycamore																	
Phytolacca americana	Pokeweed																	
Podocarpus spp.	Podocarpus																	
Prunus angustifolia	Plum, chicksaw																	
Prunus anygdalus	Almond																	
Prunus armeniaca	Apricot																	
Prunus avium	Cherry																	
Prunus caroliniana	Cherry laurel																	
Prunus persica	Peach																	
Prunus spp.	Plum, cultivated																	
Pyracantha coccinea	Pyracantha/ Firethorn																	
Pyrus communis	Pear																	
Quercus spp.	Oak																	
Rhus spp.	Sumac/ Laurel Sumac																	
Rubus spp.	Blackberry																	
Rudbeckia laciniata	Goldenglow																	
Sambucus spp.	Elderberry																	
Sassafras albidum	Sassafras																	
Schefflera spp.	Umbrella Tree																	
Solidago spp.	Goldenrod																	
Sonchus oleraceus	Sowthistle																	
Sorghum halepensse	Johnsongrass																	
Thuja spp.	Arborvitae																	
Tristania laurina	Tristania																	
Tupidanthus calyptratus	Tupidanthus																	
Viburnum spp.	Viburnum																	
Vigna sinensis	Cowpea																	
Vitis spp.	Grape																	
Xanthium spp.	Cocklebur																	

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Yucca aloifolia	Yucca																	
Zea mays	Corn																	
LandLMD 89-1-C Plants to Avoid																		
Trees																		
Eucalyptus spp.	Eucalyptus	Limited use. Fast growing, messy, brittle wood.																
Geijera parviflora	Australian Willow	Does not perform well. No or stunted growth.																
Ginkgo biloba	Maidenhair Tree	Does not perform well																
Juglans californica	S. Califonia Black Walnut	Fruiting, Litter Issues																
Liquidambar styraciflua	Sweet Gum	Rotundiloba' Variety only																
Pinus spp.	Pine	Limited use																
Platanus spp.	Sycamore	Limited use																
Pyrus calleryana	Callery or Bradford Pear	Subject to fireblight																
Punica granatum	Pomegranate	Non fruiting variety only																
Syagrus romanzoffianum	Queen Palm	Does not perform well																
Washingtonia spp.	Fan Palm	Limited use. High maintenance cost.																
Shrubs																		
Convolvulus mauritanicus (C. sasbatius)	Ground Morning Glory	High attrition rate																
Escallonia 'fradesii'	Escallonia	Limited use																
Escallonia 'compakta'	Compact Escallonia	Limited use																
Hibiscus rosa-sinensis	Hibiscus	Pest issues																
Leucophyllum species	Sage	Desert sites only																
Nerium oleander	Standard Oleander	Too large for most areas																
Accents / Grasses																		
Anigozanthos cultivars (A. flavidus)	Kangaroo Paw	Short lived, high attrition rate																
Dietes iridioides (vegeta)	African iris	Limited use																

Botanical	Common	Wucols Region 1	Wucols Region 2	Wucols Region 3	Wucols Region 4	Wucols Region 5	Wucols Region 6	Sunset Zones	Mature Height (Feet)	Mature Width (Feet)	Road Right-of-Way	Erosion Control / Slope ‡	Fuel Mod.(per F.D. approval) ‡	MSHCP Adjacent ‡	Water Quality / BioSwale ‡	Medians 14' Wide (median trees subject to review)	Medians 18' Wide (median trees subject to review)	Medians 28' Wide (median trees subject to review)
Helictotrichon sempervirens	Blue Oat Grass	Water sensitive																
Muhlenbergia species	Deer Grass	Limited use, short lived																
Phormium hybrids	New Zealand Flax Hybrids	Limited use, do not perform well																
Groundcover																		
Aptenia 'Red Apple'	Red Apple	Limited use																
Myoporum species	Myoporum	Limited use, not on slopes greater than 5'. No Myoporum 'Pacificum'.																
VINES																		
Campsis radicans	Common Trumpet Creeper	Fast growing, invasive																
Distictis buccinatoria	Blood Red Trumpet Vine	Fast growing, invasive																
Hedera canariensis	Algerian Ivy	Invasive, damaging to walls																
Hedera helix	English Ivy	Invasive, damaging to walls																
Macfadyena unguis-cati	Cat's Claw Vine	Fast growing, invasive																
Merremia aurea	Yellow Morning Glory	Fast growing, invasive																

Note: A wall attachment and establishment detail must be provided for all vines that are not "self climbing/attaching". Plant material adjacent to self climbing/attaching vines must be a minimum of 30" from base of vine upon installation.

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