APPENDIX 9.11

WILDFIRE TECHNICAL REPORTS

ACCEPTED DRAFT

Murrieta Hills
FIRE PROTECTION TECHNICAL REPORT
Plan No. SP 012-3164, TTM 35853

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EXECUTIVE SUMMARY

This Fire Protection Technical Report (FPTR) has been prepared for the Murrieta Hills Project (Proposed Project) which will be annexed into the City of Murrieta, Riverside County. This FPTR details measures for fire protection which meet or exceed the most recent Murrieta Fire Code or provides compensating measures resulting in same practical effect. The Proposed Project will be required to meet the applicable codes that are in place at time of construction, unless they are less restrictive than those identified herein or have been mitigated through alternative materials and methods. This FPTR provides analysis of the Proposed Project, its potential risk from wildfire, and its potential impact on the Murrieta Fire and Rescue (MFR). Further, it provides requirements, recommendations, and measures to reduce the risk and impacts to acceptable levels, as determined by the fire authority having jurisdiction.

This FPTR also identifies the fire risk associated with the Proposed Project's planned land uses, and identifies requirements for fuel modification, building design and construction and other pertinent development infrastructure criteria for fire protection. The primary focus of this FPTR is providing an implementable framework for suitable protection of the planned structures and the people living and utilizing them. Tasks completed in the preparation of this FPTR include data review, code review, site fire risk analysis, land use plan review, fire behavior modeling, and site specific recommendations.

Where possible, this FPTR incorporates principles of sustainability that are an important component of the Proposed Project. Preservation and conservation of biological resources, including native plant communities, energy and water, along with conservation and maintenance of the site's aesthetics, are important components of the Proposed Project. These project elements have been duly considered and integrated into this FPTR, where they do not lessen fire protection.

The Project site is approximately 972 acres, of which, approximately 325 acres are proposed for the development of a master-planned, residential community with the remaining 647 acres set aside as open space preserve. The Project is located in western Riverside County, north of Temecula, west of Wildomar, and south of Menifee. The Proposed Project will be built in three phases that include nine planning areas and will include single-family and multi-family residential, mixed-use, retail/commercial, park and recreation facilities, and related water, sewer, electrical and roadway infrastructure necessary within a planned community. First response fire and emergency medical services will be provided by Murrieta Fire and Rescue (MFR) from existing Station 4, which is capable of responding to the entire Proposed Project within five minutes travel time.

The structures in the Proposed Project will be built using ignition resistant materials per the most recent City Fire and Building Codes (Chapter 7A – focusing on structure ignition resistance from flame impingement and flying embers in areas designated high fire hazard areas) which are the amended California Fire and Building Codes. These features will be complemented by an improved water availability, capacity and delivery system; multiple fire department and resident ingress/egress roads; monitored defensible space/fuel modification; interior, automatic fire sprinkler systems in all structures, monitored interior sprinklers in applicable structures; and other fire safety measures that will provide properly equipped and maintained structures with a high level of fire ignition resistance. Commercial areas will be required to implement the latest fire and building codes specifically addressing the unique demands of large commercial structures.

The site fire risk analysis resulted in the determination that wildfire has occurred and will likely occur near the Project site again. However, the Project will include ignition resistant landscapes and structures and firefighters will have needed defensible space and access with implementation of specified measures. Based on modeling and analysis of the Project site to assess its unique fire risk and fire behavior, it was determined that the California and Murrieta standard of 100-foot-wide fuel modification zones (FMZs) would be suitable to protect this Proposed Project from the anticipated wildfire that may burn in the fuels adjacent to the developed areas. However, as a requirement exceeding measure, the FMZs will be extended an additional 50 feet, for 150 feet total on the Project's perimeter, providing even greater setback and defensible space that is from 3 ½ to 6 times the modeled wildfire flame lengths, assisting firefighter protection of this community. In addition, perimeter lot rear yards will be considered part of the FMZ areas, providing another 20 feet, on average and increasing FMZs to 170 feet wide.

Project internal areas will include customized FMZs based on the internal open space areas. FMZs, when properly maintained, have proven effective at minimizing structure ignition from direct flame impingement or radiant heat, especially for structures built to the latest ignition resistant codes like the Proposed Project's. The FMZs will be maintained in perpetuity by a funded Community Facilities District or Homeowner's Association (or similarly funded entity), and inspected annually by a 3rd party with a copy of the report sent to MFR, ensuring that the required fuel reduction work occurs. The HOA will enforce the CC&Rs, eliminating the potential for accumulated fuels (both vegetation and personal items) that may lead to wildfire structure ignition.

In addition to the code-required fire protection features, the Project provides additional measures including heat-deflecting landscape walls at strategic locations along evacuation roads and adjacent an internal open space/park to augment the fuel modification zones and to provide additional protection.

Two planning areas, PAs 3 and 7, have been the focus of agency questions whether dead end road lengths are consistent with CCR Title 14 – Fire Safe Regulations. These areas include looped roadways that provide at least two access points, but they are located relatively proximal to the other. As a conservative approach, this FPTR details additional Project specific measures that are provided to mitigate the potential for impaired evacuation from these two planning areas.

ES.1 Findings for Maximum Dead-End Road Length

The proposed project includes lot sizes less than one acre, and therefore would be subject to the maximum dead end road length of 800 feet (SRA Fire Safe Regulations, Title 14, Section 1273.09 – Dead End Roads). Depending on how the dead end road length standard is interpreted, the 800 feet distance may be exceeded for two planning areas, nos. 3 and 7. However, both development areas include two ways in and out and no lot is more than 800 feet to a secondary route. Additionally, there are mitigating factors related to the type of development and the measures provided by the project to address the potential dead end road length issue.

Gov Code 66474.02

California Government Code Section 6647.02 requires project tentative maps located in state responsibility areas (SRA) or very high fire hazard severity zones must make findings before they can be approved. The findings are:

1. A finding supported by substantial evidence in the record that the design and location of each lot in the subdivision, and the subdivision as a whole, are consistent with any applicable regulations adopted by the State Board of Forestry and Fire Protection pursuant to Sections 4290 and 4291 of the Public Resources Code.
2. A finding supported by substantial evidence in the record that structural fire protection and suppression services will be available for the subdivision through any of the following entities:
    a. A county, city, special district, political subdivision of the state, or another entity organized solely to provide fire protection services that is monitored and funded by a county or other public entity.
    b. The Department of Forestry and Fire Protection by contract entered into pursuant to Section 4133, 4142, or 4144 of the Public Resources Code.
3. A finding that to the extent practicable, ingress and egress for the subdivision meets the regulations regarding road standards for fire equipment access adopted pursuant to Section 4290 of the Public Resources Code and any applicable local ordinance.

The applicable codes all include language pertaining to exceptions or modifications when a code requirement cannot be strictly complied with, but a project can be implemented to meet the intent of the code.

The California Code of Regulations, Title 14 Natural Resources, SRA Fire Safe Regulations define the basic wildland fire protection standards of the California Board of Forestry. These regulations apply to projects building in SRA. Title 14 allows exceptions to its standards:

> "Upon request by the applicant, exceptions to standards within this subchapter or local jurisdiction certified ordinances may be allowed by the inspection entity listed in 14 CCR 1270.05, where the exceptions provide the same overall practical effect as these regulations towards providing defensible space. Exceptions granted by the inspection entity listed in 14 CCR 1270.05 shall be made on a case-by-case basis only. Exceptions granted by the inspection entity listed in 14 CCR 1270.05 shall be forwarded to the appropriate CAL FIRE Unit Office that administers SRA fire protection in that county and shall be retained on file at the Unit Office."

The 2016 California Fire Code section [A] 104.8 Modifications also authorizes modifications to the fire code in certain circumstances. This section of the fire code states:

> "Whenever there are practical difficulties involved in carrying out the provisions of this code, the fire code official shall have the authority to grant modifications for individual cases, provided the fire code official shall first find that special individual reasons make the strict letter of this code impracticable and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered into the files of the department of fire prevention."

Based on this FPTR's Project requirements and the allowance in the applicable codes for exceptions, the fire code official (MFR Fire Marshal) grants a modification for the proposed project based on the findings listed below.

The modification for the Project's perceived dead end road length exceedance is based on the project's provision for multiple egress routes through ignition resistant landscapes (buffered from wildland fuel exposure), wider than required fuel modification zones, ongoing maintenance of roads and landscapes, short distances that must be travelled to urban areas, several site-specific measures exceeding code requirements and the ability to temporarily refuge firefighters and residents on site when considered safer than evacuating.

The following special individual reasons make compliance with the strict letter of the Fire Code with respect to maximum dead-end road lengths impractical:

1. Topographical challenges would make construction of a road to the north from the western portion of the project or to the south from the western portion of the project very difficult and biologically impactful. The potential for these routes was analyzed and determined to be infeasible and unnecessary with proposed measures.
2. Open Space Preserve limits and environmental issues constrain the ability to grade a road to the north or south from the western portion of the project without significant impacts to biological habitat.
3. Even if a road to the north or south from the western portion of the project could be constructed, which as noted, would be very difficult, the road would extend through wildland fuels and may not be appropriate for evacuation during a wildland fire that would likely be originating in the open space areas. It is considered safer to evacuate through the Murrieta Hills Community with its ignition resistant and fire adapted landscapes.
4. The project includes multiple egress points to the north with access to north and east-bound existing roads and one egress way to the south.

The intent and purpose of the Fire Code is to protect the public health and safety. The modification for the proposed project complies with this intent for the following reasons:

1. This FPTR includes a plan for early evacuation or as a contingency option when evacuation is considered by responding law and fire officials to be more dangerous, temporarily refuging on site when a wildfire is in the vicinity of the community and could threaten evacuating residents.
2. The plan for evacuation would not interfere with the ability of surrounding property owners to evacuate from their premises because the project would be evacuated only when there is sufficient time to do so safely.
3. The Murrieta Hills Community's HOA will annually hire a 3rd party, qualified FMZ inspector to the approval of the MFR to verify that the FMZs are maintained in a condition that would not facilitate fire spread. This would also reduce the impact of landscaping hanging into the roadways by reviewing size and location of trees and maintaining 13-foot, 6-inch vertical clearance for fire apparatus. This will also eliminate the possibility that the project's landscape, over time, loses its functionality for reducing and minimizing fire intensity and providing defensible space throughout the project. A copy of the report would be sent to MFR, ensuring that the required fuel reduction work occurs. The HOA will enforce the CC&Rs, eliminating the potential for accumulated fuels (both vegetation and

personal items) that may lead to wildfire structure ignition. Any non-compliant item(s) found during the 3rd party inspection will be required to be complied with immediately.

This modification will not lessen health, life, and fire safety requirements for the following reasons. Note that this list includes both required measures (included in the latest Residential, Building and Fire Codes) as well as measures that are above and beyond the requirements. It is important to include both because at one time, many of the now required measures were once used as mitigation for justifying code modifications. These requirements are important components of the ignition restiveness of new communities.

1. The buildings at the project site will use ignition resistant construction materials based on the latest Building and Fire Codes, including:
    - Exterior ignition-resistant walls (required)
    - Class A-rated roof assemblies (required)
    - Dual pane, tempered windows (required)
    - Ember resistant vents and other openings (not required – baffled vents above code requirement)
    - Eave ember protection (required)
    - Underfloor and appendage protection (required)
    - Weep screed protection (required)
2. Interior, automatic fire sprinkler systems will be provided in all structures (required)
3. Customized fuel modification zones exceeding the standard will be provided around all structures. These zones are based on fire behavior modeling and site conditions and are 3 ½ to 6 times as wide as the modeled adjacent flame lengths. (not required by code, however offered as mitigation as part of acceptance of this plan)
4. Roadside fuel modification adjacent all project roads of 20 feet on either side and the southerly McElwain Road including 80 foot wide fuel modification on the westerly side. (code exceeding along McElwain Road)
5. Heat deflecting landscape walls of masonry construction that are six feet in height are provided along strategic perimeter roadways and for interior structures adjacent internal open space. The walls 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 fuels are lighter, like this project site, the fuels are quickly consumed, heat and flame are absorbed or deflected by the wall, and the fuel

burns out within a short (30 second to two minute) time frame (Quarles and Beall 2002). Vegetation located from the retaining wall to the structure will be limited to irrigated, low volume plantings that will not readily facilitate fire spread. Walls like these have proven to deflect heat and airborne embers and are consistent with NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3 and International Urban Wildland Interface Code (2009, Appendix G). NFPA 1144, A.5.1.3.3 states: "Noncombustible walls and barriers are effective for deflecting radiant heat and windblown embers from structures." These walls and barriers are usually constructed of noncombustible materials (concrete block, bricks, stone, and stucco). See Page 45 for me detail about heat deflecting walls. (not required by code, however offered as mitigation as part of acceptance of this plan – code exceeding where they are determined to provide protection for nearby structures)

6. The project HOA will annually hire a 3rd party wildland urban interface (WUI) inspector to certify that the fuel modification zones meet the intent of the FPTR. A copy of the inspection report will be provided to the MFR each year. Any non-compliant item(s) found during the 3rd party inspection will be required to be complied with immediately. (not required by code, however offered as mitigation as part of acceptance of this plan)
7. Funding will be provided through a Community Facilities District (CFD) or similar funding mechanism to maintain the project's fire protection features such as fuel modification zones in perpetuity. (required)
8. The project will provide funding to MFR and they will, as part of their Cooperative Wildland Fire Agreement, fund the protection for the approximately 647 acres of Open Space areas of the Project. The project recognizes that funding costs may change over time. (not required by code, however offered as mitigation as part of acceptance of this plan)
9. The Community HOA will include an outreach and educational role to coordinate with MFR and to establish a local Fire Safe Council, oversee landscape committee enforcement of fire safe landscaping, ensure fire safety measures detailed in this FPTR have been implemented, educate residents on and prepare community-wide "Ready, Set, Go!" plans (not required by code, however offered as mitigation as part of acceptance of this plan)
10. The project has prepared an evacuation plan and will include a public outreach and education focus. (not required by code, however offered as mitigation as part of acceptance of this plan)
11. The project will follow "Ready, Set, Go!" and use a conservative threshold for early evacuations. (not required by code, however offered as mitigation as part of acceptance of this plan)

12. The project will enable a contingency plan for temporarily refuging residents on site if considered safer than evacuation. (not required by code, but possible in new master planned communities built to fire hardened requirements)

Additional analysis and reasoning informing the conclusions of this FTPR are provided in the following sections. The Findings for same practical effect are discussed in more detail in Section 9.

1 INTRODUCTION

This FPTR has been prepared for the Murrieta Hills community (Proposed Project). The purpose of this FPTR is to evaluate the potential impacts resulting from wildland fire hazards and identify measures necessary to adequately mitigate those risks to a level consistent with City of Murrieta (City) thresholds. Additionally, this plan generates and memorializes the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which will be the Murrieta Fire and Rescue (MFR) upon annexation. The project area is currently located in the unincorporated area of Riverside County, surrounded by the Cities of Menifee, Wildomar, and Murrieta. The Project is currently located within a State Responsibility Area (SRA) within CAL FIRE/Riverside County Fire Department's jurisdiction. However, upon annexation to the City of Murrieta, it is expected that structural fire protection and medical emergency response will be provided by MFR while CAL FIRE will continue to provide wildland fire protection. Requirements and recommendations detailed in this FPTR are based on site-specific characteristics, applicable code requirements, and incorporate input from the project applicant, City planners, and the FAHJ.

As part of the assessment, this plan has considered, amongst other site factors, the property location, topography (including saddles, chutes, chimneys), geology, combustible vegetation (fuel types), unique climatic conditions, fire behavior and fire history. The plan addresses water supply, access (including secondary access where applicable), structural ignitability and fire resistive building features, fire protection systems and equipment, potential impacts to existing emergency services, mitigating fire protection features, defensible space, and vegetation management. This FPTR identifies and prioritizes areas for fuel reduction treatments and recommends the types and methods of treatment that will protect the community and essential infrastructure. This FPTR also recommends measures that property owners and the homeowner's association (HOA) will take to reduce the probability of structure ignition throughout the area addressed by the plan for the life of the project.

The following tasks were performed toward completion of this plan:

- Gather site specific climate, terrain, and fuel data;
- Process and analyze the data using the latest 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 wildfire risk associated with the Proposed Project and site;

- Collect site photographs and map fuel conditions using 200-scale aerial images. Field observations were utilized to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this FPTR. Refer to Appendix A for site photographs of existing site conditions.
- Meet with City fire planners to discuss and resolve identified issues.
- Prepare this FPTR detailing how fire risk will be mitigated through a system of fuel modification, structural ignition resistance enhancements, and fire protection delivery system upgrades.

1.1 Intent

The intent of this FPTR is to provide fire planning guidance and requirements for reducing fire risk and demand for fire protection services associated with the Proposed Project. Further, this FPTR provides justifications for a perceived non-conformance with the fire code regarding dead-end road length and substantiates measures considered to mitigate the non-conformance. To that end, the fire protection "system" detailed in this FPTR includes a 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 safety system that will be enacted by the Proposed Project has proven through real-life wildfire encroachment examples throughout southern California to significantly reduce the fire risk associated with this type of Proposed Project.

1.2 Applicable Codes/Existing Regulations

This FPTR demonstrates that the Proposed Project will be in compliance with applicable portions of the City of Murrieta Municipal Code (Chapter 15.24 – Fire Code) and MFR's applicable ordinances[1] or the current fire and building codes at the time of tentative map approval. The Proposed Project will also be consistent with:

- California Public Resources Code 4290 and 4291
- 2016 California Code of Regulations, Title 14 Fire Safe Regulations
- California Government Code 66474.02
- 2016 California Building Code, Chapter 7A
- 2016 California Fire Code, Chapter 49

[1] The last adoption of the Fire Code (2001 edition) with no appendices or amendments to the adoption by MFR was in November 2002 (Ordinance No. 268-02).

- 2016 California Residential Code, Section 237 as adopted by City of Murrieta.

Chapter 7A of the California Building Code focuses primarily on preventing ember penetration into homes, a leading cause of structure loss from wildfires. Thus, it is an important component of the requirements of this FPTR given the Proposed Project's wildland urban interface location which is predominately within an area statutorily designated a Very High Fire Hazard Severity Zone (VHFHSZ) by CAL FIRE (CAL FIRE FRAP 2016), County of Riverside, and City of Murrieta (City of Murrieta 2016). A small portion of the northeast corner of the property is designated as a Moderate Fire Hazard Severity Zone.

Fire hazard designations are based on topography, vegetation, and weather, amongst other factors with more hazardous sites including steep terrain, unmaintained fuels/vegetation, and wildland urban interface locations. Projects situated in VHFHSZ's require fire hazard analysis and application of fire protection measures that have been developed to specifically result in defensible communities in these WUI locations. As described in this FPTR, the Proposed Project will meet all applicable Code requirements for building in higher fire hazard areas, or meet the intent of the code through the application of site-specific fire protection measures.

These codes have been developed through decades of after fire structure "save" and "loss" evaluations to determine what causes buildings to ignite or avoid ignition 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 2016 California Building Code (Chapter 7A, Section 701A Scope, Purpose and Application).

1.3 Proposed Project Summary

1.3.1 Location

The Proposed Project Site is located in unincorporated Riverside County and is bordered by the City of Menifee to the north, the City of Murrieta to the east and south, and the City of Wildomar to the west (Figure 1). More specifically, the approximately 974-acre Murrieta Hills site lies west of Interstate 215 (I-215) and east of Fromer Lane, between Keller Road and Bottle Brush Road. The Proposed Project Site is within Assessor's Parcel Numbers (APN) 384-190-001, 384-190-003, 384-190-005 through 014, 384-200-006 through 010, 384-200-012 through 017, 384-210-001, and 384-210-003. The property is in Sections 27 and 28, Township 6 South, Range 3 West, as shown on the U.S. Geological Survey 7.5-minute Murrieta and Romoland quadrangle maps as depicted in Figure 2.

Regional access to the Murrieta Hills site is provided by I-215 with an existing interchange at Scott Road, one mile to the north, and Clinton Keith Road, roughly two miles to the south. Plans are in

place to provide a new exit off I-215 at Keller Road as another route to the recently constructed hospital east of the I-215. Keller Road provides the main access to the Proposed Project, while Zeiders Road and Gloria Road provide available secondary access although neither road currently fully complies with the applicable Fire Code road requirements.

1.3.2 Current Site and Vicinity Land Use

The site is currently comprised of undeveloped land that has been subject to disturbances from various sources including, a former nursery, off-road vehicles, mountain bikers, trash dumping, and a significant target shooting area. The site is vegetated by chaparral, coastal sage scrub, native oaks and ornamental trees, and riparian scrub. Approximately 97 acres in the northeast portion of the property has been frequently disked for dry-crop farming; e.g., growing wheat and oats. The site contains remnants of an olive orchard, vacated nursery, adjacent windbreak, and old structure. Numerous dirt roads traversing the property were observed throughout the site. Portions of the site are within the Western Riverside County Multiple Species Habitat Conservation Plan (MSCHP) and are subject to an existing Habitat Evaluation and Acquisition Negotiation Strategy (HANS) agreement for the preservation of on-site natural habitat (JPR 09-02017-01; RC14010216; Sub-unit 2, Lower Sedco Hills, Sun City/Menifee Plan, criteria Cell Group C).

Two water reservoir tanks that are owned by Eastern Municipal Water District (EMWD) are located along the Proposed Project's northern boundary. Gas and electric will be provided by Southern California Gas Company and Southern California Edison from existing facilities adjacent to the Proposed Project Site. The project would be served by EMWD from existing water and sewer facilities that are within Keller Road or connect to Zeiders Road, respectively.

Existing land uses surrounding the Proposed Project Site vary from highly urbanized areas to open space lands. Development is primarily concentrated in the Community of Greer Ranch to the south and a new development to the east which includes Loma Linda University Medical Center and MFR Fire Station No. 4. Semi-rural residential lots and agricultural land uses occur to the north. To the west of the Proposed Project Site is undeveloped land that extends to Wildomar-Sedco Hills.

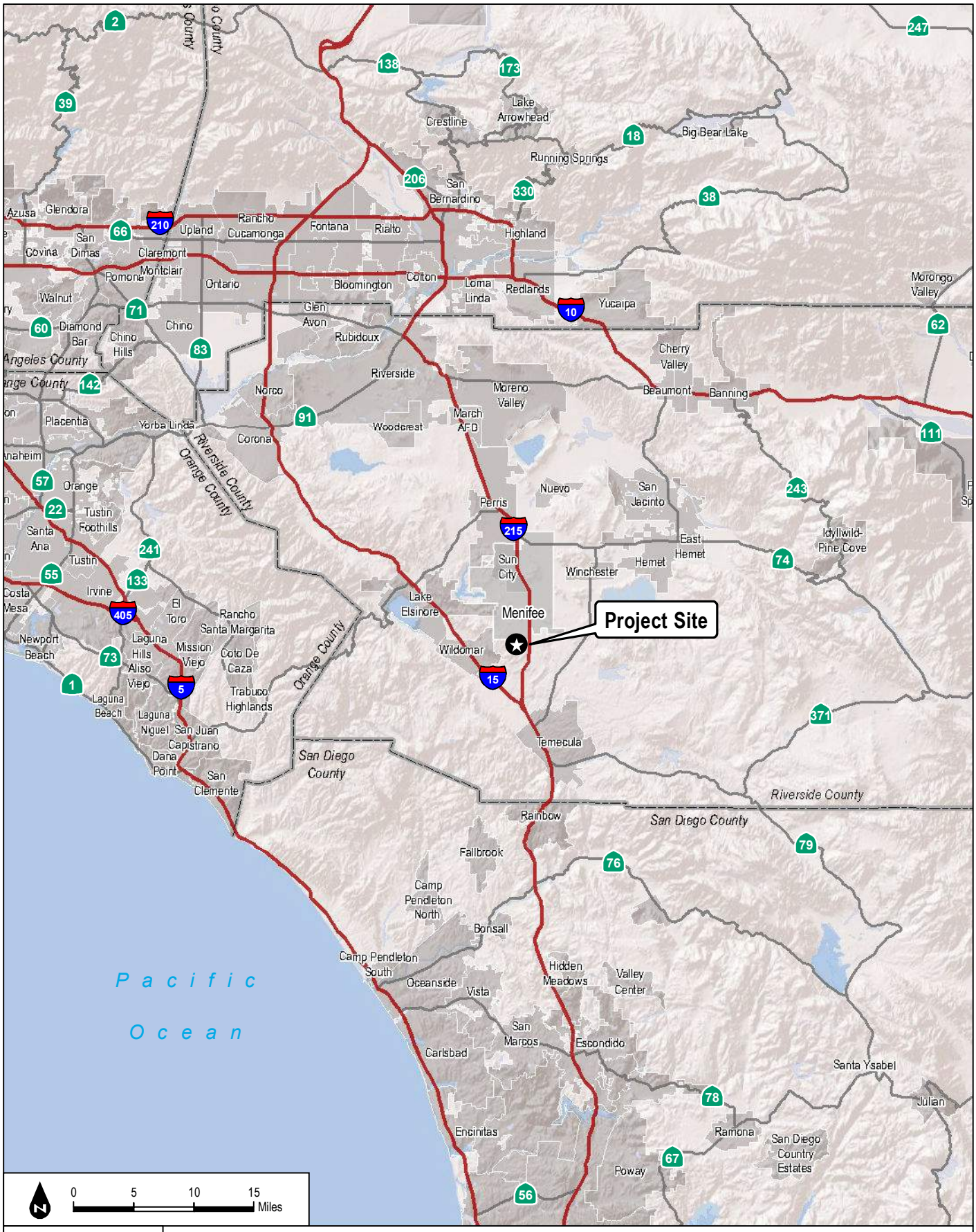

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FIGURE 1
Regional Map

Murrieta Hills Fire Protection Plan

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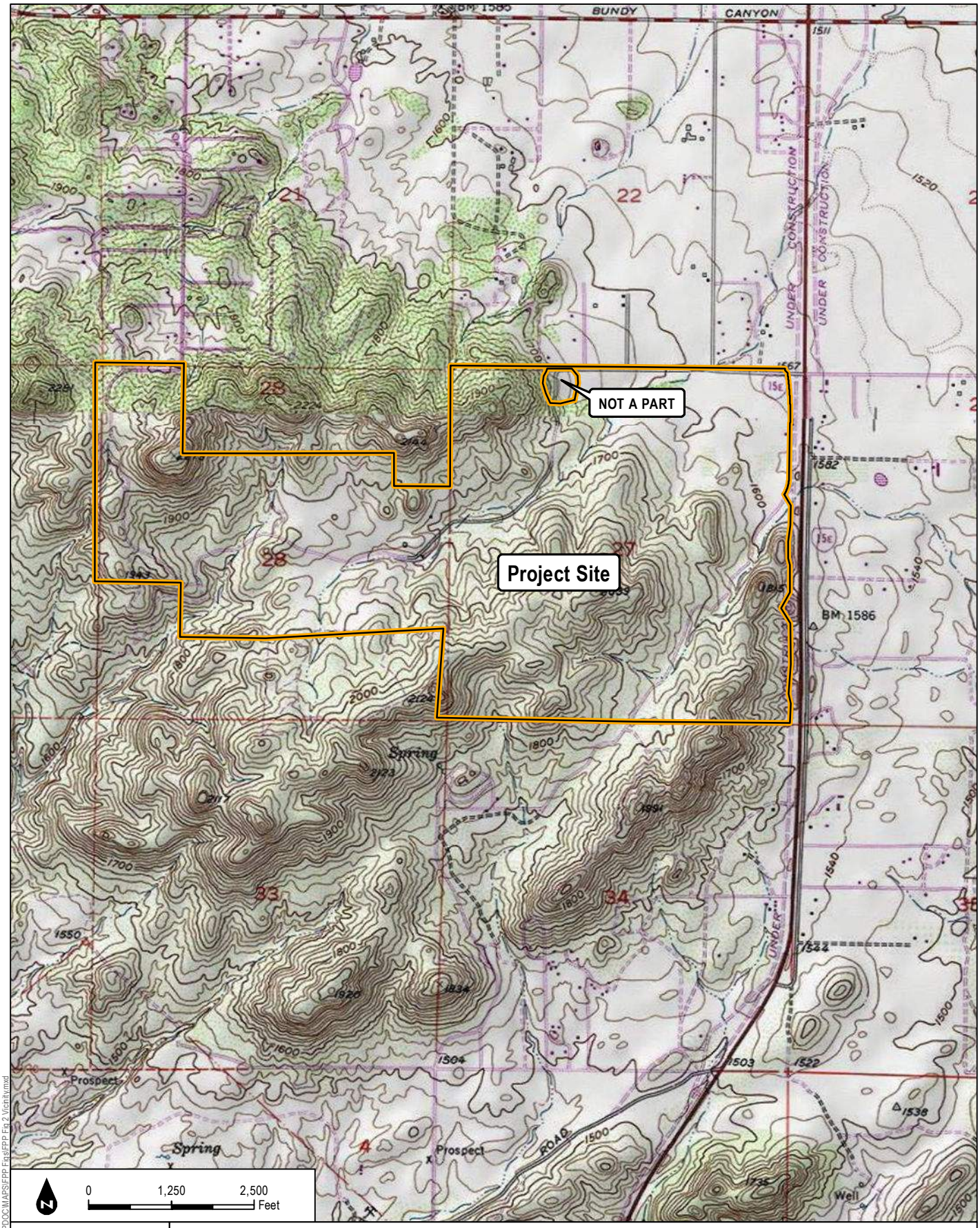

SOURCE: USGS 7.5 Minute Series Topographic Maps

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FIGURE 2
Vicinity Map

Murrieta Hills Fire Protection Plan

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1.3.3 Project Description

The Murrieta Hills project is an amendment to the original Murrieta Hills Specific Plan No. SPM-No. 4, approved by the City of Murrieta on April 18, 1995 under resolution No. 95-353. This resolution allows for single family residential, multi-family residential, commercial, and natural and improved open space on approximately 972 acres. The conceptual development plan for the site is depicted in Figure 3. The Murrieta Hills project also includes construction of a public park, up to three water supply tanks, water quality basins, on-site public streets, and off-site road improvements, as warranted. Primary access into the project would be provided from Keller Road along the northern project boundary. Within the project site, access would be provided by a series of internal roadways connected to Keller Road. The extension of McElwain Road that is proposed parallel to, and just west of I-215, along with future improvements to Keller Road, would connect the existing terminus north of Linnel Lane to Keller Road at Zeiders Road.

The Murrieta Hills project proposes annexation of the development area into the City of Murrieta. An amendment to the City's General Plan is proposed to change the existing land use to Specific Plan Area. A zone change is also proposed to rezone the property to appropriate City of Murrieta Zoning Districts. Table 1 provides a breakdown of the proposed uses with approximate acreages (acreages rounded to the nearest whole number; actual acreages may change slightly as part of final design and engineering):

Table 1
Murrieta Hills Proposed Land Use

Proposed Land Use	Approximate Acreage	No. of Units
Single-Family Detached Residential	198	497
Executive Homes (Future Phase) 10,000 S.F. Average Lot Size	50	60
Multi-Family Residential	13	193
Community Commercial	18	--
Natural Open Space (Excluding HANS)	39	--
Open Space: HANS MSHCP	613	--
Major Roadways (including Caltrans ROW and Street ROW)	41	--
Total	**972**	**750**

Source: Murrieta Hills Specific Plan Amendment, Pulte/BP Murrieta Hills LLC

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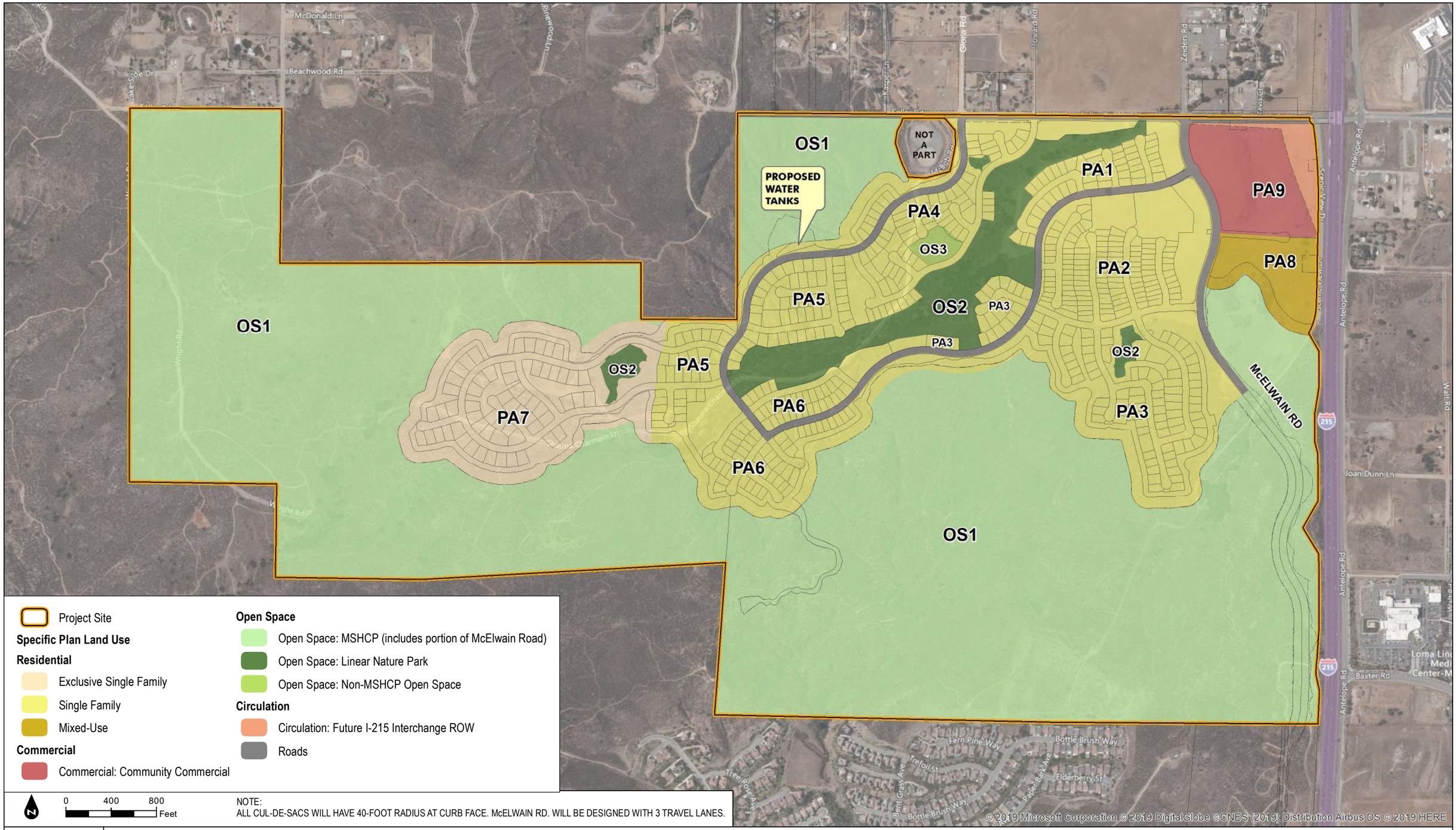

SOURCE: AERIAL-BING MAPPING SERVICE; SPECIFIC PLAN LAND USE-MICHAEL BAKER INTERNATIONAL 2019

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FIGURE 3

Murrieta Hills Project Site Plan

Murrieta Hills Fire Protection Plan

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2 PROPOSED PROJECT SITE RISK ANALYSIS

2.1 Field Assessment

Following extensive review of available digital site information, including topography, vegetation polygons, fire history, aerial imagery and the Proposed Project's site plan, Dudek fire protection planners conducted a field assessment of the Proposed Project on May 3, 2016, in order to confirm digital data and fill any identified data gaps. Dudek's site assessment was aided by Project biologists who conducted a comprehensive vegetation mapping assignment of the Murrieta Hills property over the course of several years 2005, 2006, 2007, 2008, 2012, 2013, and 2016 (Helix 2016).

Among the field tasks that were completed are:

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

Site photographs were collected (Appendix A: Representative Photographs) and fuel conditions were mapped on aerial images. Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the requirements provided in this FPTR.

2.2 Site Characteristics and Fire Environment

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread upslope. Terrain that forms a funneling effect, such as chimneys, chute's or saddle's on the landscape can result in especially intense fire behavior. Conversely, flat terrain tends to have little effect on fire spread, resulting in fires that are driven by vegetation and/or wind.

The Project's surrounding topography is varied with prominent knolls and large rock outcroppings throughout the Paloma and Menifee Valleys and steeper hillsides to the west and south of the Proposed Project site. The Murrieta Hills property is characterized by three primary drainages and their associated sub-drainages. The first enters the property midway along its southern boundary and drains to the northeast, exiting the property in its northeast corner and into Paloma and Menifee Valleys. The

second enters the property at the eastern end of its southern boundary and also drains to the northeast, exiting the property in its northeast corner. The third enters the property in the western portion of its northern boundary and drains to the southwest, exiting the property in its southwest corner.

On-site elevations range from 1,568 feet above mean sea level (AMSL) in the northeast corner of the property to 2,278 feet AMSL near the western edge of the property. Slopes range from flat in the northeast corner of the property to moderate and steep along the hillsides and ridges that separate the site's drainages. Large rock outcroppings commonly occur throughout the property's slopes. As previously stated, slope is important relative to wildfire, because steeper slopes typically facilitate more rapid fire spread upslope. In the case of the Proposed Project Site, the steeper slopes are primarily within the areas designated as permanent open space preserve and will not be developed. The site's steeper slopes ascend away from the developed areas of the Proposed Project (vs. situations where development occurs at top of slope). The slopes and drainages are generally in alignment with the extreme Santa Ana wind events, which can influence fire spread by creating wind-driven fires, especially when moving upslope.

2.2.2 Climate

Southwestern Riverside County and the Project Area are influenced by the Pacific Ocean and are frequently under the influence of a seasonal, migratory subtropical high pressure cell over the ocean known as the "Pacific High" (WRCC 2017a). This high pressure cell provides the project site, as all of Southern California, with a Mediterranean climate, characterized by warm summers, mild winters, moderate afternoon breezes and generally fair weather with infrequent rainfall. The climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Santa Ana winds (WRCC 2017) The average high temperature for the project area during fire season is approximately 74.6°F, with summer and early fall months (June–October) reaching up to 91.1°F average high temperature. Almost all of the annual rainfall comes from fringes of mid-latitude storms from late November to early April. Rainfall in the project area varies considerably, measuring on average, 12.5 inches per year. The prevailing wind is an on-shore flow from the Pacific Ocean. Prevailing winds arriving in Temecula, Murrieta, Wildomar, and Menifee from the Pacific Ocean typically cannot make it to these locations because the Santa Ana Mountains pose a significant barrier. Instead, marine air travels into these areas through a low spot in the Santa Ana Mountains near Rainbow Pass (This is just about where the U.S. Border Patrol Station is located on Interstate 15 (I-15)). Likewise, Pacific Ocean air traverses coastal areas in Los Angeles and Orange Counties, then moves east and southeast along Santa Ana Canyon, where State Route 91 is presently located. As a result, the northwest winds converge with the southwest winds in a line near Lake Elsinore that extends east across Sun City and Perris and onto the San Jacinto Valley. This meeting of winds is called the Elsinore Convergence Zone (WeatherCurrent.com 2016; NOAA 2007) Daytime winds average approximately 6-8 miles per

hour (mph) as air moves regionally onshore from the cool Pacific Ocean to the warm Mojave Desert (Murrieta Highlands Specific Plan –SPM-1,92-154).

Additionally, during the summer months, an unusual combination of topography, proximity to the Pacific Ocean 20 to 25 miles to the west, and the hot, dry inland valleys and deserts to the east cause marine air flow eastward over the crest of the Santa Ana Mountains and down through the northeast-facing canyons and drainages of the Elsinore Front. This phenomenon is known as the Elsinore effect. It meant that during the heat of summer, fires burning in the afternoon along the Elsinore Front would typically burn down slope, contrary to most normal fire behavior for that time of day. This down slope movement of air would generally subside around sundown as the valleys and desert areas to the east cooled, at which time fires would reverse direction and begin to burn upslope (Lee 2015). This condition is not applicable at the Proposed Project Site and is therefore not a fire influencer for the fire behavior modeling conducted herein.

The Santa Ana winds do impact the Project site, and hot, dry (Santa Ana) winds, which typically occur in the fall and are usually from the northeast, can gust to 50 miles per hour (mph) or higher. The Santa Ana winds are due to the pressure gradient between high pressure in the plateaus of the Great Basin and lower pressure gradient over the Pacific Ocean (California Climate Change Center 2016). Drying vegetation (fuel moisture of less than 5% for 1-hour fuels is possible) during the summer months becomes fuel available to advancing flames should an ignition occur. Extreme conditions, used in fire modeling for this site, include 92°F temperatures (average high temperature) in summer and maximum sustained winds of up to 46 mph during the fall (See Section 3.1.2.2. Fire Modeling Inputs-Weather). Relative humidity of 12% or less is possible during fire season.

2.2.3 Vegetation

The Murrieta Hills property supports a variety of vegetation types that are relatively common in southwest Riverside County. Fire history data indicates that most of the site's vegetation has not burned for over 100 years. Therefore, the structure of the dominant plant communities is tall, dense, with relatively few species compared to vegetation composition in the period following wildfire. A total of 14 vegetation and land cover types were delineated on site by the project biologist (Helix 2016), which includes one non-fuel land cover type (urban/developed areas). These vegetation and land cover types were verified by Dudek fire protection planners and assigned a fuel model for use during site fire behavior modeling. The vegetation and land cover types and their coverage totals as well as corresponding fuel models are summarized in Table 2.

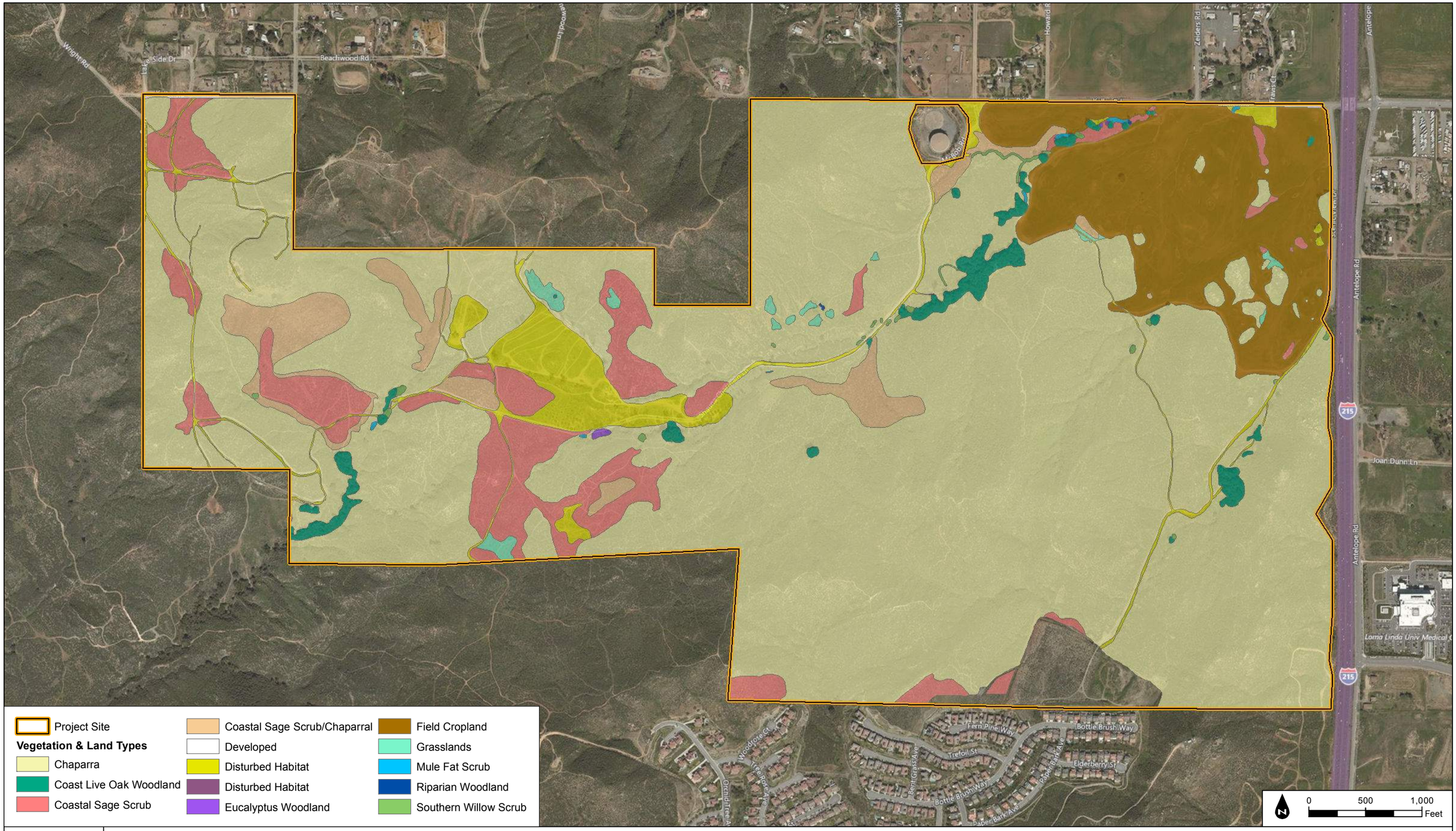
Table 2
Murrieta Hills Project Vegetation and Land Cover Types

Vegetation/Land Cover Type[1]	On-site Acreage[1]	Off-site Acreage[1]	Total On-site Percent Coverage	Corresponding Fuel Model/Canopy Cover Value
Non-Native Communities and Land Covers				
Agriculture	96.7	--	9.9%	GR1/0
Eucalyptus Woodland	0.3	--	0.0 (<0.1%)	TL2/3
Developed	1.6	1.6	0.2%	91/0
Disturbed Habitat	55.3	4.7	5.7%	GR1 or SH1/0
Non-native Grassland	4.4	1.1	0.5%	GR4/0
Upland Scrub and Chaparral				
Chaparral	701.7	9.9	72.1%	SH5/0
Coastal Sage Scrub/Chaparral	32	--	3.3%	SH2/0
Riversidean Sage Scrub	66.6	1.2	6.8%	SH2/0
Woodland				
Coast Live Oak Woodland	13.01	--	01.3%	GS2/3
Riparian				
Mulefat Scrub	0.47	0.03	0.0 (<0.1%)	SH2/0
Southern Cottonwood-Willow Riparian Woodland	0.07	--	0.0 (<0.1%)	SH2/3
Southern Willow Scrub	1.54	--	0.2%	TL8/0
Total	**973.69**	**18.5**	**100.00%**	**N/A**

Source: Helix Environmental Planning 2016
1 Acreage is rounded to nearest 0.1 except for wetland and Riparian/Riverine habitat that are rounded to the nearest 0.01.

As presented, the majority of the vegetation on the Project site is associated chaparral (72.1%), while the remainder of the vegetation cover types individually amount to 1% or less of the total project site, except agriculture (9.9%), coastal sage scrub (6.8%), coastal sage scrub-chaparral ecotone (3.3%), disturbed habitat (5.7%), and oak woodlands (1.3%). The project's vegetation and land coverage is illustrated in Figure 4 and briefly described below.

Project changes to site vegetation types will be associated with grading for development pads and roads and installation of fuel modification areas in strategic locations at the perimeter of the developed project site and around the interior semi-open space/oak-riparian corridor. Site-adjacent vegetation (off-site and adjacent the fuel modification zones) is important relative to wildfire as some vegetation, such as brush and grassland habitats are highly flammable while other vegetation, such as riparian communities or forest understory, are less flammable due to their higher plant moisture content, fuel arrangement, ignition resistance, compact structure, and available shading from overstory tree canopies. The effect vegetation has on fire behavior is substantial and understanding vegetation dynamics is important for developing an effective fuel modification plan as discussed in Section 2.2.4.



SOURCES: AERIAL-BING MAPPING SERVICE; VEGETATION-HUNSAKER 2016

DUDEK

FIGURE 4

Vegetation and Land Cover Types Map

Murrieta Hills Fire Protection Plan

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2.2.3.1 Site Vegetation and Land Cover Type Descriptions

The following descriptions are adapted from the site's General Biological Resources Assessment Report (Helix 2016).

Non-Native Communities and Land Covers

Agriculture. Agriculture lands supporting active or historical agricultural operation. On site, dry-crop farming is limited to the disked area in the northeast portion of the site. The disked area in the northeast contains scattered patches with trees or rock outcroppings that are not disked. Trees in this area include coast live oak (*Quercus agrifolia*), Peruvian pepper (*Schinus molle*), and eucalyptus (*Eucalyptus* spp.).

Developed. Developed areas support no native vegetation and may be additionally characterized by the presence of man-made structures, such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species occur. Developed areas on site include a water reservoir in the northeast and several small structures located near the center of the property.

Disturbed Habitat. This category consists of permanently disturbed land cover consisting of small areas, including unimproved roads that cross the property, off-highway vehicle trails, areas of dumped trash, and the nursery located near the center of the property, which consists of mostly non-native weed species. Additionally, a large area on the southeast portion of the site was cleared of vegetation in 1990 and then cleared again and graded circa 2005. Plant species observed in the disturbed areas include eucalyptus, Peruvian pepper, athel tamarisk (*Tamarix aphylla*), and olive (*Olea europaea*). The disturbed areas also contain bromes, mustards, and various other plant species similar to the non-native grassland and sage scrub understory.

Eucalyptus Woodland. Scattered eucalyptus trees exist on the site, concentrated in the central-western portion of the site and adjacent to the abandoned farm house. Due to the eucalyptus allopathic nature, this community typically has little to no understory and is composed entirely of eucalyptus trees and leaf litter.

Non-Native Grassland. Non-native grassland is a dense to sparse cover of annual grasses, often associated with numerous species of showy-flowered native annual forbs. This vegetative type include oats (*Avena* spp.), red brome (*Bromus madritensis* ssp. *rubens*), ripgut (*B. diandrus*), ryegrass (*Lolium* sp.), short-pod mustard (*Hirschfeldia incana*), and other mustards (*Brassica* spp.). The non-native grassland is primarily located in small patches or islands throughout the site in a mosaic with sage scrub and chaparral.

Upland Scrub and Chaparral

Chaparral. The property is largely covered by chaparral that is dominated by chamise (*Adenostoma fasciculatum*) with patches dominated by hoary-leaved ceanothus (*Ceanothus crassifolius*), and black sage (S*alvia mellifera*). The chamise and mixed chaparrals dominate the property, with a small patch of red shank (*Adenostoma sparsifolium*) chaparral occurring near the center of the property. Other plants found in the chaparral habitat type include laurel sumac (*Malosma laurina*), blue elderberry (*Sambucus nigra mexicana*), California buckwheat (*Eriogonum fasciculatum*), and scrub oak (*Quercus berberidifolia*).

Coastal Sage Scrub/Chaparral Ecotone. Coastal sage scrub/Chaparral ecotone is a community that comprises species of each of these communities (described herein) but does not specifically match either community. The ecotone community occurs where the two communities are adjacent to one another. This can also be a transitional community as sage scrub gradually is maturing in a chaparral habitat.

Riversidean Sage Scrub. Riversidean sage scrub is located in small patches of sage scrub primarily around disturbed areas. On site, it is dominated by low-growing shrubs, primarily California buckwheat (*Eriogonum fasciculatum*), but also includes California sagebrush (*Artemisia californica*), deerweed (*Acmispon glauber*), bromes, and oats). The sage scrub occurs in a mosaic with chaparral. Having a large quantity of non-native grasses and forbs, disturbed Riversidean sage scrub areas occur in a mosaic with the Riversidean sage scrub areas.

Woodland

Coast Live Oak Woodland. Coast live oak woodland is an evergreen oak woodland dominated by coast live oak. On site, coast live oak woodland primarily occurs near the banks of largest drainages within the Salt and Warm Springs creeks watersheds with others scattered in upland areas or within the bottoms of sub-drainages. Plants species observed in this community on site include coast live oak, laurel sumac, poison oak (*Toxicodendron diversilobum*), bromes, giant wildrye (*Leymus condensatus*), and spiny redberry (*Rhamnus crocea*).

Riparian

Mulefat Scrub. On the Murrieta Hills site, mulefat scrub (*Baccharis salicifolia*) is scattered in a few small pockets along the drainages. Plants species observed in the mulefat scrub on site include mulefat, arroyo willow (*Salix lasiolepis*), willow herb (*Epilobium* spp.), and salt cedar (*Tamarix ramosissima*).

Southern Cottonwood-Willow Riparian Woodland. Southern cottonwood-willow riparian forest is a tall, open, broad-leafed winter-deciduous riparian forest dominated by western cottonwood (*Populus fremontii*) and willows (*Salix* spp.). This habitat occurs on the site in two small patches in drainages.

Southern Willow Scrub. This vegetation type is fairly typical of Holland's (1986) Southern willow scrub, described as "dense, broad-leafed, winter-deciduous stands of trees dominated by shrubby willows in association with mulefat." This habitat occurs on loose, sandy, or fine gravelly alluvium deposited near stream channels during flood flows. This vegetation is scattered among the many drainages located throughout the property. Plant species observed on site in the willow scrub include arroyo willow, Goodding's black willow (*S. gooddingii*), mulefat, salt cedar, and curly dock (*Rumex crispus*).

2.2.4 Vegetation Dynamics

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

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

Conditions adjacent to the Proposed Project's footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are currently classified as moderate to high fuel loads due to the higher percentage of chamise chaparral and coastal sage scrub fuels. This climax vegetation state (undisturbed brush stands that are not disturbed for an extended period of 50 years or more) includes more uniform and dense stands of sage scrub-chaparral fuels, which were employed for a conservative modeling approach to represent worst-case (i.e., max fuels) wildfire scenarios around the perimeter of the Project.

2.2.5 Fire History

Fire history is an important component of the site-specific FPTR. Fire history data provides valuable information regarding fire spread, fire frequency, most vulnerable areas, and significant ignition sources, amongst others. Appendix B, *Fire History Exhibit,* illustrates fire history for the Murrieta Hills project vicinity. As presented, there have been 38 fires recorded by fire agencies in the vicinity (within five miles) of the project site, primarily associated with natural open spaces to the west and north. Recorded wildfires within five miles range from four acres to 31,447 (Turner Fire-1980) acres. As suggested by the data, a significant fire history exists in the vicinity of the project site, but most wildfires are contained by initial or extended attack.

Consistent with results throughout large portions of Southern California, Santa Ana wind driven fires present the highest risk of non-containment by initial or extended attack and the occurrence of a major incident. Fire history data was obtained from CAL FIRE's Fire and Resource Assessment Program (FRAP 2015) database. The 38 fires in this five mile area over the last 105 years is not considered a high number for Riverside County. On average, CAL FIRE-Riverside County Fire Department annually responds to approximately 650 wildfires (RCFD 2015) within the County.

Based on fire history, wildfire risk for the project site is associated primarily with a Santa Ana wind-driven wildfire burning or spotting onto the site from the east or north, although a fire approaching from the west during more typical on-shore weather patterns is possible. The Elsinore Effect or convergence is primarily noted along the Santa Ana Mountains to the west of the project area and would not be anticipated to have a significant impact on fire behavior at the Project site, but may result in wind shifts from on-shore to off-shore at or shortly after sunset.

Note that once the Proposed Project is built out, the fire spread patterns will be modified in the project area, as the Proposed Project will represent a large fuel break of maintained and irrigated landscapes, which fire may encroach upon and burn around, but will not burn through the valley and drainages with the same spread patterns as it has in the past.

3 ANTICIPATED FIRE BEHAVIOR

3.1 Fire Behavior Modeling

Following site evaluation and vegetative fuels data collection efforts, fire behavior modeling was conducted to document the type and intensity of fire that would be expected on the project site given characteristic site features including topography, vegetation, and weather. Dudek utilized the BehavePlus software package. BehavePlus provides a tabular output. BehavePlus was utilized for five specific fire scenarios.

3.1.1 Modeling History

Fire behavior modeling has been used by researchers for approximately 50 years to predict how a fire will move through a given landscape (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, 5.0.5, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, BehavePlus 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.

3.1.2 Modeling Inputs

3.1.2.1 Fuels

The seven fuel characteristics help define the 13 standard fire behavior fuel models (Anderson 1982) and the more recent custom fuel models developed for Southern California (Weise and Regelbrugge 1997). According to the model classifications, fuel models used for fire behavior

modeling (BehavePlus) have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface-to-volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in modeling efforts. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

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

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

- Non-burnable Models NB1, NB2, NB3, NB8, NB9
- Grass Models GR1 through GR9
- Grass shrub Models GS1 through GS4
- Shrub Models SH1 through SH9
- Timber understory Models TU1 through TU5
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4.

For the BehavePlus analyses, fuel model assignments were based on observed field conditions.

3.1.2.2 Weather

Historical weather data for the region was utilized in determining appropriate fire behavior modeling inputs for the MHSPA project site. For this analysis, 50th and 97th percentile fuel moisture and wind speed values were derived from Remote Automated Weather Stations (RAWS) data and utilized in the fire behavior modeling efforts conducted in support of this FPTR. Data from two nearby RAWS was utilized for modeling fire behavior on the Proposed Project site, including the El Cariso RAWS (located to the west-northwest), and the Santa Rosa Plateau RAWS (located to the south).

To determine weather-related modeling inputs, RAWS fuel moisture and wind speed data were processed utilizing the FireFamily Plus software package, assuming typical (50th percentile) and atypical (97th percentile) weather conditions. Data from the two RAWS was combined into a Special Interest Group (SIG) in the FireFamily Plus software, with data from each station being weighted equally. The project SIG was evaluated from August 1 through November 30 for each year between 1986 and 2015 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1986 and 2015 for 50th percentile weather conditions. Data derived from this analysis included 50th and 97th percentile values for 1-hour, 1-hour, and 100-hour fuel moistures, live herbaceous moisture, live woody moisture, and 20-foot sustained wind speed. The weather data was also evaluated to determine the maximum sustained wind speed for the 97th percentile weather scenario.

The fuel moisture and wind speed data resulting from the FireFamily Plus analysis was used in the BehavePlus fire behavior modeling efforts conducted in support of this FPTR. These variable were input directly into the BehavePlus software for that analysis effort. Table 3 presents the wind and fuel moisture input variables in the BehavePlus modeling efforts.

Table 3
Fuel Moisture and Wind Inputs

Variable	Summer Weather Condition (50th Percentile)n	Peak Weather Condition (97th Percentile)
1h Moisture	5%	2%
10h Moisture	6%	3%
100h Moisture	10%	5%
Live Herbaceous Moisture	60%	30%
Live Woody Moisture	87%	59%
20-foot Wind Speed (upslope/downslope)	10 mph (40 mph maximum)	17 mph (46 mph maximum)
Wind Direction	Uphill and downhill	Uphill

3.1.2.3 Slope

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. For the BehavePlus analysis, slope values were measured from site topographic maps at the locations of each modeling scenario, and ranged in value between 10% to 25%.

3.1.3 BehavePlus Analysis

An analysis utilizing the BehavePlus software package was conducted to evaluate fire behavior variables and. To objectively predict flame lengths, intensities, and spread rates, the BehavePlus 5.0.5 fire behavior modeling system (Andrews, Bevins, and Seli 2004) was used in five modeling scenarios and incorporated observed fuel types representing the dominant on-site vegetation (chaparral (Fuel Model SH5)), off-site vegetation on vacant lots to the northeast (short grasslands (fuel model GR4)), measured slope gradients, and wind and fuel moisture values derived from RAWS data sets. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent the site. The fire modeling inputs and results of the BehavePlus analysis are presented in Table 4.

Table 4
BehavePlus Fire Behavior Modeling Inputs and Results

Fire Scenario[3,4]	Flame Length (feet)[1]	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: Chaparral on east-facing, 25% slope				
Offshore Wind (97th Percentile -46 mph max. wind speed)	43.4	20,581	6.3	2.3
Scenario 2: Grassland[2] on flat terrain, <5% slope				
Offshore Wind (97th Percentile -46 mph max. wind speed)	36.6	14,181	14.9	2.0
Scenario 3: Chaparral on South- and West- facing, 15% slopes				
On shore Wind (50th Percentile- 40 mph max. wind speed)	26.6	7,085	3.0	1.5
Scenario 4: Post-Development (97th Percentile Weather)				
Fuel Modification Zone 1 (Fuel Model 8)	3.0	63	<1.0	0.3
Fuel Modification Zone 2 (Fuel Model SH1)	10.3	900	1.4	0.8
Scenario 5: Post-Development (50th Percentile Weather)				
Fuel Modification Zone 1 (Fuel Model 8)	1.8	21	0.07	0.2
Fuel Modification Zone 2 (Fuel Model SH1)	0.07	3	0.02	0.1

Notes:

1 Flame lengths are based on the use of customized shrub fuel models developed for Southern California chaparral that more accurately portrays how chaparral on this site would burn compared to the over-predicting SH-4 model, which has been shown to produce more aggressive fire behavior than typically occurs within Southern California fuels (Weise and Regelbrugge 1997).

2 A moderate fuel load, grass model was assigned to the undeveloped properties to the northeast of the Proposed Project site.

3 Results indicate expected fire behavior for maximum sustained winds. The average, daily sustained on-shore winds was calculated at 10 mph.

4 Results indicate expected fire behavior for maximum sustained winds. The average, daily sustained off-shore winds was calculated at 17 mph.

As presented in Table 4, wildfire behavior in non-treated chaparral, presented as a Fuel Model SH5, represents the most extreme conditions, varying with different wind speeds. In this case, flame lengths can be expected to reach up to approximately 27 feet with 40 mph maximum wind

speeds (summer condition) and 43 feet with 46 mph wind speeds (Peak condition). Spread rates for chaparral fuel bed range from 3.0 mph (summer) to 6.3 mph (Peak). Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 1.5 miles (summer condition) to 2.3 miles (Peak condition). Chaparral fuel types can burn intensely and can produce a fast-spreading wildland fire under strong, dry wind patterns as shown for fire scenario 1. This fuel type can also produce higher flame lengths under extreme weather, but does not typically ignite or spread as quickly as light, flashy grass fuels as presented in scenario 2. Table 5 provides information pertaining to interpretation of flame length and its relationship with fireline intensity.

Table 5
Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4–8	100–500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8–11	500–1,000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1,000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

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

It should be noted that the results presented in Table 4 depict values based on inputs to the BehavePlus software. While there may be pockets of fuels that would produce larger flame lengths, the average flame lengths across the site's chaparral are predicted to be 43 feet. The model used in this analysis for chaparral is a more recent model designed by the U.S. Forest Service to more accurately represent Southern California chaparral than the original Fuel Model 4 (Anderson 1982). Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. 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.

3.1.4 Fire Behavior Summary

3.1.4.1 Existing Condition

As presented in Figure 5, wildfire behavior in non-treated heavy chaparral, modeled as a SH5, varies based on timing of fire. A worst case summer fire (Summer condition) would result in a fire

spreading at a rate of up to 3.0 miles per hour (mph). During a fall fire with gusty Santa Ana (Peak condition) winds and low fuel moisture, fire is expected to be fast moving between 6 and 15 mph with highest flame length values reaching approximately 43 feet in specific portions of the property. Spotting is projected to occur up to nearly 1.5 mile during a summer fire and nearly 2.3 miles during a fall fire.

3.1.4.2 Post-development Condition

As presented in Table 4, Dudek conducted modeling of the site for post-FMZ fuel reduction recommendations for this project. Fuel modification includes establishment of irrigated and thinned zones on the periphery of the project's neighborhoods and roads as well as interior landscape requirements. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the developed landscape (Fuel Model 0), Fuel Modification Zone 1(Fuel Model 8), and Fuel Modification Zone 2 (Fuel Model SH1). Fuel model assignments for all other areas remained the same as those classified for the existing condition. As depicted, the fire intensity and flame lengths in untreated, biological open space areas would remain the same. Conversely, the FMZ areas experience a significant reduction in flame length and intensity. The 43.4-foot tall flames predicted during pre-treatment modeling during extreme weather conditions are reduced to 10.3 feet tall at the outer edges of the FMZ and to 3.0 feet by the time the inner portions of the FMZ are reached. During summer weather conditions, a fire approaching from the west would be reduced from 27-foot tall flames to less than 2.0 feet tall with low fire intensity due to the higher live and dead fuel moisture contents.

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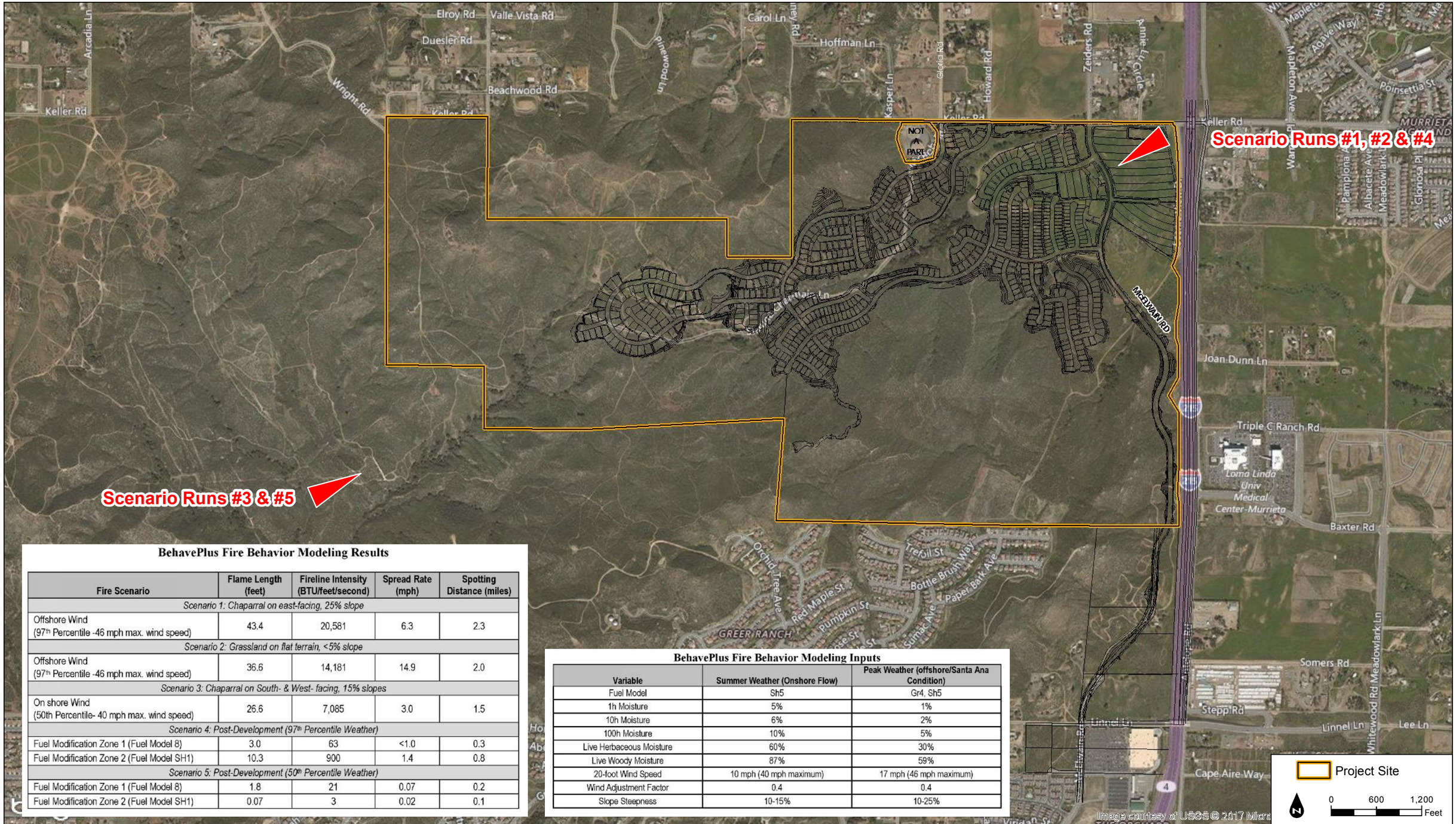

BehavePlus Fire Behavior Modeling Results

Fire Scenario	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: Chaparral on east-facing, 25% slope				
Offshore Wind (97th Percentile -46 mph max. wind speed)	43.4	20,581	6.3	2.3
Scenario 2: Grassland on flat terrain, <5% slope				
Offshore Wind (97th Percentile -46 mph max. wind speed)	36.6	14,181	14.9	2.0
Scenario 3: Chaparral on South- & West- facing, 15% slopes				
On shore Wind (50th Percentile- 40 mph max. wind speed)	26.6	7,085	3.0	1.5
Scenario 4: Post-Development (97th Percentile Weather)				
Fuel Modification Zone 1 (Fuel Model 8)	3.0	63	<1.0	0.3
Fuel Modification Zone 2 (Fuel Model SH1)	10.3	900	1.4	0.8
Scenario 5: Post-Development (50th Percentile Weather)				
Fuel Modification Zone 1 (Fuel Model 8)	1.8	21	0.07	0.2
Fuel Modification Zone 2 (Fuel Model SH1)	0.07	3	0.02	0.1

BehavePlus Fire Behavior Modeling Inputs

Variable	Summer Weather (Onshore Flow)	Peak Weather (offshore/Santa Ana Condition)
Fuel Model	Sh5	Gr4, Sh5
1h Moisture	5%	1%
10h Moisture	6%	2%
100h Moisture	10%	5%
Live Herbaceous Moisture	60%	30%
Live Woody Moisture	87%	59%
20-foot Wind Speed	10 mph (40 mph maximum)	17 mph (46 mph maximum)
Wind Adjustment Factor	0.4	0.4
Slope Steepness	10-15%	10-25%

SOURCE: AERIAL-BING MAPPING SERVICE; SITE PLAN-STANTEC 2017

FIGURE 5

BehavePlus Fire Behavior Exhibit

DUDEK

Murrieta Hills Fire Protection Plan

Document Path: Z:\Projects\j960801\MAPDOC\MAPS\FPP Figs\FPP Fig 5 BehavePlus Fire Behavior.mxd

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4 EMERGENCY RESPONSE AND SERVICE

4.1 Fire Facilities

The Proposed Project area is currently located within SRA and, therefore, fire service for the existing Project site is provided by CAL FIRE- Riverside County Fire Department. The project proponent proposes an annexation of the entire project site into the City of Murrieta. Once finalized, MFR will provide initial response to the Proposed Project site. MFR operates four Fire Stations, all of which could respond to a fire or medical emergency at the site. Table 6 presents a summary of the location, equipment, staffing levels, maximum travel distance, and calculated travel time for the four MFR stations. Travel distances are derived from Google road data while travel times are calculated applying the nationally recognized RAND Corporation formula used by the Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard: (T=0.65 + 1.7 D, where T= time and D = distance). The response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time.

Table 6
Murrieta Fire and Rescue Responding Stations Summary

Fire Station	Address	Apparatus	Staffing (Total/Station)	Maximum Travel Distance	Travel Time**
1	41825 Juniper Street Murrieta, California 92562	Ladder Truck, Water Tender, Technical Rescue and Lighting and Air	4	8.6 miles*	15 min
2	40060 California Oaks Road Murrieta, California 92562	Type I and III engines***	4	5.6 miles*	10 min
3	39985 Whitewood Road Murrieta, California 92563	Type I and III engines***	4	8.2 miles*	15 min
4	28155 Baxter Road Murrieta, California 92563	Type I and III engines***	4	1.4 miles*	3 min
5	38391 Vineyard Parkway Murrieta, California 92562	Type I and III engines***	4	9.5 miles*	17 min

* Distance measured to Project entrance located on the intersection of Keller Road Road and Zieders Road at the northeastern edge of property.
** Assumes speeds calculated with the ISO drive time formula, where Time = 0.65+1.7(Distance).
*** Engines are cross-staffed by the station engine company

The closest existing MFR Fire Station is FS 4, located at 28155 Baxter Road, which staffs a minimum of three personnel 24 hours per day/seven days per week and houses one Paramedic Engine (Type I) and a cross-staffed, Type III brush engine. Additionally, secondary response could be provided from Riverside County Fire Department (RCFD) Fire Station #68 and other MFR Fire Stations, as needed.

The City has a signed automatic aid agreement on first alarm or greater with the Riverside County Fire Department. The City is also part of the State of California Master Mutual Aid Agreement. In the event of a major fire, Murrieta is provided one outside resource and that is CAL FIRE. If the Master Mutual Aid Agreement is activated, then other outside resources can be brought into the City, as needed.

The Cooperative Wilfire Agreement between MFR and CAL FIRE that would be funded by the Project to MFR would enable MFR to call on CAL FIRE's full response weight. Vegetation fires require special apparatus and depending on weather and fuel conditions, may require a significant response.

Full MFR response:

- Five Type III engines
- One Battalion Chief
- One mutual aid CAL FIRE Engine to cover City

Full CAL FIRE response:

- Five to 10 Type III engines (depending on dispatch level)
- Battalion Chief
- Three fixed-wing aircraft (two tankers and air attack)
- Dozer
- Two hand crews
- Two helicopters

Additional resources would be available if needed.

4.2 Emergency Response Travel Time Coverage

The City of Murrieta bases its response time goals on the National Fire Protection Association (NFPA) 1710, and the Insurance Service Office. The City's General Plan indicates a response time of 5.5 minutes travel time plus 1 minute for turnout (dispatch time is not addressed). MRF conducted its own analysis and created target response times for various call types with structure fire call responses within 10 minutes (90 seconds dispatch, 60 seconds turnout, 7 minutes and 30 seconds travel, for 90% of the calls and for emergency medical calls, the total response time to 90% of calls is 8 minutes 30 seconds (Community Risk Assessment – Standards of Cover). Station 4 response time goal currently based on NFPA 1710 and complies 56.1% of the time.

Response travel time to the project site's furthest destination within the backbone streets from MFR fire station 4 would be approximately 4 minutes when the engine is in quarters. The overall response time in Station 4's primary response area is 9 minutes 54 seconds at 90 percentile. Therefore, the Proposed Project achieves the City's target response time standard for first arriving, but it is acknowledged that the actual response time may be longer, according to average response times.

4.3 Estimated Calls and Demand for Service from the Project

The MFR documented the following average emergency calls since

- 2014 – 7,734 calls
- 2015 – 8,326 calls
- 2016 – 8,470 calls
- 2017 – 9,072 calls
- 2018 – 9,456 calls
- 2019 – Jan through May – 4,228 – projected 2019 calls - over 10,000

The realized call volume has increased annually as the City population of approximately 115,000[2] increases (City of Murrieta 2016a). The call volume of 87 per 1,000 persons per year is higher than the national average of approximately 82 calls. For this analysis, the higher (most conservative) per capita call volume of roughly 0.87 will be used for MFR as a conservative approach. Based on the proposed development plans, the project's estimated 2,230 residents (assumes an average of 3.2 occupants per residence for this type of community (US Census Bureau 2017) and 697 households) would generate roughly 201 calls per year (0.6 calls per day), most of which are expected to be medical-related calls (approximately 80% of total emergency incidents).

Station 4 call response levels have been increasing as the City's population increases:

- 2014 – 865 calls
- 2015 – 991 calls
- 2016 – 1,012 calls
- 2017 – 1224 calls
- 2018 – 1,510 calls

[2] City population total number is from California Department of Finance Demographic Research Unit 2015.

Service level requirements are not expected to be significantly impacted with the increase of 201 calls per year (0.6 call per day) for a station (MFR Station 4) that currently responds to roughly 4.1 calls per day (1,510 calls per year (City of Murrieta 2016a), 125 calls per month, 29 calls per week), but would contribute to a cumulative, but mitigated response impact as the number of calls grows to levels that would require additional resources. However, this level is not reached by adding the Murrieta Hills project calls alone. The next closest MFR fire station is station 2. This MFR station responded to 2,805 calls in 2015, or approximately 7.6 calls per day. For reference, a station that responds to 5 calls per day in an urban setting is considered average and 10 calls per day is considered busy. Therefore, the addition of less than one call per day to Station 4's current low call volume is not expected to cause a significant decline in Station 4's level of service.

Development impact fees for Murrieta Hills and other projects that contribute to the cumulative impact on fire service help to support additional resources and provide funding for capital costs necessary to continue providing service at acceptable levels. The Murrieta Hills FPTR also assists MFR by providing a layered, redundant fire protection approach. The FPTR helps ensure that fire events that occur in or around the project are not facilitated toward structures and provides proactive mitigation of catastrophic scenarios, reducing overall impacts and strain on the MFR resources. The requirements described in this FPTR are intended to aid firefighting personnel and minimize the demand placed on the existing emergency service system.

5 FIRE SAFETY REQUIREMENTS – DEFENSIBLE SPACE, INFRASTRUCTURE, AND BUILDING IGNITION RESISTANCE

5.1 Fuel Modification Zones

5.1.1 Zones and Permitted Vegetation

As indicated in preceding sections of this FPTR, an important component of a fire protection system is the fuel modification area. Fuel modification areas are designed to gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the community's WUI exposed structures, as well as around all structures including:

- All residential and other occupancies
- Open space areas within the community
- Emergency Access Roads or Streets

Based on the modeled extreme weather flame lengths for the Proposed Project, average wildfire flame lengths are projected to be approximately 43 feet high. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient fuel modification zone (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 fire fighters with room to work and minimizing structure ignition. For this Proposed Project, the FMZ width outside the lot line is 150 feet, a minimum of 3 ½ to almost six times the modeled flame lengths based on the fuel type represented adjacent to the site.

The following FMZ requirements are proposed for the Project's landscapes. In addition to the FMZs meeting defensible space requirements, the entire project landscape will be restricted to lower flammability plant materials as part of a fire adapted community approach. The FMZs and landscaped areas are presented graphically in Appendix D. In addition, the proposed Project plant palette and the Murrieta example acceptable plant list and fuel modification notes are provided in Appendix E.

Fuel Modification Zone Definition

FMZs are designed to provide buffers at perimeter areas of projects or between structures and wildland fuels to reduce fuel available to wildfire. These zones reduce fire spread rates and fire intensity by providing thinned fuels in the outer zones and irrigated, selective plantings in the inner zones. FMZs are typically 100 feet wide. The total width of the majority of FMZs for the Proposed Project will be up to 70% wider when rear yards are included. The rear yards will be considered

FMZs, averaging an additional 20 feet, extending total fuel modification zone to 170 feet in most cases. Therefore, a typical landscape/fuel modification installation for the Proposed Project's perimeter lots exceeds the 100 foot standard, consisting of up to 170-foot wide fuel management area from the structure extending outward towards preserve areas.

This extended FMZ is important as a mitigation for potential wildfire impacts as research has indicated that the closer a fire is to a structure, the higher the level of heat exposure (Cohen 2000). However, studies indicate that given certain assumptions (e.g., 10 meters (33 feet) of low fuel landscape, no open windows), wildfire does not spread to homes unless the fuel and heat requirements (of the home) are sufficient for ignition and continued combustion (Cohen 1995, Alexander et al. 1998). Construction materials and methods can prevent or minimize ignitions. Similar case studies indicate that with nonflammable roofs and vegetation modification from 10–18 meters (roughly 33–60 feet) in southern California fires, 85–95% of the homes survived (Howard et al. 1973, Foote and Gilless 1996).

These results support Cohen's (2000) findings that if a community's homes have a sufficiently low home ignitability (i.e., 2013 California Building Code), the community can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to homes/structures at the residential location without excessive wildland fuel reduction and focusing the effort in the areas nearest the structures. Cohen's (1995) studies 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 Model (SIAM) 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 may require about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). This study utilized bare wood, which is more combustible than the ignition resistant exterior walls for structures built today. The Proposed Project has provided up to 150 feet (plus 20 foot rear yards) for modeled 43 foot tall flame lengths. Therefore, the additional buffer allows for the possibility that longer flame lengths occur and still provides wider setbacks than scientific studies indicate would be necessary.

Other means of providing setback include obstacles, including steep terrain, rock outcroppings, and non-combustible walls, which can block or deflect all or part of the radiation and heat, thus making narrower fuel modification distances possible. This approach is utilized on the Proposed Project interior areas adjacent to the oak-riparian corridor to reduce habitat impacts while providing adequate protection.

As indicated in this report, the FMZs and additional fire protection measures proposed for this project provide a wildfire buffer, and exceed the standard 100 foot wide, two zone standard by up to 70%. The zones are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), site topography and vegetation, extreme and typical weather, position of structures

on pads, position of roadways, adjacent fuels, fire history, current vs. proposed land use, neighboring communities relative to the proposed project, and type of construction. The fire intensity research conducted by Cohen (1995), Cohen and Butler (1996), and Cohen and Saveland (1997) and Tran et al. (1992) supports the fuel modification proposed for this project.

General Criteria

- All plant material listed on the Murrieta Hills "Fire Protection Technical Report" prohibited plant list (Appendix F) will be prohibited within any Fuel Modification Zone.
- 50%–70% of the overall fuel modification areas shall be planted with deep rooting (below the first 6 inches) plant material, where feasible, based on soil type.
- Debris and trimmings produced by thinning and pruning shall be removed from the site, except for larger woody debris that may be chipped and left on site for weed and erosion control.
- There shall be no hedging of shrubs so that they do not form a means of rapidly transmitting fire from the native growth to the structures.
- Shrubs may be planted in clusters not exceeding a total of 400 square feet (i.e., 20-feet x 20-feet; 10-feet x 30-feet, etc.)
- A distance of no less than the width of the largest shrub's mature spread shall be provided between each shrub cluster.
- Non-shrub avenues devoid of shrubs shall be included to provide a clear access route from toe of slope to top of slope and shall be a minimum width of 6 feet and spaced a distance of 200 linear feet on center.
- Where shrubs or other plants are planted underneath trees, the mature tree canopy shall be maintained at a height no less than three times the shrub or other plant's mature height to break up any fire laddering[3] effect.
- Expanses of native or naturalized grasses shall be cut to within 2 inches in height prior to the end of growing season in April or May.
- Individual clumps of grass can be maintained year-round up to twenty-four inches in height when they are isolated from other fuels or where necessary to stabilize soil and prevent erosion.
- Debris and trimmings produced by thinning and pruning of vegetation shall be removed from the site.

[3] Plant material that can carry a fire burning in low-growing vegetation to taller vegetation is called ladder fuel. Examples of ladder fuels include low-lying tree branches and shrubs, climbing vines, and tree-form shrubs underneath the canopy of a large tree.

Zone 1A- Setback Zone

Zone 1A – Definition

Zone 1A is the first 20 feet (rear yard) from the structure to the lot line for those lots adjacent to natural open space around or within the development footprint. This area will be included in the overall site reduced fuel zones. Homeowners will be responsible for ensuring that rear-yard landscaping is compliant with this FPTR. The project's HOA will include a landscape committee to review and approve landscape plans and provide ongoing education to homeowners regarding fire adapted landscape maintenance.

Zone 1

Zone 1 – Definition:

All public and private areas located between the lot line and 50 feet outward. These areas may be located on public slopes, private open-space lots, public streets, and/or private yards, as defined in the landscape fuel modification exhibit.

Some perimeter lots receive extended Zone 1 FMZs on the manufactured slope or internal common area landscaping. These FMZs exceed the code requirement by providing low fuel densities and irrigated fuels for distances exceeding a standard 50 feet.

Zone 1 – Specific Criteria:

- All highly flammable native vegetation, especially plant species found on the Prohibited List (Appendix F) shall be removed. This zone will be planted with drought-tolerant, less flammable plants from the Murrieta Hills Project Plant Palette (Appendix E), which was prepared by VDLA Landscape Architects and reviewed/revised by the authors of this FPTR.
- This irrigated high plant moisture zone shall be serviced by a permanent automatic irrigation system that keeps plants hydrated via efficient drip irrigation, as defined by the Project's Landscape Architect.
- No tree limb encroachment within 10 feet of a structure or chimney, including outside barbecues or fireplaces.
- Minimum 10 feet between tree canopies.
- Tree maintenance includes limbing-up (canopy raising) 8 feet or one-third the height of a mature tree.

- Additional trees (excluding prohibited or highly flammable species) may be planted as parkway trees on single loaded streets.
- 75% of all groundcover and sprawling vine masses shall be limited to a maximum height of 18 inches.
- 25% of all groundcover and sprawling vine masses may reach a maximum height of 24 inches.
- Ground covers must be of high-leaf moisture content, per accepted industry standards.
- Shrubs shall be less than 2 feet tall, with minimum 5-foot centers, on average.
- Randomly placed approved succulent type plant material may exceed the height requirements, provided that they are spaced in groups of no more than three and a minimum of five feet, on average away from described "clear access routes" and neighboring plantings.
- Vegetation/Landscape Plans shall be in compliance with this FPTR and approved by the City of Murrieta Planning Department.

Zone 2

Zone 2 – Definition

All public and private areas located between the outside edge of Zone 1 and 100 feet outward. These areas may be located on public slopes, private open-space lots, public streets, and/or private yards, as defined in the landscape fuel modification exhibit.

Zone 2 – Specific Criteria

- Represents a 50% thinning zone – 50% less fuel than on adjacent unmaintained preserve areas. Zone 2 areas will include removal of dead/dying vegetation, exotics, and plant species listed on the prohibited plant list. Removal of these components will result in 50% thinning of the existing fuels. As necessary to meet the 50% thinning objective, other plants will be removed to create a mosaic of vegetation with adequate spacing and discontinuity. Large shrubs shall not be cut back hard or hedge them into unnatural shapes.
- All manufactured slopes within this area shall be serviced by a temporary, aboveground automatic irrigation system which will be turned off once the plantings are established, but will remain in place.
- Trees may be located within this zone, provided that they are planted in clusters of no more than three. A minimum distance of no less than 20 feet shall be maintained between the tree cluster's mature canopies. The trees will be limbed up to maintain vertical separation from understory shrubs.

- Only those trees on the Project Plant List (Appendix E) and/or those approved by the biologist shall be allowed within this zone.
- A person or contractor knowledgeable about the use and maintenance of California native plants should oversee the selection, thinning, and pruning.
- 75% of all groundcover and sprawling vine masses shall be limited to a maximum height of 36 inches.
- 25% of all groundcover and sprawling vine masses may reach a maximum height of 48 inches.
- Randomly placed approved succulent type plant material may exceed the height requirements, provided that they are spaced in groups of no more than three.
- Single specimen native shrubs, exclusive of chamise and sage, may be retained, on 20-foot centers.

5.1.2 FMZ Augmentation

Internal Oak-Dominated Open Space

As depicted in Appendix D, lots adjacent to the internal oak riparian drainage open space will receive additional measures, including heat deflecting walls and dual-tempered pane windows. In addition, the potential severity of a wildfire within this project-internal open space park will be minimized through ongoing fuel treatments. The area will be maintained as an FMZ through annual maintenance of non-jurisdictional areas so that vegetation does not exceed a height of four inches. There are limited areas within this open space that are jurisdictionally protected by California Department of Fish and Wildlife and will be left unmaintained. All of these areas are beyond 150 feet from adjacent structures. Additionally, should mortality of oaks and or willow trees occur in these jurisdictional areas, from drought, insect, disease or other factors, they will be removed or chipped on site to avoid the accumulation of dead fuels.

The preserved woodland vegetation on site includes variable, density oak canopy that will be maintained in a park-like condition with raised canopies (outside the jurisdictional area) and removal of understory ladder fuels. Fire behavior modeling conducted for this project indicates that fires in the oak woodlands would result in roughly 15-foot flame lengths under summer conditions (in the ground fuels beneath and adjacent the oaks). Extreme conditions may result in crown fire, where tree crowns burn and create more intense fire and longer flame lengths. As indicated in this report, the post-treatment flame lengths and fire intensity will be much lower due to removal of specific species and maintenance of fuel heights at a four inch height for the majority of the internal open space.

The thinned FMZs and additional fire protection measures proposed for this area provide equivalent wildfire buffer, but are not standard zones. Rather, they are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), site topography and vegetation, extreme, jurisdictional habitat areas, oak woodland canopy, and typical weather, position of structures on pads, adjacent fuels, fire history, and type of construction.

Cultural Resource Preserve Areas

As depicted in Appendix D, two areas that are culturally significant have been preserved within the development footprint. These areas will be maintained at a four inch vegetation height through annual treatments. Depending on the requirements to avoid disturbing the cultural resources, it may be necessary to treat these areas with hand tools, which may include motorized trimmers and saws, instead of wheeled or tracked machines. Additionally, the FMZ area south of the Multi family Planning Area 8 site has been historically disked and the HOA will continue providing FMZ via as-needed mowing.

Heat Deflecting Walls


Example heat deflecting wall

Some of the project's slopes and the elevated lots/pads adjacent the oak drainage areas as well as areas where FMZ is less than 150 feet (see Appendix D), provide an opportunity to place a non-combustible, six foot tall, heat-deflecting wall (or view wall with lower 2 foot block wall and upper 4 feet dual pane, one pane tempered glazing) to provide additional deflection for the most fuel modification area constrained lots. When buildings are set back from slopes, 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 2005)[4].

With houses set back from the slope edge, flames, convective heat and firebrands from fires spreading upslope tend to loft over the top of the house rather than directly impacting it, especially with the addition of a non-combustible wall. The duration of radiant heat impact on the downhill facing side of the house is also reduced. An imaginary line extended along the slope depicts the path of the heat (hot air rises) and flame. The structure set back is important to avoid heat and/or flame intersection with the structure.

[4] Protecting Life and Property from Wildfire (NFPA 2005). James C. Smalley, Editor. NFPA Wildland Fire Protection. 2005.

Heat-deflecting landscape view walls of masonry construction with fire-rated glazing that are six feet in height (roughly lower two feet masonry construction and upper three feet dual pane, one pane tempered glazing or equivalent and meeting Chapter 7A and/or MFR approval) will be incorporated at top of slope/edge of lots adjacent this interior drainage area and along the internal roadways where they traverse undeveloped stretches, graphically depicted in Appendix D. The landscape walls 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 fuel burns out within a short (30 second–2 minute) time frame (Quarles and Beall 2002). Walls like these have proven to deflect heat and airborne embers and are consistent with NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3 and International Urban Wildland Interface Code (ICC 2012). NFPA 1144, A.5.1.3.3 states: "Noncombustible walls and barriers are effective for deflecting radiant heat and windblown embers from structures." These walls and barriers are usually constructed of noncombustible materials (concrete block, bricks, stone, stucco) or earth with emergency access openings built around a development where 30 feet (9 meters) of defensible space is not available.

Exterior Windows

Since the structures will be hardened to wildland urban interface standards, they will be ignition resistant. However, a potentially vulnerable structure component with regard to radiant or convective heat exposure would be the exposed side windows. Determining whether provision for a set back from oak canopy of 30 to 50 feet is adequate requires application of available research. To address this issue, it is worthwhile to examine the structure ignitability modeling, independent ignition experiments, and case studies that support fuel treatments as low as roughly 34 feet from structures, and compare them with the project. Cohens' (1995) structure ignitability model (SIAM) assesses ignitability of bare wood when exposed to a continuous heat source. The model assumes a worst-case condition of a constant 1,700 degrees (F). A constant, maximum heat source is typically not the case during a wildfire due to the movement of a fire, non-uniform vegetation distribution, and the lack of a uniform, constant flame front.

The analysis conducted for this report indicates that the structure setbacks of a minimum of 35 feet from the fuels is consistent with study results for separating the structures from the short-duration heat and flame associated with a fire burning within one of the preserved riparian woodland drainages. The typical duration of large flames from burning vegetation is on the order of 1 minute and up to several minutes for larger fuels at a specific location (Cohen 1995; Butler et al. 2004, Ramsay and Rudolph 2003). Tests of various glazing products indicate that single pane, tempered glass failure may occur between 120–185 seconds from exposure (University of California 2011; Manzello et al. 2007) but those tests include direct

and constant heating that would not be experienced during a wildfire on this site. Depending on the heat applied and the type of glass used in the various studies, the cracking/failure time varied. However, given the short duration of maximum heat (likely several minutes for the oaks), the loss of heat over distance (25 feet minimum), the dual pane, two pane tempered glazing specified for this project, wildfire heat and flame experienced by the windows from the wildland fire is not expected to be enough (in temperature or duration) to cause failure of both panes. Quarles et al. (2010) provides strong endorsement for tempered glass performance. His research and tests conclude that multi-pane (2–3 panes) with at least one pane tempered is well-suited for wildfire exposures. He indicates that tempered glass is at least four times stronger and much more resistant to thermal exposures than normal annealed glass. The use of code required dual pane, one pane tempered glass provides several benefits, with thermal exposure performance the most important for this study. This FPTR requires both panes tempered to improve the strength of the windows.

5.2 Other Vegetation Management

5.2.1 Roadside Fuel Modification Zones (Including Driveways exceeding 150 feet in length)

- High BTU producing, flammable vegetation including shrubs and trees shall be cleared and are prohibited (refer to the prohibited plant list in Appendix F).
- Tree and shrub canopies shall be spaced such that interruptions of tree crowns occur and horizontal spacing of 20 feet between mature canopies of trees or tree groups is maintained. Newly planted trees may be spaced closer due to their smaller crowns, but will require maintenance, and eventually removal of some trees as they mature to maintain the 20 feet crown spacing.
- Grass shall be mowed to at least 4 inches in height.
- Single tree specimens, fire resistive shrubs, or cultivated ground cover such as green grass, succulents or similar plants used as ground covers may be used, provided they do not form a means of readily transmitting fire.
- All roads, including the extension of McElwain Road, in the development will have vegetation clearance of flammable vegetation on each side, as follows:
    1. Fire Access Roads (any road that a responding fire engine would use to access an emergency) – 20 feet from edge of pavement
    2. New roads/driveways – 20 feet from edge of pavement

3. McElwain Road – a minimum 80 feet wide on the west side and a minimum of 20 feet wide on the east side, including wider areas at drainage locations due to fill slopes on the western edge.

- Trees may be placed within Roadside Vegetation Management Zones within the developed portions of the Proposed Project. The following criteria must be followed:
    1. Tree spacing to be 20 feet between mature canopies (30 feet if adjacent to a slope steeper than 41%).
    2. Trees must be limbed up one-third the height of mature tree or a minimum of 8-feet, whichever is greater.
    3. No tree canopies lower than 13 feet 6 inches over roadways.
    4. No tree trunks intruding into roadway width.
    5. No trees or other plants on the Prohibited Plant List (Appendix F) are permitted.
    6. No flammable understory is permitted beneath trees.
    7. Any vegetation under trees to be fire resistive and kept to 2 feet in height or below, and no more than one third the height of the lowest limb/branch on the tree.

5.2.2 Trail Vegetation Management

Trails include the community pathways that are all accessible from public roads, the FMZ fire and maintenance pathways at the rear of perimeter lots, and the "optional trail," which may occur along the internal drainage area. Vegetation Management alongside these roads/trails will include maintenance to remove flashy fuels and maintain the trail in a useable, low fuel condition. Clearing weedy species and grasses on the trail and immediately adjacent the trail is specified to maintain an accessible path with low fuel ignition potential. Weather protected trail reader boards shall be installed at the entrance of all trails and pathways which will include educational reading materials relating to the fire threats as well as other public educational materials. The weather protected trail reader board will be constructed with non-combustible building materials. Final locations of all trail boards will be to the approval of the MFR Fire Marshal.

5.2.3 Parks, Open Space, etc.

- Landscaping within parks and maintained open space areas will be in compliance with the guidelines in this plan as fuel modification zone areas.
- These areas will be maintained to Zone 1 standards.

- Open space parks that are intended to remain natural (excluding cultural resource areas and the internal linear park which will be managed at 4-inch fuel heights) will be managed without irrigation in a low fuel condition through thinning, removal of flammable species, and maintenance free of accumulating debris.

5.2.4 Water Detention Basins

Fire-safe vegetation management will be performed within the basins (on basin slopes) on a yearly basis in accordance with the City's weed abatement standards and in compliance with the following guidelines.

- Groundcovers or shrubs included on the basin slopes shall be low-growing with a maximum height at maturity of 36 inches. Single tree specimens or groupings of two to three trees per grouping of fire resistive trees or tree form shrubs may exceed this limitation if they are located to reduce the chance of transmitting fire from vegetation to habitable structures and if the vertical distance between the lowest branches of the large, trees or tree form shrubs and the tops of adjacent plants are three times the height of the adjacent plants to reduce the spread of fire through ladder fuels.
- All trees on basin slopes shall be planted and maintained at a minimum of 10 feet from the tree's mature drip line to any combustible structure.
- Grasses on slopes must be maintained/mowed to 6 inches in height.
- This area shall be maintained annually free of dying and dead vegetation

5.2.4.1 Water Tank

The proposed water tank in Open Space 1 to the south of the Project will be provided fuel modification of 50 feet in width around the tank along with 20 feet of fuel modification alongside both edges of the access roadway. This fuel modification zone area will be maintained along with the remainder of the Project site's fuel modification zones.

5.2.5 Murrieta Hills Preserve Areas

The planned fuel modification zones encompass the analyzed needed buffers and there is no intention or identified need to expand the zones into designated preserve areas. A Homeowners' Association (HOA), or other legal entity approved by the MFR Fire Marshal, ("Approved Maintenance Entity") shall receive approval prior to or conducting vegetation management activities within any jurisdictional or preserve areas from the City, County, and/or the appropriate resource agencies (California Department of Fish and Game (CDFG), U.S. Fish and Wildlife

Service (USFWS), Army Corps of Engineers (ACOE)) prior to conducting Vegetation management activities within any jurisdictional or preserve areas

5.2.6 Private Residential Lots

This FPTR provides direction for community managed and maintained fuel modification zones. It also provides a guide for selecting lower flammability plant material along with planting and maintenance requirements for private lot owners. The 150 feet wide fuel modification zone will be required to be planted with low flammability plantings and/or consist of low fuel densities, consistent with this FPTR. In addition, it is recommended that none of the plant materials listed in Appendix F: Prohibited Plant List in this plan or otherwise known to be especially flammable are allowed to be planted on private lots. This FPTR, or a summary of its key points will be provided to all buyers in a private property owner's guide to living in a fire environment. In addition the Proposed Project Covenants, Conditions, and Regulations (CC&Rs) shall include a reference to the FPTR and the HOA's (or similar entity's) landscape committee shall not approve plans including any of the prohibited plant species to ensure compliance with the FPTR.

5.2.7 Fuel Modification Easement for Greer Ranch

The Greer Ranch community, which is located to the south of Murrieta Hills and its associated open space, had at some point in the past encroached onto Murrieta Hills' property. The encroachment includes three areas of fuel modification zone ranging to 180 feet from Greer Ranch structures as well as a large borrow pit that extends up to 800 feet from the property line. This disturbed area has provided a partial fuel modification zone, but native fuels are repopulating the area, and over time, will establish the need for ongoing maintenance. Greer Ranch appears to have been approved without the necessary off-site easements to maintain fuel modification zones. The Murrieta Hills project, through this FPTR, recognizes the importance for structure protection fuel modification adjacent to the Greer Ranch residences as well as the need for a buffer that minimizes the likelihood that a structure fire in Greer Ranch spreads to the adjacent open space. Therefore, a fuel modification easement will be granted along the property's southern edge, adjacent to the Greer Ranch residences, as indicated in Appendix D: Murrieta Hills Fuel Modification Plan. The easement will be recorded with the County/City Assessor's Office.

5.2.8 Annual Fuel Modification Maintenance

Vegetation management shall be completed annually by May 1 and more often as needed for fire safety, as determined by the MFR. Homeowners and private lot owners shall be responsible for all vegetation management on their lots, in compliance with this FPTR which is consistent with MFR requirements.

The "Approved Maintenance Entity" shall be responsible for and shall have the authority to ensure long term funding, ongoing compliance with all provisions of this FPTR, including vegetation planting, fuel modification on the perimeter and within interior maintained common areas, vegetation management, and maintenance requirements on all private lots, multi-family residences, parks, common areas, roadsides (including Keller Road), and open space under their control (if not considered biological open space). Any water quality basins, flood control basins, channels, and waterways will be kept clear of flammable vegetation, subject to paragraph 6.2.4, above.

5.2.9 Annual FMZ Compliance Inspection

To confirm that the Proposed Project's common areas are being maintained according to the FPTR, the Approved Maintenance Entity shall obtain an inspection and report from a MFR–authorized 3rd-party Wildland Fire Safety Inspector, in May of each year, certifying that vegetation management activities throughout the Proposed Project have been performed pursuant to this FPTR. The 3rd-party Wildland Fire Safety Inspector must be approved by the MFR Fire Marshal prior to entering into an agreement with the company or individual. The 3rd-party Wildland Fire Safety Inspector must submit qualifications and certifications for review. The report will be funded by the Approved Maintenance Entity and submitted to MFR for approval. If the FMZ areas are not compliant, the HOA will have a specified period to correct any noted issues so that a re-inspection can occur and certification can be achieved.

5.2.10 Interior Manufactured Slopes

Interior slopes will be considered "Vegetation Management Areas." These internal slopes will include:

Specific Requirements

- The irrigation and maintenance requirements of standard fuel modification zones apply to these areas.
- The area is completely irrigated or the area is adequately separated from structures.
- Only trees and shrubs from the Project Plant List (Appendix E), and planted in accordance with spacing requirements, can be used on interior manufactured slopes.
- Vegetative under-story must not create a fuel ladder or create the potential for ground fires. Trees shall be limbed up to three times the height of the under-story vegetation height or no vegetation taller than 2 feet in height within 15 feet of trees is allowed.

5.2.11 Construction Phase Fuel Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management shall be performed pursuant to the FAHJ on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks of at least 30 feet shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation.

- Vegetation management requirements and perimeter FMZs shall be in place along with paved access, and fire hydrants, prior to the combustible construction initiation.
- Vacant lots adjacent to active construction areas/lots will be required to implement vegetation management if they are within 30 feet of the active construction area. Perimeter areas of the vacant lot shall be maintained as a Vegetation Management Zone extending 30 feet from roadways and adjacent construction areas.
- Prior to issuance of a permit for any construction, grading, digging, installation of fences, etc., on a vacant lot, the 30 feet at the perimeter of the lot is to be maintained as a Vegetation Management Zone.
- In addition to the establishment of a 30-foot-wide vegetation management zone prior to combustible materials being brought on site, existing vegetation on the lot shall be reduced by at least 60% upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuels shall be removed and trees/shrubs shall be properly limbed, pruned and spaced per this plan.

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

- All new power lines shall be underground for fire safety during high wind conditions or during fires on a right-of-way that can expose aboveground power lines. Temporary construction power lines may be allowed in areas that have been cleared of combustible vegetation.
- A construction fire prevention plan shall be prepared to minimize the likelihood of ignitions and pre-plan the Proposed Project fire prevention, protection and response plan.
- A construction phasing plan will be provided to MFR prior to building permit issuance. The construction phasing plan will illustrate access, water supply and fuel buffers.
- Caution must be used not to cause erosion or ground (including slope) instability or water runoff due to vegetation removal, vegetation management, maintenance, landscaping, or irrigation. Fuel reduction work should include removal of above ground biomass only. No uprooting of treated plants/fuels is necessary.

5.3 Road Requirements

5.3.1 Access

5.3.1.1 Access Roads

Site access, including road widths and connectivity, will comply with the requirements of the Murrieta Fire Code, (California Fire Code, Title 24, Part 9, Appendix E – Fire Apparatus Access Roads) with the possible exception of dead end road length. The City has identified PAs 3 and 7 in Phase 2 as potentially exceeding the allowable dead end road length of CCR Title 14 Fire Safe Regulations, resulting in a potential need for additional access or alternatives that provide the same practical effect.

- All fire access and vehicle roadways will be of asphaltic concrete and designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 pounds) that may respond, including Type I engines, Type III engines, ladder trucks, and ambulances. Proposed on-site roads will meet City of Murrieta's Department of Public Works' (DPW) Road Standards. Access roads shall be at a minimum provided first layer of pavement prior to combustible construction occurring.
- On-site, local streets will be constructed to a minimum unobstructed width of 40-foot with parking on both sides of the street (28 feet minimum width unobstructed in commercial areas) and shall be improved with aggregate cement or asphalt paving materials. There shall be at least two points of primary access for emergency response and evacuation from Keller Road along the northern project boundary and at the connections with Zeiders Road and Gloria Road. Additionally, an extension of McElwain Road to Keller Road parallel to, and just west of I-215, is required prior to any construction of any portion of the proposed project. This extension is planned to connect the existing terminus north of Linnel Lane to Keller Road at Zeiders Road. All interior residential streets will be designed to accommodate a minimum of a 75,000-pound fire apparatus.
- Fire access roads for each phase shall meet all Proposed Project approved fire code requirements and/or mitigated exceptions for maximum allowable dead-end distance, paving, and fuel management prior to combustibles being brought to the site. Planning areas 3 and 7 will include several focused measures to compensate for the perceived exceedance of allowable dead end road length.
- On-site fire lane road at commercial buildings (road closest to the building) will be 26 feet wide, per code or as approved by City Fire Marshal.
- Street parking will be provided on one or both sides of residential collector streets, depending on the street width. Parking will be assumed to be 6 to 8 feet in width. Where road widths do not accommodate parking, restrictions will apply, per the DPW Road Modification, and the

streets will be posted with signs stating "No Parking; Fire Lane." Street sections are to be reviewed and approved by the City DPW and the City Fire Marshal.

- Roads with a median or center divider will have 12 feet unobstructed width on both sides of the center median or divider. Center dividers are not permitted on single lane accesses. Emergency fire truck access points will be provided through the center divider at 1,000-foot intervals, where road segment length allows.
- Any dead end roads longer than 150 feet shall have approved provisions for fire apparatus turnaround. Fire apparatus turnarounds will include a turning radius of a minimum 28 feet, measured to the inside edge of improved width.
- Cul-de-sac bulbs are required on dead-end roads in residential areas where roadways serve more than two residences. Cul-de-sacs will be provided with a paved radius of a minimum of 40 feet up to 50 feet to allow for street parking within the cul-de-sac.
- Roadways and/or driveways will provide fire department access to within 150 feet of all portions of the exterior walls of the first floor of each structure.
- Commercial area access roads will be determined at Development Plan processing.
- Roadway design features (e.g., speed bumps, humps, speed control dips, planters, fountains) that could interfere with emergency apparatus response speeds and required unobstructed access road widths will not be installed or allowed to remain on roadways. Traffic Calming features (i.e., raised intersections, intersection neck downs, roundabouts and parallel bay parking with landscape pop-outs) may be allowed, subject to approval by the City's Fire Marshal and City DPW.
- Vertical clearance of vegetation along roadways will be maintained at 13 feet, 6 inches. Vertical clearance in the commercial areas to be clear to the sky to allow aerial ladder truck operation.
- Angle of driveway/roadway approach/departure will not exceed 7° (12%) per Fire Department.
- Road grades exceeding 15% are not permitted, unless approved by the Fire Chief (maximum 20% with mitigations).
- Developer will provide information illustrating the new roads, in a format acceptable to MFR, to update the Fire Department's maps.
- Any roads that have traffic lights shall have City–approved traffic preemption devices (Opticom) compatible with devices on the Fire Apparatus, per MFR.

5.3.1.2 Secondary Access

The project is currently within a fire hazard severity zone and SRA with direct wildfire protection provided by CAL FIRE. The project will be annexed into LRA with structural fire protection provided by MFR. Depending on how this situation is interpreted, California Government Code 66434.02 and California Code of Regulations, Title 14 – Natural Resources, Chapter 7 Fire Protection may apply to this project. Title 14 includes limitations on dead end road length. For projects with parcels zoned for less than one acre, like the Proposed Project, the maximum dead end road length is 800 feet. This potential issue is based on an interpretation of what constitutes secondary access. The Proposed Project does provide secondary access and looped roads that do not dead end, with the exception of a few relatively short cul-de-sacs.

As described, the two main entrances will be off Keller Road in the northern portion of the project. Additional access will be provided off McElwain Road (to be constructed) which is located in a separate portion of the project providing access on the east and southeast portions of the Project. Spacing between the access points are 350 feet between the northcentral access points and 700 feet between the northeastern and northcentral access points. If traffic was all required to use Keller Road to the east during an evacuation, then this situation would not be ideal because all of the traffic would be using the same route and could cause congestion and slower evacuations and/or difficult emergency vehicle ingress. However, McElwain Road may be used to relieve some of the traffic off of Keller Road, depending on the type of fire and whether that route would be considered safe. Additionally, existing Zeiders Road and Gloria Road would both provide accessible routes to the north, connecting with Scott Road one mile north of Keller Road. These roads do not meet the strict definition of the Fire Code, but are passable by passenger vehicles and typical fire engines and could be utilized in an emergency.

A discussion of the dead end road length issue and the Project's meeting the California Government Code 66474.02 Findings is provided in Section 9.0 of this FPTR.

5.3.2 Gates

Access gates are not proposed for this project. Public roads shall not be gated..

5.3.2.1 Traffic Calming

Traffic calming devices including speed bumps, speed humps, or similar shall not be allowed within the Project due to their tendency to slow responding emergency vehicles and potential affect on evacuations.

5.3.3 Driveways

Any structure that is 150 feet or more from a common road in the development shall have a paved driveway meeting the following specifications:

- Grades up to 15% are acceptable. Over 15% and less than 20% are acceptable with surfacing and sub-base consistent with the City's road design guidelines.
- Driveways serving two houses or fewer will be 16 feet wide unobstructed with a fire apparatus turnaround. Driveways serving more than two houses will be 24 feet wide unobstructed;
- Lighted house addresses shall be posted at the entrance to each driveway if house numbers are not visible from the street; and

Identification of roads and structures will comply with Murrieta requirements, as follows:

- All structures shall be identified by street address numbers at the structure. Numbers will be 4 inches in height, 0.5-inch stroke, and located 6 to 8 feet above grade. Addresses on non-residential buildings shall be 6 inches high with 0.5-inch stroke. Numbers will contrast with background and be lighted.
- Multiple structures located off common driveways will include posting addresses on structures, on the entrance to individual driveways, and at the entrance to the common driveway for faster emergency response.
- Structures 100 feet or more from a roadway will include numbers at the entrance to the driveway.
- Proposed roads within the development will be named, with the proper signage installed at intersections to the satisfaction of the Fire Department and the DPW.
- Streets will have street names posted on non-combustible street signposts. Letters/numbers will be 4 inches high, reflective, on a 6-inch-high backing. Signage will be 7 feet above grade. There will be street signs at the entrances to the development, all intersections, and elsewhere as needed subject to approval of the Fire Chief.
- Access roads to private lots to be completed and paved prior to lumber drop and prior to the occurrence of combustible construction.

5.4 Structure Requirements

5.4.1 Ignition-Resistance

This section outlines ignition-resistant construction (for all structures) that will meet the requirements of the most recent California Fire and Building Codes (Chapter 7A). Code updates

are likely to occur before the Proposed Project is fully constructed. As such, building plans must meet the "then-current" California Building Code in effect at the time of building plan submittal.

There are two primary concerns for structure ignition: 1) radiant and/or convective heat and 2) burning embers (NFPA 2008, IBHS 2008). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant.

Likewise, radiant and convective heat impacts on structures have been minimized through the CBC Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided the Proposed Project are required by City and state codes. However, these requirements are worth listing because they have proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2013 Building/Fire Code update), of extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into local and state codes. For instance, San Diego County after-fire assessments, indicate strongly that the building codes are working in preventing home loss: of 15,000 structures within the 2003 fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 fire perimeter, 17% were damaged or destroyed. A much smaller percentage (3%) of the 789 homes that were built to 2001 codes were impacted and an even smaller percentage (2%) of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008). It has been reasoned that by fire officials conducting after-fire assessments that damage to the structures built to the latest codes is likely from unmaintained flammable landscape plantings or objects next to structures or open windows or doors (Hunter 2008). Because the Murrieta Hills HOA will enforce CC&R's, accumulated landscape and personal items will not be allowed and will directly and positively impact the fire resistance and safety of the entire project.

The building codes developed for construction in high and very high fire hazard zones is working to minimize the vulnerability of new residences and other structures to wildfires. There are numerous examples of master planned communities built to ignition resistant standards and include HOA managed fuel modification zones that have been tested by wildfire and functioned as they were intended. The Proposed Project incorporates a fire protection system that has been found by after-action fire reports, independent researchers, as well as USGS researchers (2013) to perform well against wildfires. Newer communities, especially those within jurisdictions that have adopted the latest State Fire and Building

Codes, and that have a well-defined fuel modification zone requirement, perform well against wildfires. Examples include 4S Ranch in San Diego County, Stevenson's Ranch in Santa Clarita, Serrano Heights in Orange County and many others in Southern California.

The following project features are required for new development in WUI areas and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

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

1. Exterior walls of all structures and garages to be constructed with approved non-combustible (stucco, masonry, or approved cement fiber board) or ignition-resistant material from grade to underside of roof system. Wood shingle and shake wall covering is prohibited. Any unenclosed under-floor areas will have the same protection as exterior walls. Per the Building Code, Chapter 7A: Exterior wall coverings to extend from top of foundation to the underside of roof sheathing, and terminate at 2-inch nominal solid wood blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure). The underside of any cantilevered or overhanging appendages and floor projections will maintain the ignition-resistant integrity of exterior walls, or projection will be enclosed to grade.
2. Eaves and soffits will meet the requirements of SFM 12-7A-3 or be protected by ignition-resistant materials or non-combustible construction on the exposed underside, per Building Code, Chapter 7A.
3. There shall be no use of paper-faced insulation or combustible installation in attics or other ventilated areas per Building Code.
4. There shall be no use of plastic, vinyl (with the exception of vinyl windows with metal reinforcement and welded corners), or light woods on the exterior.
5. All roofs shall be a Class "A" listed and fire-rated roof assembly, installed per manufacturer's instructions, to approval of MFR. Roofs shall 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 shall be enclosed to prevent intrusion of burning debris. When provided, roof valley flashings shall 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 (Chapter 7A).

6. No vents in soffits, cornices, rakes, eaves, eave overhangs or between rafters at eaves or in other overhang areas. Gable end and dormer vents to be alternative design resistant to ember penetration. Vents shall be ember resistant (eg., Brandguard or O'Hagin)
7. Vents shall not be placed on roofs unless they are approved for Class "A" roof assemblies (and contain an approved baffle system (such as Brandguard vents) to stop intrusion of burning material) or are otherwise approved.
8. Turbine vents are prohibited.
9. Exterior glazing in windows (and sliding glass doors, garage doors, or decorative or leaded glass in doors) to be dual pane with one tempered pane, or glass block or have a 20-minute fire rating. Glazing to comply with CBC Chapter 7A.
10. 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.
11. Skylights to be tempered glass (CBC, Chapter 7A).
12. Rain gutters and downspouts to be non-combustible. They shall be designed to prevent the accumulation of leaf litter or debris, which can ignite roof edges (CBC, Chapter 7A).
13. Doors to conform to SFM standard 12-7A-1, or shall be of approved noncombustible construction or shall be solid core wood having stiles and rails not less than 13/8 inches thick or have a 20-minute fire rating. Doors to comply with CBC, Chapter 7A. Garage doors to be solid core 1.75-inch-thick wood or metal, to comply with code.
14. Decks and their surfaces, stair treads, landings, risers, porches, balconies to comply with language in CBC, Chapter 7A and be ignition-resistant construction, heavy timber, exterior approved fire retardant wood, or approved non-combustible materials.
15. Decks or overhangs projecting over vegetated slopes are not permitted. Decks to be designed to resist failing due to the weight of a firefighter during fire conditions. There will be no plastic or vinyl decking or railings. The ends of decks to be enclosed with the same type of material as the remainder of the deck.
16. There shall be no combustible awnings, canopies, or similar combustible overhangs.
17. No wood fences to be allowed within 5 feet of structures on any lots. The first 5 feet from a structure will be non-combustible or meet the same fire resistive standards as walls. The exception is that a wood gate may be used adjacent to a structure, if there is a 5-foot length of non-combustible or fire-resistive fencing between the gate and the remainder of the fence where it abuts the structure.

18. 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 Murrieta Fire Code. The code requires that openings be maximum 0.5 inch. Arrestors shall be visible from the ground
19. Any liquid propane gas LPG tanks (except small barbecue and outdoor heater tanks), firewood, storage sheds, and other combustibles shall be located at least 30 feet from structures. There shall be no flammable vegetation under or within 30 feet of LPG tanks, or tanks shall be enclosed in an approved ignition-resistant enclosure with 10 feet clearance of flammable vegetation around it.
20. Storage sheds and outbuildings to be constructed of approved non-combustible materials, including non-combustible Class A roofs and shall be subject to the same restrictions as the main structure on lot.
21. Additionally, any of the above-listed structures (i.e., outbuildings, storage sheds, and separate unattached garages) that are 250 square feet or more in size shall be equipped with automatic fire sprinklers. Locations, and required fuel modification zones, will be subject to approval of Murrieta Fire Marshal and the Building Official based on size of the structure.

5.4.2 Fire Protection System Requirements

Infrastructure, Structural Fire Protection, and Fire Protection Systems

WUI fire protection requires a systems approach, which includes the components of vegetation management, structural safeguards (both previously addressed), and adequate infrastructure. This section provides recommendations for infrastructure components.

Infrastructure Recommendations

The following conceptual recommendations are made in order to comply with the City's requirements, the California Fire Code, and nationally accepted fire protection standards, as well as additional requirements to assist in providing reasonable on-site fire protection.

Water service will be provided by the Eastern Municipal Ware District (EMWD). Facilities exist within Keller Road. EMWD water tanks exists along the project's northern boundary, which is not a part of this project. Additional upgrades to the system, including up to three water tanks, are being proposed within the Proposed Project site. All water storage and hydrant locations, mains and water pressures will be designed to fully comply with City's Guidelines for Fire Flow.

Signage

- Residence street address numbers will be illuminated.

Fire Hydrants

- Hydrants in the residential areas have been plotted and approved by MFR (Appendix C). Hydrants to be located on the normal Fire Apparatus response side of the road at each intersection and at 300-foot spacing as required by the Fire Chief. Where applicable, hydrants to be located at the entrance to cul-de-sac bulb (not in the bulb itself). Hydrants to be provided on each side of any divided road or highway.
- Commercial area hydrants to be determined at development plan processing.
- The water system for fire protection to be an approved water supply with hydrants and mains. Fire flow in the mains for residential occupancies to be at least 2,500 gallons per minute (gpm) in fire mains with a 20-psi residual pressure for 2 hours. Fire flow for the commercial occupancies to be a minimum of 3,000 gpm in fire mains at 20 psi for 3 hours. No credit for sprinklers is available in wildfire prone areas. The amount of stored water for fire protection to be for the required duration (minimum 2 hours) at the worst-case fire flow at times of maximum peak domestic and commercial demand (including agriculture). Any private water systems to comply with National Fire Protection Association (NFPA) 22 and 24. In addition, fire protection water systems to comply with American Water Works Association Standard M-31; "Distribution Requirements for Fire Protection."
- Hydrants to have one 2 ½-inch and one 4-inch NST outlet and be of bronze construction per the District Fire Code. Hydrants at commercial buildings to have one 4-inch outlet and two 2 ½-inch outlets.
- Hydrants to have a 3×3 concrete pad at base (gravel if dry barrel hydrant) for weed control.
- Reflective blue dot hydrant markers (minimum 3-inch square) to be installed in the street to indicate location of the hydrant. The lateral shut-off valve will be located in the street 10–25 feet in front of hydrant.
- Crash posts will be provided where needed on site areas where vehicles could strike fire hydrants, fire department connections, etc.

Fire Sprinklers

All structures, of any occupancy type, are required by the MFR to have internal fire sprinklers. One- and two-family residences may have NFPA 13-D systems. Enclosed patios porches,

workshops, barns, storage structures, separate unattached garages, RV structures, and auxiliary use rooms over 500 square feet also to have sprinkler protection.

Other occupancies, three or more stories in height, shall have a sprinkler system in compliance with NFPA 13R as amended in Chapter 80, per the 2016 California Fire Code Section. Actual system design is subject to final building design and the occupancy types in the structure. All other occupancies in this development shall have fire sprinklers in compliance with the Fire Code requirements and NFPA 13. All systems other than single-family detached dwelling systems to be remotely supervised to an approved 24/7 alarm company.

Fire Alarm Systems

- All residential units shall have electric-powered, hard-wired smoke detectors in compliance with 2016 CFC.

5.4.3 Additional Requirements and Recommendations Based on Occupancy Type

This section includes conceptual occupancy-specific recommendations based on the type of occupancy.

Additional Commercial and School Building Requirements and Recommendations

All retail, commercial, and office buildings will comply with appropriate Murrieta building codes. Construction in this area will comply with CBC, Chapter 7A, and shall comply with other state requirements for fire safety.

6 EMERGENCY PRE-PLANNING – EVACUATION

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

6.1 Quick Reference – Wildland Fire Evacuation Plan

Evacuation is a process by which people are moved from a place where there is immediate or anticipated danger, to a safer place, and offered temporary shelter facilities. When the threat passes, evacuees are able to return to their normal activities, or to make suitable alternative arrangements.

Figure 6 illustrates the Emergency Evacuation Routes available to the Murrieta Hills Community. The exhibit highlights the community's backbone interior roads along with primary access points and off-site roads and major traffic corridors leading to designated evacuation areas.

The available evacuation routes for the residents and guests of Murrieta Hills Community are:

1. **Egress to the east via Keller Road –** this is the primary access road and provides access to I-215 and to Gloria Road, Howard Way, Zeiders Road north, and when constructed, to McElwain Road south.
2. **Egress to the north and east via Gloria Road, Ciccotti Street, Howard Way, and Scott Road** – This is a gravel road route that is passable by passenger vehicles, but would require slower speeds. The road extends approximately 1.1 miles from Keller Road where it intersects Scott Road. Scott Road provides options for travel to the west or east on improved, paved roads.
3. **Egress to the north via Zeiders Road** – this road includes section of gravel and paved roadway. The first 0.25 mile north of Keller Road is paved. The middle 0.5 mile is gravel roadway that is driveable by passenger vehicles, but does include rough, rutted roadways and would not be ideal conditions for evacuation. The northernmost 0.25 mile of this road, just south of Scott Road, is paved. Once on Scott Road, travel east or west on improved, paved roads is available.

4. **Egress to the south on McElwain Road** – this egress route intersects Keller Road approximately 0.25 miles west of the I-215. This egress route will be improved, paved and offer three travel lanes for a portion of the route. It will interconnect with existing McElwain Road at Linnel Street. The road continues south to Clinton Keith Road where travel east and west is possible and access to I-215 is nearby.

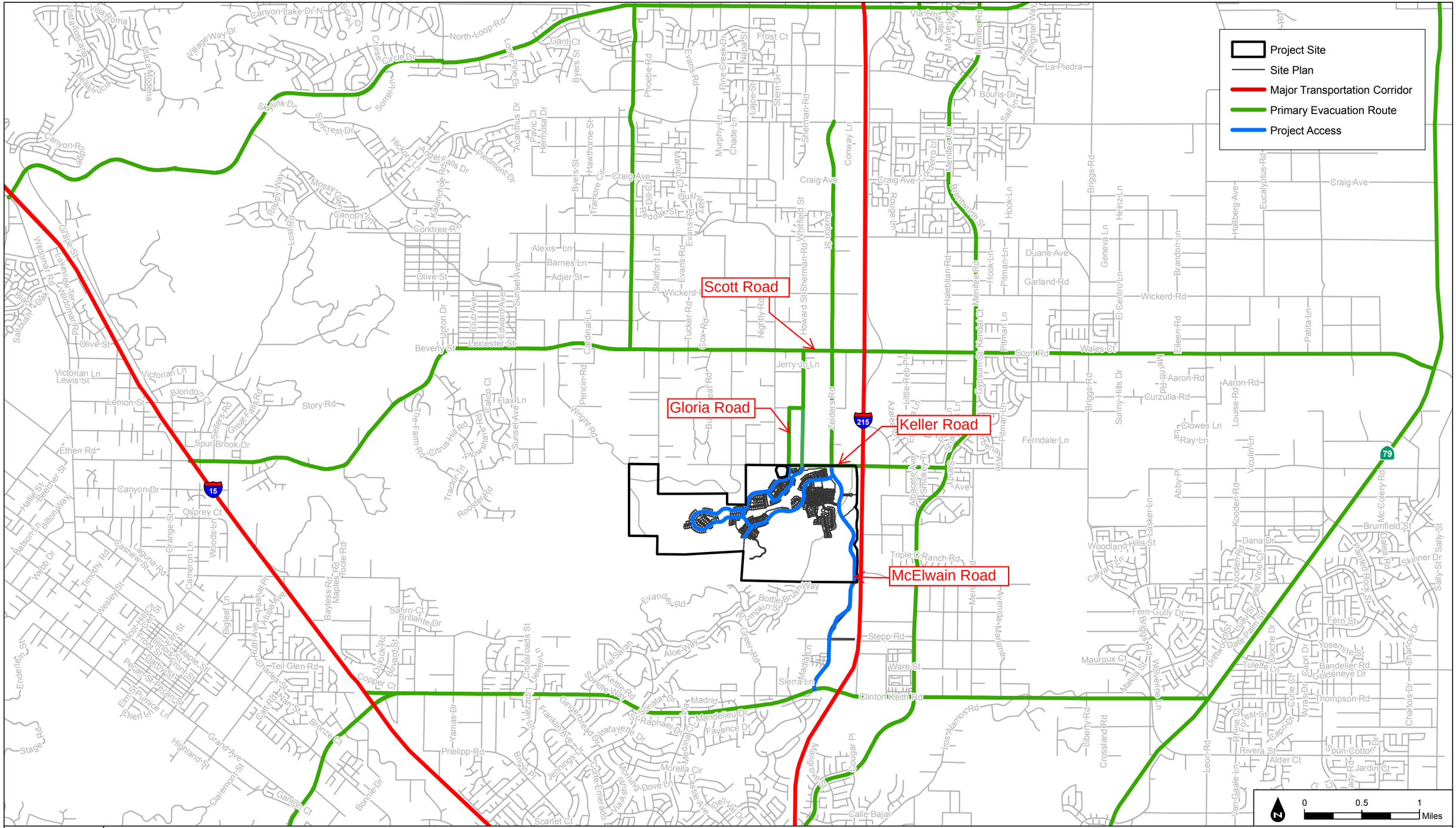
This evacuation plan has been prepared specifically for the Murrieta Hills Project and focuses on wildland fire evacuations, although many of the concepts and protocols will be applicable to other emergency situations. Ultimately, this plan will be used by the Project's Homeowner's Association to educate community residents as to their evacuation approach during wildfires and other similar emergencies.

It is recognized that wildfire and other emergencies are often fluid events and that the need for evacuations are typically determined by 1) on-scene first responders, 2) a collaboration between first responders, law enforcement, and designated emergency response teams, including Office of Emergency Services and the Incident Command established for larger emergency events. As such, and consistent with all emergency evacuation plans, this Emergency Evacuation plan is to be considered a tool that supports existing pre-plans, as available for the area, and provides for citizens who are familiar with the evacuation protocol, but is subservient to emergency event-specific directives provided by agencies managing the event.

6.2 Background

This Murrieta Hills Evacuation Plan has been prepared based on standard operational evacuation planning procedures. Large-scale evacuations are complex, multi-jurisdictional efforts that require coordination between many agencies and organizations. Emergency services and other public safety organizations play key roles in ensuring that an evacuation is effective, efficient, and safe.

Evacuation during a wildfire is not necessarily directed by the fire agency, except in specific areas where fire personnel may enact evacuations on scene. The Murrieta Police Department, Riverside County Sheriff's Department, California Highway Patrol, and other cooperating law enforcement agencies have primary responsibility for evacuations. These agencies work closely within the Unified Incident Command System, with the County Office of Emergency Services, and responding fire department personnel who assess fire behavior and spread, which should ultimately guide evacuation decisions.



SOURCES: AERIAL-BING MAPPING SERVICE, 2016; COUNTY OF RIVERSIDE, 2016

Figure 6
Fire Evacuation Map

DUDEK

Murrieta Hills Fire Protection Plan

Document Path: Z:\Projects\j960801\MAPDOC\MAPS\FPP Figs\FireEvac.mxd

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It is important to note that every evacuation scenario will include some level of unique challenges, constraints, and fluid conditions that require interpretation, fast decision making, and alternatives. For example, one roadway incident that results in blockage of evacuating vehicles may require short-term or long-term changes to the evacuation process. In a worst-cast situation, where evacuees are evacuating late, and fire encroachment is imminent, this can have serious ramifications. This hypothetical scenario highlights the importance of continuing to train responding agencies, model various scenarios, educate the public, and take a very conservative approach to evacuation decision timelines (early evacuation) as well as providing contingency plans.

Equally as important, the evacuation procedures should be regularly updated with lessons learned from actual evacuation events. The authors of this Evacuation Plan recommend that occasional updates are provided, especially following lessons learned from actual incidents, as new technologies become available that would aid in the evacuation process, and as changing landscapes and development patterns occur within and adjacent the Murrieta Hills project that may impact how evacuation is accomplished. At the time of this plan's preparation, there was no encompassing emergency evacuation plan available for the greater region. This Murrieta Hills Wildland Fire Evacuation Plan is consistent with standard evacuation planning and can be integrated into a regional evacuation plan when and if the area officials and stakeholders (MFR, CAL FIRE, Riverside County Fire, Office of Emergency Services, Riverside County Sheriff's Department, and others) complete one.

As demonstrated during large and localized evacuations occurring throughout southern California over the last 15 years, an important component to successful evacuation is early assessment of the situation and early notification via managed evacuation declarations. Riverside County and cities within the county, including Murrieta, utilize the Riverside County Early Warning Notification System to help meet these important factors. Among the methods available to citizens for emergency information are radio, television, social media/internet, neighborhood patrol car PA notifications, and Reverse 911.

The Murrieta Hills community residents will be strongly encouraged to register with Reverse 911. In addition, the community HOA will organize annual evacuation public outreach as well as maintain a fire safe page on the community Web page, including key sections of this Emergency Evacuation Plan and the FPTR, and links to important citizen preparedness information.

6.3 Riverside County Evacuation Planning Summary

This Wildland Fire Evacuation Plan incorporates concepts and protocols practiced throughout southern California counties. The basic protocols are set forth in the California Master Mutual Aid

Agreement, which dictate who is responsible for an evacuation effort and how regional resources will be requested and coordinated.

First responders are responsible for determining initial protective actions before EOCs and emergency management personnel have an opportunity to convene and gain situational awareness. Initial protective actions are communicated to local EOCs and necessary support agencies as soon as possible to ensure an effective, coordinated evacuation.

During an evacuation effort, the designated County Evacuation Coordinator is typically the Sheriff, who is also the Law Enforcement Coordinator. The Evacuation Coordinator will be assisted by other law enforcement and support agencies. Law enforcement agencies, highway/road/street departments, and public and private transportation providers will conduct evacuation operations. Procurement, regulation, and allocation of resources will be accomplished by those designated. Evacuation operations are conducted by the following agencies:

- County Sheriff's Department
- Fire and Rescue
- County Health and Human Services Agency
- Department of Animal Services,
- Department of Planning and Land Use
- Department of Environmental Health
- Department of General Services
- Department of Public Works
- Department of Agriculture, Weights, and Measures
- Department of Parks and Recreation

6.4 Murrieta Hills Evacuation Road Network

Wildfire emergencies that would be most likely to include an evacuation of Murrieta Hills would be large wildfires approaching from the west, south, or north, as these are the areas that include wildland fuels. Areas to the north and east of the site are urbanized or include a mix of grasslands that can support wildfire, and could result in the open space areas around Murrieta Hills igniting. Fires are often wind driven and occur during declared Red Flag Warning days where low humidity and high winds facilitate fire ignition and spread. If a fire starts in the open lands to the east of the Project and is fanned by these fire weather conditions, an early evacuation of the area may occur as many as 24 or more hours prior to actual threatening conditions, depending on the location of

the ignition. Fires occurring on typical weather days, even fires igniting off the local highways or from existing communities, have been very successfully controlled at small sizes within minutes of ignition and would not typically trigger a need to evacuate the project. Partial evacuation or temporary relocation of some neighborhoods could be an option in these cases.

If a wildfire ignited closer to the Murrieta Hills community during weather that facilitates fire spread, where multiple hours are not available for evacuation, a different evacuation approach would need to be explored. It is preferred to evacuate long before a wildfire is near, and in fact, history indicates that many human fatalities from wildfires are due to late evacuations when they are overtaken on roads. Therefore, it is prudent to consider a contingency option. For example, if a wildfire is anticipated to encroach upon the community in a timeframe that is shorter than would be required to evacuate all residents, then options available to responding fire and law enforcement personnel should include 1) partial relocation where residents in perimeter homes on the southern and western portions of the development are temporarily relocated to internal areas or to the commercial areas, 2) Individual neighborhood relocations where residents are temporarily relocated to the commercial area or to developed Murrieta, 3) temporary refuge where residents are instructed to remain in their homes while firefighters perform their structure protection function. Although not a shelter in place community, the structures in Murrieta Hills are ignition resistant, defensible and designed to require minimal resources for protection, which enables these contingency options that may not be available to other nearby communities.

The roads that will be used for ingress and egress from the Murrieta Hills community are described as:

- **Keller Road** – providing primary access to Murrieta Hills, Keller Road provides a 32 foot wide paved roadway with two designated travel lanes that are a minimum of 14 feet wide. Keller Road provides east-west travel beneath the I-15 Freeway to Antelope Road. Antelope Road to the north provides I-15 freeway access (both north and south bound) at Scott Road in the future. Keller Road intersects Zeiders Road and Gloria Road, both providing travel to the north and McElwain Road which provides southbound access.
- **Zeiders Road** – Keller Road intersects Zeiders Road, a 32 foot wide paved surface with shoulders, two designated 12 foot wide travel lanes that extends to the north to Scott Road, but includes a 0.5 mile section of dirt road. This road does not currently comply with fire code road requirements, but is passable.
- **Gloria Road** – Keller Road also intersects Gloria Road, which is a maintained dirt road that intersects Howard Road and travels northward to Scott Road. Neither Gloria or Howard Roads currently comply with fire code road requirements, but are passable.

- **McElwain Road** – McElwain Road will be constructed in phase 1 from Keller Road to Linnell prior to lumber drop to satisfy MFR fire and safety concerns. McElwain will extend to the south approximately 1.6 miles to existing McElwain Road, providing egress to the south to Clinton Keith Road. Clinton Keith Road provides travel to the east or west and access to I-215 and I-15.

Even with roadways that are designed to the code requirements, it is important to note that no region's road infrastructure is designed to accommodate a short-notice, mass evacuation of thousands of people. In order to accommodate this type of evacuation where there is little time available and a large number of people are directed onto available roads, a region would need to provide freeways with many more lanes than even the largest freeways, feeder roads with several or more lanes, and have law enforcement personal at every intersection in the region to keep traffic flowing freely. This is not reasonable or feasible and therefore, requires other approaches.

Among the most important factors for successful evacuations in urban settings is control of intersections downstream of the evacuation area. If intersections are controlled by law enforcement, barricades, signal control, or other means, potential backups and slowed evacuations can be minimized. Another important aspect of successful evacuation is a managed and phased evacuation declaration. Evacuating in phases, based on vulnerability, location, or other factors, enables the subsequent traffic surges on major roadways to be smoothed over a longer time frame and can be planned to result in traffic levels that flow better than when mass evacuations include large evacuation areas at the same time. This plan defers to Law Enforcement and Office of Emergency Services to appropriately phase evacuations and to consider the vulnerability of communities when making decisions. For example, the Murrieta Hills Community will offer its residents a high level of fire safety on site (as detailed in this FPTR) along with options for properly equipped and trained firefighter safety zones and temporary resident on-site refuge (within their well-protected homes) as a contingency, as discussed further in this plan.

The Murrieta Hills planned community interior road network and the existing regional road system that it interconnects, provides multi-directional primary and secondary emergency evacuation routes consistent with most communities in this area. It is likely that major ground transportation corridors in the area will be used as primary evacuation routes during an evacuation effort. Emergency management departments typically evaluate road systems to determine the best routes for fire response equipment and "probable" evacuation routes for relocating people to designated safety areas. The primary roadways that would be used for evacuation from Murrieta Hills are Keller Road, Antelope Road (northbound), Mapelton Avenue, and Scott Road. These roads provide access to or are feeder roads to the nearest major traffic corridor, the I-215 which provides access to the north or south.

During an emergency evacuation from the Murrieta Hills community, the primary and secondary roadways may be providing citizen egress while responding emergency vehicles are inbound. Because the roadways are all designed to meet or exceed Fire Code requirements for unobstructed width, potential conflicts that reduce the roadway efficiency required for smooth evacuations are minimized.

The community's primary evacuation routes are accessed through a series of internal neighborhood roadways, which intersect with the primary ingress/egress roads that intersect off-site primary and major evacuation routes. Based on the existing road network, the community can evacuate to the north (once off site), south, east and west (once off site to the north or south) depending on the nature of the emergency.

Depending on the nature of the emergency requiring evacuation, it is anticipated that the majority of the community traffic would exit the project via Keller Road. From Keller Road, traffic could be directed east, north, or south. In a typical evacuation that allows several hours or more time, all traffic may be directed to the east on Keller Road, then north on Antelope toward Scott Road and the I-15. If less time is available, fire and law enforcement officials may direct some neighborhoods to travel northbound on Zeiders or Gloria Road and others may be directed southward on McElwain Road.

6.4.1 Evacuation Route Determination

Fire and law enforcement officials may identify evacuation points before evacuation routes are announced to the public. Evacuation routes are determined based on the location and extent of the incident and include as many pre-designated transportation routes as possible. Absent direction from fire and/or law enforcement officials, residents would be advised to use the primary access road – Keller Road for evacuations.

6.4.2 Roadway Capacities and Maximum Evacuation Time Estimate

Roadway capacity represents the maximum number of vehicles that can reasonably be accommodated on a road. Roadway capacity is typically measured in vehicles per hour and can fluctuate based on the number of available lanes, number of traffic signals, construction activity, accidents, and obstructions as well as positive effects from traffic control measures.

Each roadway classification has a different capacity based on level of service, with freeways and highways having the highest capacities. Based on traffic estimates from similar roadways, and using peak numbers and a conservative estimate, roads that would be the most likely available to Murrieta Hills residents and their estimated hourly capacities are:

1. Keller Road – 2,600 vehicles/hour
2. Zeiders Road – 500 vehicles/hour

3. Gloria Road – 500 vehicles/hour
4. McElwain Road – 2,600 vehicles/hour

Using these estimates, the length of time it will take for an area to evacuate can be determined by dividing the number of vehicles that need to evacuate by the total roadway capacity. Based on Murrieta Hills' estimated 697 single family homes, and assuming 2.7 cars per household (U.S. Census Bureau 2016), during an evacuation, it is calculated that up to 1,882 vehicles could be evacuating from the residential areas. Commercial areas will add traffic to an evacuation occurring during daytime hours. It is estimated that 200 additional vehicles may be on site at any one time. Therefore, worst case, in a major incident that required full evacuation of the community, it is estimated that up to 2,082 vehicles may be evacuating, although this is a conservative estimate as that number would likely be far lower as many families would likely drive in one vehicle versus in multiple vehicles and depending on the time of day, many of these vehicles may already be off site, such as if a fire occurred during typical work hours.

Based on the internal roadway capacities of at least 2,600 vehicles per hour, four potential egress routes, off-site roadway capacities, and incorporating the lowest capacity roadway in a worst case condition, and discounting the capacity for the possibility that traffic would move slower during some evacuations, it is estimated that between 1 to 2 hours may be necessary for a complete evacuation of Murrieta Hills. The maximum timeframe is a very conservative estimate that may be reduced with law enforcement managing traffic flow and maximizing efficiency by routing neighborhoods out the four available egress routes and then south, north, or west, as appropriate. Up to two hours for complete evacuation is not considered unusual and would be accommodated during large, wind driven wildfires from the east. Wildfires originating closer to the community would allow significantly less time for evacuation, and Murrieta Hills offers decision makers with contingency options, including evacuating or relocating a portion of the community (much lower number of vehicles and faster evacuation time, proportional to the vehicle total being moved).

6.5 Murrieta Hills Resident Fire/Evacuation Awareness

The Murrieta Hills Community HOA will be active in its outreach to residents regarding fire safety and general evacuation procedures. There are aspects of fire safety and evacuation that require a significant level of awareness by the residents and emergency services in order to reduce and/or avoid problems with an effective evacuation. Mitigating potential impediments to successful evacuations requires focused and repeated information through a strong educational outreach program. The Murrieta Hills HOA will engage residents and local fire agencies through a variety of methods.

Key sections of this FPTR and evacuation plan will be provided to each homeowner/HOA member as well as being accessible on the HOA Website. Annual reminder notices will be provided to each homeowner encouraging them to review the plan and be familiar with community evacuation protocols. The HOA will work with local fire agencies to hold an annual fire safety and evacuation preparedness informational meeting. The meeting will be attended by representatives of the fire agencies and important fire and evacuation information reviewed. One focus of these meetings and of the HOA's annual message will be on the importance of each resident to prepare and be familiar with their own "Ready, Set, Go!" evacuation plan. The "Ready, Set, Go!" program is defined at: http://wildlandfirersg.org/ and information about preparing an individual Action Plan is provided in Appendix G.

The focus of the "Ready, Set, Go!" program is on public awareness and preparedness, especially for those living in the wildland-urban interface (WUI) areas. The program is designed to incorporate the local fire protection agency as part of the training and education process in order to insure that evacuation preparedness information is disseminated to those subject to the potential impact from a wildfire. There are three components to the program:

"READY" – Preparing for the Fire Threat: Take personal responsibility and prepare long before the threat of a wildfire so you and your home are ready when a wildfire occurs. Create defensible space by clearing brush away from your home as detailed in this FPTR (Dudek 2017). Use only fire-resistant landscaping and maintain the ignition resistance of your home. Assemble emergency supplies and belongings in a safe spot. Confirm you are registered for Reverse 911. Make sure all residents residing within the home understand the plan, procedures and escape routes.

"SET" – **Situational Awareness When a Fire Starts:** If a wildfire occurs and there is potential for it to threaten Murrieta Hills, pack your vehicle with your emergency items. Stay aware of the latest news from local media and your local fire department for updated information on the fire. If you are uncomfortable, leave the area.

"GO!" – **Leave Early!** Following your Action Plan provides you with knowledge of the situation and how you will approach evacuation. Leaving early, well before a wildfire is threatening your community, provides you with the least delay and results in a situation where, if a majority of neighbors also leave early, firefighters are now able to better maneuver, protect and defend structures, evacuate other residents who couldn't leave early, and focus on citizen safety.

"READY! SET! GO!" is predicated on the fact that being unprepared and attempting to flee an impending fire late (such as when the fire is physically close to the community) is dangerous and exacerbates an already confusing situation. This Murrieta Hills Wildland Fire Evacuation Plan

provides key information that can be integrated into the individual Action Plans, including the best available routes for them to use in the event of an emergency evacuation.

Situation awareness requires a reliable information source. One of the most effective public notification methods is Reverse 911. Riverside County operates a Reverse 911 notification system (Early Warning Notification System) that provides a recorded message over land line telephone systems and cell phones relating to evacuation notices. It is up to individual residents to register their cell phones for the Reverse 911 notification. The registration of cell phones can be done on line at http://countyofriverside.us/residents/emergencies/earlywarningnotificationsystem.aspx.

As part of the Murrieta Hills resident fire awareness and evacuation readiness program, information will be delivered in a variety of methods. The HOA will be responsible to provide and distribute to each homeowner a complete copy of the project's FPTR and this Wildland Fire Evacuation Plan, including materials from the READY! SET! GO! Program. The HOA is also responsible for insuring the distribution of copies of the aforementioned materials to those individuals that purchase properties for re-sales and to the management of multi-family residential and commercial properties. The management of multi-family residential units that do not have individual unit ownership will be responsible for conducting informational sessions regarding the Fire Safety measures and Evacuation Plan details and will be responsible for making copies of the Evacuation Plans available for each unit. As with the multi-family residential properties, management of the commercial properties will be responsible for the dissemination of the Evacuation Plan information to their employees.

As part of the approval of this project, it shall be binding on the HOA to actively participate as a partner with the MFR, the RCFD, and law enforcement and to assist with the coordination and distribution of fire safety information they develop.

6.6 Murrieta Hills Evacuation Procedures

It is estimated that the minimum amount of time needed to move the Murrieta Hills population to urbanized and/or designated evacuation areas may require in excess of one hour to evacuate and up to two or more hours under varying constraints that may occur during an evacuation. This includes additional allowances for the time needed to detect and report a fire, for fire response and on-site intelligence, for Early Warning Notification System and in the field patrol cars announcing evacuations, and for notifying special needs citizens. Wolshon and Marchive (2007) simulated traffic flow conditions in the wildland urban interface (WUI) under a range of evacuation notice lead times and housing densities. To safely evacuate more people, they recommended that emergency managers (1) provide more lead time to evacuees and (2) control traffic levels during evacuations so that fewer vehicles are trying to exit at the same time.

Wildfire emergency response procedures will vary depending on the type of wildfire and the available time in which decision makers (Incident Command, MFR, RCFD, CAL FIRE, and/or County Office of Emergency Management) can assess the situation and determine the best course of action. Based on the community, it's road network, and the related fire environment, the primary type of evacuation envisioned is an orderly, pre-planned evacuation process where people are evacuated from the Murrieta Hills community to more urban areas further from an encroaching wildfire (likely to urban areas to the east, both north and south of the project) well before fire threatens. This type of evacuation must include a conservative approach to evacuating, i.e., when ignitions occur and weather is such that fires may spread rapidly, evacuations should be triggered on a conservative threshold that includes time allowances for unforeseen, but possible, events that would slow the evacuation process.

Evacuation is considered by many to offer the highest level of life protection to the public, but it can result in evacuees being placed in harm's way if the time available for evacuation is insufficient (Cova et al. 2011). An example of this type of evacuation which is highly undesirable from a public safety perspective is an evacuation that occurs when fire ignites close to vulnerable communities. Murrieta Hills is not considered a vulnerable community, however there are vulnerable communities within the region. This type of situation is inherently dangerous because there is generally a higher threat to persons who are in a vehicle on a road when fire is burning in the immediate area than in a well-defended, ignition resistant home. Conditions may become so poor, that the vehicle drives off the road or crashes into another vehicle, and flames and heat overcome the occupants. A vehicle offers little shelter from a wildfire if the vehicle is situated near burning vegetation or catches fire itself. This type of evacuation must be considered a very undesirable situation by law and fire officials in all but the rarest situations where late evacuation may be safer than seeking temporary refuge in a structure (such as when there are no nearby structures, the structure(s) is/are already on fire, or when there is no other form of refuge).

The third potential type of evacuation is a hybrid of the first two. In cases where evacuation is in process and changing conditions result in a situation that is considered unsafe to continue evacuation, it may be advisable to direct evacuees to pre-planned temporary refuge locations, including their own home if it is ignition resistant and defensible, such as those at Murrieta Hills. As with the second type of evacuation discussed above, this situation is considered undesirable, but the evacuation pre-planning must consider these potential scenarios and prepare decision makers at the IC level and at the field level for enacting a contingency to evacuation when conditions dictate.

Indications from past fires and related evacuations throughout Southern California, which has experienced increasingly more frequent and larger fires, are that evacuations are largely successful, even with a generally unprepared populace. It then stands to reason that an informed and prepared populace would minimize the potential evacuation issues and related risk to levels considered acceptable from a community perspective.

Evacuation orders or notifications are often triggered established and pre-determined model buffers which are based on topography, fuel, moisture content of the fuels and wind direction. Evacuations are initiated when a wildfire reaches or crosses one of these pre-determined buffers. Evacuations can also be very fluid. The incident command, law enforcement and County OES would jointly enact evacuations based on fire behavior.

6.6.1 Murrieta Hills Evacuation Baseline

For purposes of this Evacuation Plan, the first and most logical choice for all of the residents and guests within the boundaries of the Murrieta Hills Community is to adhere to the principals and practices of the "READY! SET! GO!" Program previously mentioned in this document. As part of this program, it is imperative that each resident develop a plan that is clearly understood by all family members and attends the educational and training programs sponsored by the Murrieta Hills HOA and the local fire agencies. In addition, it is imperative that the "READY! SET! GO!" Program information is reviewed on a routine basis along with the accompanying maps illustrating evacuation routes, temporary evacuation points and pre-identified evacuation areas. It must be kept in mind that conditions may arise that will dictate a different evacuation route than the normal roads used on a daily basis.

Residents are urged to evacuate as soon as they are notified to do so or earlier if they feel uncomfortable. Directions on evacuation routes will be provided in most cases, but when not provided, Murrieta Hills residents will proceed according to known available routes away from the encroaching fire. Depending on the type of emergency and the resulting evacuation, it could take as long as two hours or more to complete a community-wide evacuation, based on nationally recognized road capacity standards and competing use of the roads by residents from other areas.

Note: this evacuation plan will require adjustment and continued coordination by the Murrieta Hills HOA and/or developer and Fire/Law enforcement agencies during each of the construction phases. With each phase, the evacuation routes may be subject to changes with the addition of both primary and secondary evacuation routes.

6.6.2 Civilian and Firefighter Evacuation Contingency

As of this document's preparation, no community in California has implemented an official civilian shelter in place option during a wildland fire. Even the communities in Rancho Santa Fe, California which are designed and touted as shelter in place communities, were evacuated during the 2007 Witch Creek Fire. This is not to say that people have not successfully sheltered in place during wildfire, where there are numerous examples of people sheltering in their homes, in hardened structures, in community buildings, in swimming pools, and in cleared or ignition resistant landscape

open air areas. The preference will likely always be early evacuation following the "Ready, Set, Go!" model, but there exists the potential for unforeseen civilian evacuation issues, and having a contingency plan will provide direction in these situations that may result in saved lives. Potential problems during wildfire evacuation from Murrieta Hills include:

- Fires that prevent safe passage along planned evacuation routes
- Inadequate time to safely evacuate
- Fire evacuations during rush hour traffic or when large events are occurring
- Blocked traffic due to accidents or fallen tree(s) or power pole(s)
- The need to move individuals who are unable to evacuate

It is recommended that a concerted pre-planning effort focus on evacuation contingency planning for civilian populations when it is considered safer to temporary seek a safer refuge than evacuation.

6.6.2.1 Fire Fighter Safety Zones

The International Fire Service Training Association (IFTSA; Fundamentals of Wildland Fire Fighting, 3rd Edition) defines Safety Zones as areas mostly devoid of fuel, which are large enough to assure that flames and/or dangerous levels of radiant heat will not reach the firefighting personnel occupying them. Areas of bare ground, burned over areas, paved areas, and bodies of water can all be used as safety zones. The size of the area needed for a safety zone is determined by fuel types, its location on slopes and its relation to topographic features (chutes and saddles) as well as observed fire behavior. Safety zones should never be located in topographic saddles, chutes or gullies. High winds, steep slopes or heavy fuel loads may increase the area needed for a Safety Zone.

The National Wildland Fire Coordinating Groups (NWFCG), Glossary of Wildland Fire Terminology provides the following definitions for Safety Zone and Escape routes

> Safety Zone. An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuelbreaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity.

According to NWFCG, Safety Zone(s):

- Must be survivable without a fire shelter

- Can include moving back into a clean burn
- May take advantage of natural features (rock areas, water, meadows)
- Can include Constructed sites (clear-cuts, roads, helispots)
- Are scouted for size and hazards
- Consider the topographic location (larger if upslope)
- Should be larger if downwind
- Should not include heavy fuels
- May need to be adjusted based on site specific fire behavior

The definition for a safety zone includes provisions for separation distance between the properly equipped and trained firefighter and the flames of at least four times the maximum continuous flame height. Distance separation is the radius from the center of the safety zone to the nearest fuels. For example, considering worst case 43 foot tall flame lengths that may be possible in the fuels adjacent this project, then a 172 foot separation would be required, and more if there were any site-specific features that would result in more aggressive fire behavior. In order to provide 172 feet in all directions, a minimum 2.1 acres is considered necessary for a safety zone to be considered appropriate for one 3 person engine crew during an extreme weather fire.

If one considers the ignition resistant and maintained landscaping within each of the Murrieta Hills neighborhoods, along with the adjacent fuel modification zones that are a minimum of 150 feet wide, and Chapter 7A of California Building Code compliant structures, most of the project's interior roads would provide Safety Zones available to responding firefighters. Potential safety zones likely require additional focused study by MFR and other fire and law enforcement agencies.

6.6.2.2 Temporary Firefighter Refuge Areas

Firescope California defines a contingency plan when it is not possible to retreat to a safety zone. This contingency includes establishment of firefighter TRA(s), which are defined as:

> A preplanned area where firefighters can immediately take refuge for temporary shelter and short-term relief without using a fire shelter in the event that emergency egress to an established Safety Zone is compromised.

Examples of a TRA may include the lee side of a structure, inside of a structure, large lawn or parking areas, or cab of apparatus, amongst others. Differences between a TRA and a Safety Zone is that TRA's are closer to the immediate firefighting area, are considered a contingency to being able to get to a Safety

Zone, do not include a requirement for a large area set back four times the flame lengths of adjacent fuels, and cannot be feasibly pre-planned until firefighters arrive on scene and size up the situation.

Firescope appropriately notes that although Safety Zones and viable Escape Routes shall always be identified in the WUI environment, they may not be immediately available should the fire behavior increase unexpectedly. Often a TRA is more accessible in the WUI environment. A TRA will provide temporary shelter and short-term relief from an approaching fire without the use of a fire shelter and allow the responders to develop an alternate plan to safely survive the increase in fire behavior.

TRAs are pre-planned areas (planned shortly after firefighters arrive on scene) where firefighters may take refuge and temporary shelter for short-term thermal relief, without using a fire shelter in the event that escape routes to an established safety zone are compromised. The major difference between a TRA and a safety zone is that a TRA requires another planned tactical action, i.e., TRAs cannot be considered the final action, but must include self-defense and a move out of the area when the fire threat subsides. A TRA should be available and identified on site at a defended structure. TRAs are NOT a substitute for a Safety Zone. TRA pre-planning is difficult, at best because they are very site and fire behavior specific. For the Murrieta Hills Community, TRAs would likely include navigating into any of the neighborhoods or the commercial area where 150 feet wide fuel modification zones provide defensible space and maintained landscapes are provided, along with ignition resistant residences and wide roads that offer numerous opportunities for TRA.

The entire developed portions of the Murrieta Hills community, but especially the interior areas of neighborhoods, are considered TRAs. This is an important concept because it offers last-resort, temporary refuge of firefighters, and in a worst-case condition, residents. This approach would be consistent with Firescope California (2013) which indicates that firefighters must determine if a safe evacuation is appropriate and if not, to identify safe refuge for those who cannot be evacuated, including civilians.

Each of the site's residences that can be considered for TRA includes the following features:

- Ignition Resistant Construction
- 150 feet wide Fuel Modification Zones
- Annual inspections by 3rd party fuel modification zone inspectors
- Wide roadways with fire hydrants
- Maintained landscapes and roadside fuel modification
- Ember resistant vents
- Interior fire sprinklers

Because there is the possibility that evacuation of the project may be less safe than temporarily refuging on site, such as during a fast-moving, wind driven fire that ignites nearby, including temporary refuge within residences, in the commercial area, or elsewhere on site is considered a contingency plan for Murrieta Hills. This concept is considered a component of the "Ready, Set, Go!" model as it provides a broader level of "readiness" should the ability to execute an early evacuation be negated by fire, road congestion, or other unforeseen issues. Note: this approach would be considered a last-resort contingency during wildfire with the primary focus being on early evacuation.

6.7 Evacuation Plan Limitations

This Wildland Fire Evacuation Plan has been developed based on wildfire and evacuation standards commonly used in southern California and is specifically intended as a guide for evacuations for the Murrieta Hills Community. This plan provides basic evacuation information that will familiarize residents with standard evacuation preparedness protocols as well as travel route options that may be available to them during an emergency. However, because emergencies requiring evacuation have many variables and must be evaluated on a case by case basis, this plan shall be subservient to real-time law enforcement and fire personnel/ agencies' decision making and direction during an emergency requiring evacuation.

This Evacuation Plan promotes the "Ready, Set, Go!" model, adopted by the State of California and many fire agencies statewide, including MFR. The goal is to raise agency and citizen awareness of potential evacuation issues and get a majority of the public "Ready" by taking a proactive stance on preparedness, training drills, and visitor education, and evacuation planning efforts. The Murrieta Hills populace will be "Set" by closely monitoring the situation whenever fire weather occurs and/or when wildland fire occurs, and elevating pre-planned protocol activities and situation awareness. Lastly, officials will implement the plan and mandate that populations "Go" by executing pre-planned evacuation procedures in a conservative manner, i.e., evacuation will occur based on conservative decision points, as proposed in this evacuation plan or when directed by fire and law enforcement personnel, whichever is more conservative. The preferred alternative will always be early evacuation. However, there may be instances when evacuation is not possible, is not considered safe, or is not an option based on changing conditions. For example, should a fire occur and make evacuation from the project ill advised, a contingency plan for residents will be available. This contingency would include moving people to pre-designated temporary refuge areas until it is safe to evacuate or the threat has been mitigated.

Ultimately, it is the intent of this Evacuation Plan to guide the implementation of evacuation procedure recommendations such that the process of evacuating people from the Murrieta Hills project is facilitated in an efficient manner and according to a pre-defined, practiced evacuation protocol as well as providing a contingency option of temporarily refuging, if evacuation is considered less safe.

It is recommended that the evacuation process is carried out with a conservative approach to fire safety. This approach must include maintaining the Murrieta Hills fuel modification landscape, infrastructural, and ignition resistant construction components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation. Accordingly, evacuation of the wildfire areas should occur according to pre-established evacuation decision points, or as soon as they receive notice to evacuate, 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 wildland-urban interface to educate themselves on practices that will improve safety.

6.8 Wildfire Education

Murrieta Hills residents and occupants of commercial facilities will be provided on-going education regarding wildfire, the evacuation plan, and this FPTR's requirements. This educational information will support the fire safety and relocation features/plans designed for this community. Informational handouts, community Web-site page, mailers, fire safe council participation, inspections, and seasonal reminders are some methods that will be used to disseminate wildfire and relocation awareness information. MFR will be asked to review and approve all wildfire educational material/programs before printing and distribution.

The Murrieta Hills HOA will provide on-going resident education outreach regarding wildfire safety, the "Ready, Set, Go!"[5] pre-planning model, and this FPTR's requirements for the entire master-planned development. Informational handouts, facility Web-site page, mailers, fire safe council participation, inspections, and seasonal reminders are some methods that may be used to disseminate wildfire and relocation awareness information. The HOA will coordinate with MFR and other applicable fire agencies regarding wildfire educational material/programs before printing and distribution.

The Murrieta Hills residents and visitors of commercial and property facilities will be provided homeowners informational brochures at point of sale regarding wildfire and this FPTR'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. Of particular importance in this FPTR is the guidance in the types of plants that are allowed or prohibited in landscaped areas and appropriate construction within vegetation management zones.

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

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7 CUMULATIVE IMPACT ANALYSIS

Cumulative impacts from multiple projects within a fire agency's jurisdiction, like MFR can cause fire response service decline and must be analyzed. The Proposed Project represents a substantial development that would increase the existing call volume by 0.6 calls per day, on average. The resulting impact on fire services has been analyzed within this report and despite the population increase and anticipated call volume increase, the existing fire service delivery system is considered to have capacity to serve the Proposed Project. When compared to standard utilization rates for busy (10 calls per day for an urban station) fire stations (Hunt 2010), it is clear there is capacity to serve the Proposed Project.

Despite the relatively low increase in number of calls per year from the Proposed Project, it contributes to the cumulative impact on fire services, when considered with other anticipated projects within the MFR's primary response area.

The City responded to 9,456 calls in 2018 and is anticipated to surpass 10,000 calls in 2019. This equates to an average of 5.5 calls per day per station. Stations 2 and 3 respond to higher call volumes than this average and the other stations respond to fewer. The addition of over 1,000 calls per year, depending on where those calls originate, could result in a significant impact and negatively affect MFR's response capability. The addition of a sixth fire station, which is currently being explored by MFR, would mitigate this additional call volume, but would need to be situated where it could respond to the most new calls, or reduce the load for otherwise busy fire stations.

The Proposed Projects' as well as other area projects that may be approved, provide revenue for fire resources through funding via tax allocations and fire impact fees. This revenue source is expected to fund capital improvements to enhance MFR's response capabilities and at least maintain the current standards for firefighting and emergency response. The City is contemplating constructing a sixth fire station and contributions from the Proposed Project and other City projects could be allocated toward ongoing maintenance of that station. Over the long term, it is anticipated that MFR will be able to perform its mission into the future at levels consistent with the its' internal response time goals.

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8 DETERMINATION OF PROPOSED PROJECT EFFECTS

FPTRs provide an evaluation of the adverse environmental effects a proposed project may have from wildland fire. The FPTR must identify mitigation for identified impacts to ensure that development projects do not unnecessarily expose people or structures to a significant loss, injury or death involving wildland fires. Significance is determined by answering the following guidelines:

Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildland are adjacent to urbanized areas or where residences are intermixed with wildland?

The wildland fire risk in the vicinity of the Proposed Project site has been analyzed according to industry standard Guidelines for Determining Significance. It has been determined that wildfires may occur in wildland areas that surround the project site, but would not be significantly increased in frequency, duration, or size with the construction of the Proposed Project. The Proposed Project would include conversion of fuels to maintained development with designated MFR review of all landscaping and fuel modification areas and highly ignition resistant structures. As such, the site will be largely converted from readily ignited fuels to ignition resistant landscape and structures that are provided defensible space that exceeds local and State of California standards. In addition, the project provides multiple access points for firefighter ingress and resident egress, water and fire flow to code, and other fire protection features, as described throughout this FPTR.

Ignition Resistant Structures

The ignition resistant requirements for new communities built in high or very high fire hazard severity zones have been determined by State and Local Fire agencies to provide acceptable resistance to ignition from the types of wildland fires produced by southern California's wildland fuels, terrain, and weather. San Diego County conducted after-fire assessments that strongly indicate that the building codes are working in preventing home loss. Of the 15,000 structures within the 2003 Cedar fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 Witch Creek Fire perimeter, 17% were damaged or destroyed. Only 3% of the 789 homes that were built to 2001 codes were impacted and only 2% of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008). Many of the newer structures that were lost were due to human error. Similarly, of 194 structures lost or damaged in the Orange County Freeway Complex Fire (2008), there were no structures within the fire perimeter lost that were built to at least the 1996 special fire area codes (similar to the CBC Chapter 7A requirements) enacted by the City of Yorba Linda (OCFA 2008). Those codes required structure hardening against wildfire,

but are less restrictive and result in less ignition resistant structures than current San Diego County Building and Fire Code requirements. Structures built to the 2013 Fire and Building Codes result in highly ignition and ember resistant structures. When combined with maintained fuel modification areas, fire apparatus access, water (fire flow), and an equipped and trained responding fire agency, the result is a defensible project.

Effective Fuel Modification Zones

Provisions for modified fuel areas separating wildland fuels from structures have also reduced the number of fuel-related structure losses by providing separation between structures and heat generated by wildland fuels. The provided 150 foot wide (plus 20 foot backyards) fuel modification zones are designed to not only minimize wildfire encroaching upon the community, but to minimize the likelihood that an ignition from on site spreads into the Preserve by separating the unmaintained vegetation occurring outside the fuel modification zones with that in the FMZs. The FMZs will be maintained on an ongoing basis with the first 50 feet irrigated, resulting in high fuel moisture, which is difficult to ignite (USFS-WFAS 2015). In addition, FMZs provide benefits of reduced fuel densities, lack of fuel continuity, and a reduction in the receptiveness of the landscape to ignition and fire spread. Fires from off site would not have continuous fuels across the development footprint and would therefore be expected to burn around and/or over the developed landscape via spotting. Burning vegetation embers may land on Proposed Project structures, but are not likely to result in ignition based on ember decay rates and the types of non-combustible and ignition resistant materials and venting that will be used within the Proposed Project and the ongoing inspections and maintenance that will occur in perpetuity in the Proposed Project's landscaped and fuel modification areas.

Most of the primary components of the layered fire protection system provided for the Proposed Project are required by MFR. However, they are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire. In addition, interior fire sprinklers which will be provided in all structures (now required by code), have a track record of extremely high reliability (Bukowski, et.al. no date) approaching 98% and statistics indicate that fires in homes with sprinklers resulted in 82% lower property damage and 68% lower loss of life (Hall 2013). Although not designed for wildland fire defense, should embers succeed in entering a structure, sprinklers provide an additional layer of life safety and structure protection.

Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the 2007 Building Code and have been retained and enhanced in code updates since then. The following project features are required for new development in WUI areas and form the basis of

the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

- Application of the latest adopted ignition resistant building codes;
- Exterior wall coverings are to be non-combustible or ignition resistant;
- Multi- pane 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;
- Modern infrastructure, access roads, and water delivery system;
- Maintained fuel modification areas; and
- Fire apparatus access roads throughout the Project.

Ignition Sources

The types of potential ignition sources that currently exist in the area include overhead power lines, vehicles, roadways, trespassers, and off-site residential neighborhoods. The Proposed Project would introduce potential ignition sources, particularly more people in the area. However, mitigating this increase in potential ignition sources, the Proposed Project would convert nearly 335 acres of ignitable fuels to lower flammability landscape and include better access throughout the site, managed and maintained landscapes, and more eyes and ears on the ground to reduce the likelihood of arson, off-road vehicles, or shooting related fires.

The Proposed Project would comply with the applicable fire and building codes and would include a layered fire protection system designed to current codes and inclusive of site-specific measures that will result in a Proposed Project that is less susceptible to wildfire than surrounding landscapes and that would facilitate fire fighter and medical aid response. These features combined with the ignition resistance construction required result in consistency with Guidelines and a resulting acceptable fire hazard risk.

Would the project result in inadequate emergency access?

The Project includes two areas, PA 3 and PA 7 that include the potential for dead end road lengths exceeding the standard. However, lots in these planning areas are all within 800 feet of roads that provide options to travel in at least two separate directions and the roads that would be used travel through very low hazard landscapes. The intent of the long dead end road standard is to avoid residents and firefighter from having to travel long distances to safer areas through wildland fuels. This community includes managed landscapes, ignition resistant structures, and pavement along with up to

170 foot wide FMZs (including rear yards) at the perimeter of the project, providing a significantly safer route out of the area than is considered in the standard. As a conservative fire planning approach, the Project provides additional fire protection measures throughout the Project to mitigate the potential long dead end roads. Measures provided include:

- Extended fuel modification zones
- Heat deflecting walls along sections of evacuation routes
- FMZ access points for firefighters and maintenance
- An all-weather, maintained trail around Project perimeter for firefighter access
- Elimination of fuels adjacent structures (weep screed protection)
- Additional hardening of structures – ember resistant vents
- Evacuation plan and active HOA outreach
- Others as described in detail in Section 5.3.1.2

The proposed internal looped roadways provide emergency access that includes a minimum of 24 feet (two 12 foot wide, unobstructed travel lanes) and room for parking. Additionally, the roads would provide residents the option to evacuate from at least two egress points from each neighborhood. Depending on the nature of the emergency, residents can exit to the north/northeast along code consistent Keller Road, or along Gloria or Zeiders Roads, neither of which is currently compliant with road standards, but are available and passable. In addition, McEwlain Road will be constructed by the Project and extend to the south, providing a remote ingress/egress route in the opposite direction of the other routes. Further, during emergencies when it is safer to remain on site, temporary refuge would be possible as a last resort, if evacuation was considered unsafe, given the large area of developed landscape that will result from the Proposed Project's construction. The internal roadways from the residences to Keller Road will be provided fuel modified passageways. The Proposed Project will provide a minimum of 20 feet of modified fuel areas along both sides of all on site and McElwain road will receive at least 80 feet of FMZ along the west exposure and at least 20 feet along the easterly side to provide a buffer that will act to reduce ignitions from vehicle related causes and provide set back from wildland fuels.

Evacuation would be focused on early evacuations, long before fire was in the area, following the "Ready, Set, Go!" model, or else contingency options that would be available to this Proposed Project may be determined to be safer than evacuating by responding fire and law enforcement personnel. An evacuation plan will be prepared for the Proposed Project and provided to the residents so that all residents are aware of the evacuation routes, of the fluidity of wildfire events, and of the options that may be presented to them by responding law enforcement and/or fire personnel, Reverse 911, or other

officials. An annual evacuation awareness program will be conducted as well as online access to fire awareness educational material on the Communities' Website.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

The Proposed Project is projected by Dudek's call volume analysis (utilizing the more conservative between Murrieta's actual (87 calls per 1,000 persons per year) and a national per capita call generation factor of 82 calls per 1,000 persons) to add approximately 201 calls per year to the MFR's existing call load. This is not substantial enough of an increase to require additional resources given that Station 4 currently runs just over four calls per day. Additionally, the nearby location of Station 4 negates the need for additional facilities in terms of meeting the City's emergency travel time standard.

Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The Proposed Project will be served by the Eastern Municipal Water District (EMWD). Facilities exist within Keller Road. An EMWD water tank exists along the project's northern boundary, which is not a part of this project. Additional upgrades to the system, including up to three water tanks, are being proposed within the Proposed Project site. All water storage and hydrant locations, mains and water pressures will be designed to fully comply with City's Guidelines for Fire Flow per 2016 edition of the California Fire Code as amended by the City of Murrieta.

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9 FINDINGS FOR COMPLIANCE WITH CALIFORNIA GOVERNMENT CODE 66474.02

From a practical standpoint, the dead end road lengths in Title 14 are provided to help ensure that firefighters can safely ingress while citizens are safely egressing (Board of Forestry and Fire Protection 2014). Title 14 lists its road requirements intent as (1273.00. Intent):

> Road and street networks, whether public or private, unless exempted under section 1270.02(e), shall provide for safe access for emergency wildland fire equipment and civilian evacuation concurrently, and shall provide unobstructed traffic circulation during a wildfire emergency consistent with Sections 1273.00 through 1273.11.

Paulos (1991) indicates that the dead end road lengths derived in 1991, and presumably continuing to the 2016 update of Title 14, were:

> "selected to consider safe emergency ingress and egress during a wildfire. Dead-end roads require that civilians and fire fighters exit the road at the same point they entered the road. Like a one-way road, there are many hazardous limitations including being trapped by a wall of flame, falling trees, disabled vehicles, long travel distances before being able to turn around, and the potential for large numbers of vehicles traveling that road. This section limits or reduces the potential dangers of dead-end road to fire fighters and civilians.
>
> The distances were selected to consider the number of turnouts necessary to provide for fire engine passage and the ability to turn around, drive forward and exit the road. In addition, limitations are based on the volume of vehicle traffic that may be present and utilizing a road with only one point of ingress and egress during an emergency. This will allow more rapid evacuation and escape of civilians without conflict with arriving fire resources. The distances and zoning limits the amount of traffic and the distances to be traveled to provide reasonable safety for the fire fighters as described in 1273.08".

Section 1273.08 explains that the road length "limits the distance a CDF engine may face opposing traffic on a one lane road and places a safety egress within a maximum of three minutes of travel (very little time in the face of a fast moving fire storm) at 20 mph." In reality, at 20 mph, an engine could travel 5,280 feet. Thus, If three minutes at 20 mph is the basis for the dead end road lengths, then the entire project meets the intent of the code as all units can exit the project via one of the four available access points within 3 minutes travel. Further, the requirement is most applicable where roads cross fuel beds, are less than 20 feet wide, include extensive unmaintained trees, do

not include opportunities for engine turnaround, and do not include a loop with a second roadway. The roads will be a minimum of 40 feet wide with no parking allowed and will travel through developed and maintained landscapes with perimeter FMZ of 150 feet and roadside FMZ. These factors all but eliminate the possibility that a "wall of flame", falling trees, disabled vehicles, or long travel distances before being able to turn around would be encountered during an evacuation.

This intent is justified and can be implemented in a variety of ways, based on site specific features, project provisions, and planning strategies. However, there is no scientific basis supporting the Title 14 dead end road lengths and the Board of Forestry recently tasked scientists at Cal Poly San Luis Obispo to evaluate the issue and provide recommendations (Cal Poly 2016). The results of that study indicate that the dead end road lengths required in Title 14 are arbitrary and it was recommended that they be abandoned and removed from Title 14 (Cal Poly 2016).

One major weakness with the arbitrary dead end road lengths is that they do not account for site-specific characteristics or provided features that make longer road lengths as safe, or safer than, the listed lengths. For example, a dead end road that is narrow (less than 20 feet) and extends through heavy vegetation into a box canyon, should be limited on how long it is based on civilian and firefighter safety. However, a 40 feet wide road, traveling through developed, maintained landscapes, with connections to roads that provide additional options for travel, should not be constrained in the same manner to the arbitrary length limits. These two scenarios are in sharp contrast and the latter example represents the conditions at the Project site.

The Project meets the arbitrary 800 feet dead end road length requirements for most of the project. Roads within PA 3 and PA 7 form an extension off of the main road loop through the Project, and these portions of the project could be interpreted as dead-ends because the road serving this area is a loop with access points within 250 feet of each other (Figure 3). PA 3 includes an approximately 1,600 feet cul-de-sac and PA 7 includes a nearly 2,700 feet extension from the entrance to the end of the cul-de-sac at the furthest point, but both are accessed by 40 foot wide roads traveling through fuel modified urban landscapes.

Attempting to force this Project's access roads into the Title 14 dead end road length model is tenuous, at best because every Project planning area offers at least two wide travel road options from every lot within 800 feet of that parcel. This negates the potential for constrained fire apparatus access and supports fast community wide evacuations, consistent with Title 14.

Because PAs 3 and 7 are being questioned regarding Title 14 requirements, even though, as described above, it is considered a questionable comparison, this FPTR addresses these planning areas and other key locations throughout the community with additional fire safety enhancements,

as part of a conservative approach, to make a finding that the Proposed Project meets the intent of Title 14 and California Government Code 66474.02.

The fire code official has the authority to require more than one fire apparatus access road based on the potential for impairment of a single road by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access. The Proposed Project provides secondary access options.

Section 1270.07 of PRC 4290 provides an exception. Paulos (1991) describes the purpose of the exception as: "This is necessary to permit parties to proceed with their project when equal protection can be provided but the action would not otherwise be allowable under the regulations." He goes on to explain "There will be situations occur where fuel conditions, building materials or practices, topography or other factors combine to form a set fire safe conditions which could not have been anticipated in these rules."

> Title 14 also allows exceptions to its standard (Sec.1270.07. Exceptions to Standards):Upon request by the applicant, exceptions to standards within this subchapter or local jurisdiction certified ordinances may be allowed by the inspection entity listed in 14 CCR 1270.05, where the exceptions provide the same overall practical effect as these regulations towards providing defensible space. Exceptions granted by the inspection entity listed in 14 CCR 1270.05 shall be made on a case-by-case basis only.

Title 14 defines exception and same practical effect as:

> An alternative to the specified standard requested by the applicant that may be necessary due to health, safety, environmental conditions, physical site limitations or other limiting conditions such as recorded historical sites, that provide mitigation of the problem. Same Practical Effect: As used in this subchapter means an exception or alternative with the capability of applying accepted wildland fire suppression strategies and tactics, and provisions for fire fighter safety, including:
>
> (a) access for emergency wildland fire equipment,
>
> (b) safe civilian evacuation,
>
> (c) signing that avoids delays in emergency equipment response,
>
> (d) available and accessible water to effectively attack wildfire or defend a structure from wildfire, and
>
> (e) fuel modification sufficient for civilian and fire fighter safety.

The Project provides each of these accepted wildland fire suppression strategies and tactics and provisions for fire fighter safety through a redundant, layered system of protection.

Additional code support for the Proposed Project can be found in the Government Code (Sec 66474.02), which outlines the finding that must be made before a tentative map within a VHFHSZ is approved:

1. A finding supported by substantial evidence in the record that the design and location of each lot in the subdivision, and the subdivision as a whole, are consistent with any applicable regulations adopted by the State Board of Forestry and Fire Protection pursuant to Sections 4290 and 4291 of the Public Resources Code.
2. A finding supported by substantial evidence in the record that structural fire protection and suppression services will be available for the subdivision through any of the following entities:
    a. A county, city, special district, political subdivision of the state, or another entity organized solely to provide fire protection services that is monitored and funded by a county or other public entity.
    b. The Department of Forestry and Fire Protection by contract entered into pursuant to Section 4133, 4142, or 4144 of the Public Resources Code.
3. A finding that to the extent practicable, ingress and egress for the subdivision meets the regulations regarding road standards for fire equipment access adopted pursuant to Section 4290 of the Public Resources Code and any applicable local ordinance.
4. This section shall not supersede regulations established by the State Board of Forestry and Fire Protection or local ordinances that provide equivalent or more stringent minimum requirements than those contained within this section.

Each of these Government Code requirements can be shown to be provided by the Project, or significant mitigations are provided as same practical effect, as discussed in detail in following sections.

The feasibility of providing two additional secondary access roads, one to the north from PA 5 or 7 and one to the east southeast from PA 3 were analyzed. However secondary access routes have proven infeasible based upon this evaluation. The options all include physical challenges, a combination of steep terrain, environmental and biological habitat constraints, necessity for modifications to City roadway standards, dangerous conditions of the secondary access road as it crosses fuel beds, and inability to encroach on MSCP preserve lands.

Since secondary access is not feasible given the constraints described above, the project has developed an alternative approach for secondary access that meets the intent of the code through the implementation of a list of specifically developed measures and features.

A request for an exception, as allowed in Title 14, PRC 4290 and the California Fire Code (Section 503.1.1) to the requirements for dead end road lengths is being requested for the project because the project technically conforms to secondary access requirements, as detailed in this FPTR, but also because additional egress (technically tertiary egress) from two planning areas is infeasible due to unique topographical, geological, and environmental conditions. As described above, the typical mitigation for exceeding the dead end road length is to provide secondary access. Because additional access points are not feasible, the project is proposing meeting the intent of the dead end road length through a combination of site design that allows at least two ways in and out of every neighborhood, site features, and customized measures that provide a system of fire safety above and beyond the already restrictive fire and building code requirements. This system of fire protection includes a redundant layering of measures designed to keep roadways open and passable, and reduce the possibility that wildfire threatens the project. Details are provided in the following section.

The "Findings and Mitigation Conclusion" described below form the basis for the following decisions made by the fire code official: 1) an alternative approach for secondary access has been developed that meets the intent of the code through the implementation of a list of specifically developed measures, and features; and 2) the modification is granted in that the intent and purpose of the fire code will be met by the project and such modification does not lessen health, life, and fire safety requirements.

Findings and Mitigation Conclusion

Summary of Findings and Mitigation for this Project:

In summary, the project is providing code-exceeding measures in various aspects of fire protection and safety that, combined, result in a highly defensible community, offer a means of equivalent egress, as well as contingency planning if evacuation from the site is considered unsafe. The following section provides details for each of the measures that have been developed for this project. Among the most notable of these measures are:

1. From a fire operations perspective, there are four access points into the Project. Two of these access points would provide egress to the north onto Keller Road while the third and fourth provides egress to the south along McElwain Road. Each Planning Area includes at least two roads in and out.
2. The Project is provided additional Fuel Modification on the perimeter by including: 1) 150 feet wide HOA managed perimeter FMZs; 2) 20 feet average rear yards with controlled landscaping, and 3) fuel modification within the central oak-riparian preserve, cultural resource set-asides, and roadsides.

3. The areas within the rear yards adjacent to the Project perimeter and the internal oak/riparian drainage will be considered FMZ areas and will require construction to Chapter 7A of the California building code (ignition resistant construction) for any sheds, gazebos, play equipment, or other structures.
4. The Project's structures will be required to utilize code-exceeding ember resistant vents vs the .25 inch mesh that would typically be required as embers are considered the primary wildfire threat to this Project.
5. The Project provides significant parking along designated roadways and will strictly enforce no parking areas through a contract with a towing company
6. The Project has prepared an evacuation plan and will provide public outreach to its residents through the HOA and annually host fire awareness days with the cooperation of the MFR.

The following list includes important fire protection features proposed by the Project:

Access

- **No Lot is More Than 800 Feet from Roads with Two or More Travel Options.** Each of the Project's residences will be within 800 feet of an intersection where travel in at least two separate directions is possible and travel via either of the options will be through managed landscapes that provide for safer travel than an arbitrary secondary access through an unmaintained fuel bed. The Project's interior roads are estimated to be able to effectively support up to 2,600 vehicles per hour. Keller Road and McElwain Road would be estimated to support up to 2,600 vehicles per hour each. The Project's site plan proposed 697 additional residences. If a conservative estimate of 2.7 cars per household is used (the California average is roughly 2.7 vehicles – U.S. Census Bureau 2016), there would be a total of approximately 1,882 vehicles plus vehicles associated with commercial areas seeking egress, assuming worst case. This estimate assumes a total worst-case scenario of 2,082 vehicles. The actual number of vehicles would likely be much lower than this. For example, if a fire occurred during the daylight hours, many of the vehicles would already be off site. If a fire occurred at night, families are likely to evacuate in one or two vehicles. Conservatively assuming 2.7 vehicles per household are evacuating, assuming evacuations occur through each of the three access points to Keller Road and via McElwain Road, and using the per hour vehicle totals for Keller and McElwain Roads, up to an estimated 2,600 vehicles per hour would be able to exit the area. This would accommodate 2.7 vehicles per residence (full evacuation) within a time frame of less than 1 hour. If McElwain Road was deemed unsafe to use in an evacuation, then Keller Road would be able to accommodate the Project's 2,082 max vehicles in an estimated one hour. If Zeiders and/or Gloria Roads are utilized, the one hour would be reduced proportionally to under one hour as it is

estimated up to 50% of the traffic could be diverted along these roads to the north. Building in time for unanticipated delays is prudent and results in an estimated full evacuation time of one to two hours.

- **Exceeds Fire Code Requirements: No Gates or Speed Bumps.** No gates or speed bumps or humps would be allowed in this project. This would allow traffic flow (ingress and/or egress) to move more rapidly in the case of emergency.
- **Parking Management Plan**. Street parking will be accommodated by wide roads and designated parking areas. Homeowners will need to obtain a parking permit to utilize any of the guest parking overnight. "No Parking" signs will be installed on designated streets within the project. Lastly, a contract with a towing company will be in place so that any vehicle that is illegally parked will be towed within a short timeframe. These efforts are designed to maintain the provided roads as unobstructed travel lanes so that emergency response vehicles are not hindered during responses.
- **Murrieta Hills Exceeds Fuel Modification Zone Standards.** The structures will be a minimum of 150 feet from wildland fuels (typically 170 feet including rear and/or side yards). Fuel Modification Zone setbacks exceed the City and State standard 100 feet. The Proposed Project provides a minimum of 50 feet wide irrigated Zone 1 and 100 feet of thinned Zone 2 (Appendix D).

  The internal oak-riparian corridor will be provided fuel modification to reduce fuels outside jurisdictional areas to 4 inch height. Oak-riparian habitat will be minimally thinned and canopy raised to prevent ladder fuels.

  Fuel modification is necessary to reduce the intensity of a wildfire by reducing the volume and density of flammable vegetation. These areas provide 1) increased safety for emergency fire equipment and evacuating civilians; 2) a point of attack or defense from a wildfire, and 3) strategic siting of fuel modification and greenbelts (Paulus 1991 – Fuel Modification Considerations 9044.5).
- **Formal Landscape Plan – Fire Department Review.** A formal landscaping plan would be required for the project. MFR or a retained fuel modification plan checker will review the plan for consistency with standard fuel modification layout, plant species, plant distribution, irrigation, etc.
- **Annual Inspections.** The designated FMZs Landscaping would be inspected annually and maintained on an ongoing basis. The HOA would annually hire a 3rd party, qualified FMZ inspector, or would be inspected by MFR. This would assure that the FMZs are maintained in a condition that would not facilitate fire spread. This would also reduce the impact of landscaping hanging into the roadways by reviewing size and location of trees and

maintaining 13-foot, 6-inch vertical clearance for fire apparatus. This will also eliminate the possibility that the project's landscape, over time, loses its functionality for reducing and minimizing fire intensity and providing defensible space throughout the project.

- **Restricted Landscaping Adjacent Structures.** An important component of the landscape plan that is not currently required by the State or City Codes is in the area adjacent to the residences' foundations. A one to three foot wide landscape free area would be provided to prevent flame impingement under the stucco along the weep screed and help prevent ember penetration into the structure stucco walls.

Fire Flow – Water Availability

- Water service will be provided by the Eastern Municipal Water District (EMWD). Facilities exist within Keller Road. EMWD water tank exists along the project's northern boundary, which is not a part of this project. Additional upgrades to the system, including up to three water tanks, are being proposed within the Proposed Project site. All water storage and hydrant locations, mains and water pressures will be designed to fully comply with City's Guidelines for Fire Flow per 2016 edition of the California Fire Code as amended by the City of Murrieta.
- **Murrieta Hills Fire Hydrants.** The project will inclcue 95 fire hydrants, spaced approximately every 300 feet along project streets, resulting in significant water access improvements.

Building Ignition Resistance

- **Murrieta Hills Exceeds Chapter 7A (California Building Code) Ignition-Resistant Building Standards.** The project will be subject to Chapter 7A ignition resistant building standards and will exceed those requirements in key areas:
    a. All ventilation for the structures for the development would require ember-resistant vents in addition to 1/8 screening. This exceeds current Building Code requirements.
        i. Vents for all structures will be ember resistant (Brandguard or O'Hagin)
        ii. Dryer vents will be ember resistant
    b. The fuel modification zones for Project perimeter homes and homes adjacent to the internal riparian area, including rear yard areas (total of 170 feet), will be considered limited building zones, which is not required by the code. This designation requires all structures, including sheds, gazebos, trellises, play equipment, and others to be constructed of ignition resistant materials per Chapter 7A of the California Building Code.

Emergency and Evacuation Planning

- **Murrieta Hills Evacuation Plan.** An Evacuation Plan and Working Guide based on the "Ready, Set, Go!" model has been developed includes the following subjects:
  a. Preparing your home – landscaping and home.
  b. Preparing your communications – 911, contact information, telephone usage, email, radio stations, and useful links using the internet.
  c. Registering home and cell phones with Reverse 911
  d. Preparing yourself and family – emergency routes out.
  e. Preparing for imminent evacuation.
  f. Preparing your pets and animals.
  g. Maps showing exit routes.
  h. Main evacuation routes and public safe zones.
- **Murrieta Hills – Shelter in Place Philosophy (Not Status).** The project will incorporate the same fire protection philosophies as shelter in place communities, but will not seek shelter in place status. Murrieta Hills, like most new communities in southern California, will offer emergency responders the last resort option of temporarily seeking refuge on site and directing residents to remain in their well-protected homes if early, safe evacuation is not possible.

Additional Provided Measures and Project Features That Reduce Risk and Are Integral Components of the Fire Protection System

Access and Roads

- **Availability of Alternative Evacuation Routes.** Currently two off-site northerly ingress/egress routes are available to inbound fire apparatus or outbound residents. These roads do not meet the fire code requirements. Gloria Road is a gravel road that is in condition that vehicles can drive and it would support imposed loads of fire engines. Zeiders Road is paved for portions of the roadway with a half mile long section that is gravel and rutted. Therefore, the Project cannot propose using this road to provide secondary access from the project site. But, the roadway would be available for use to connect to Scott Road (a public roadway to the north) in an emergency situation should Keller Road not be available.

- **Murrieta Hills Signage/Way Finding Plan.** The project will provide a lighted directory at each neighborhood entrance to assist with navigation through the community. In addition, street signs will be customized for this project and will meet or exceed lettering size. The goal is to provide clear, easy to follow signage to aid emergency response.
- **Murrieta Hills Road Maintenance.** The Project's road will be public, ensuring that the roads are maintained and available to emergency responders for the life of the Project.

Fire Agency Response and Resources

- **HGVS Annual Fire Operation Contribution.** The project will contribute fair-share funding annually toward fire operations through property tax allocations and fire prevention fee payments.
- The project will reimburse MFR for uncured cost associated with a Cooperative Wildfire Agreement with CAL FIRE for wildland fire protection on adjacent preserved land. Funding will be part of CFD/HOA dues and will be paid annually in perpetuity.
- **Fire Station Fast Response Travel Time to Murrieta Hills.** The existing Fire Station 4 is within 4 minutes travel to the most remote portions of the Proposed Project. This is a fast response and will assist in fire control, structure defense, and medical emergencies.

10 CONCLUSION

This FPTR has been prepared for the proposed Murrieta Hills project. This FPTR complies with the requirements of the Murrieta Fire Code (2001) and the 2016 California Fire and Building Codes. The recommendations in this document meet fire safety, building design elements, infrastructure, fuel management/modification, and landscaping recommendations of the applicable codes. The recommendations provided in this FPTR have been designed specifically for the proposed construction of structures within a WUI area. Where the project may not strictly comply with the Code, for dead end road length, alternative materials and methods have been proposed that provide functional equivalency as the code intent. The information provided herein supports the ability of the proposed structures and FMZs to withstand the predicted short duration, low to moderate intensity wildfire and ember shower that would be expected from wildfire burning in the vicinity of the site or within the site's landscape.

When properly implemented on an ongoing basis, the fire protection strategies proposed in this FPTR should significantly reduce the potential fire threat to vegetation on the community and its structures and should assist the fire authority in responding to emergencies in the Proposed Project Site. The Proposed Project's fire protection system includes a redundant layering of protection methods that have been shown through post-fire damage assessments to reduce risk of structural ignition. Modern infrastructure will be provided along with implementation of the latest ignition resistant construction methods and materials. Further, all structures are required to include interior, automatic fire sprinklers consistent with the fire codes. Fuel modification will occur on perimeter edges adjacent preserve areas as well as throughout the interior of the Proposed Project. This is a conceptual plan, which provides enough detail for MFR approval. Detailed plans, such as improvement plans, building permits, etc., demonstrating compliance with the concepts in this plan and with Fire Code requirements shall be submitted to the fire authority at the time they are developed.

Based on the results of this FPTR's analysis and findings, the following FPTR implementation measures will be provided by the Proposed Project as part of the proposed development plan:

1. Preparation of a Construction Fire Prevention Plan detailing the important construction phase restrictions and fire safety requirements that will be implemented to reduce risk of ignitions and pre-plans for responding to an unlikely ignition.
2. Project buildings will be constructed of ignition resistant construction materials based on the latest Building and Fire Codes.
3. Fuel Modification will be provided throughout the perimeter of the site and will be up to 170 feet wide in most locations, including the rear yard areas as part of the modified zone. Maintenance will occur in perpetuity as needed and the HOA will annually hire a 3rd party,

MFR-approved, FMZ inspector to provide annual certification that it meets the requirements of this FPTR.

4. Multiple ingress/egress points are provided the Project including three that are accessed off Zeiders Road and one via McEwlaine Road.
5. Fire apparatus access roads will be provided throughout the community and will vary in width and configuration, but will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances.
6. Firefighting staging areas and temporary refuge areas are available throughout the facility as well as along roadways and site green spaces.
7. Water capacity and delivery will provide for a reliable water source for operations and during emergencies requiring extended fire flow.
8. A site-specific evacuation plan has been prepared for the project and will include input and review with MFR, law enforcement and Riverside County Fire department OES.
9. The Community HOA will include an outreach and educational role to coordinate with MFR, oversee landscape committee enforcement of fire safe landscaping, ensure fire safety measures detailed in this FPTR have been implemented, and educate residents on and prepare facility-wide "Ready, Set, Go!" plans.

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

Although the proposed development and landscape will be significantly improved in terms of ignition resistance, it should not be considered a shelter-in-place community. It is recommended that the homeowners or other occupants who may use the facilities at the Murrieta Hills Community adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation. Accordingly, occupants and visitors should evacuate the

area as soon as they receive notice to evacuate, or sooner, if they feel threatened by wildfire. Fire is a dynamic and somewhat unpredictable occurrence and it is important for residents to educate themselves on practices that will improve their personal safety.

The developers, contractors, engineers, and architects are responsible for proper implementation of the concepts and requirements set forth in this Plan. Homeowners and property managers are responsible to maintain their structures and lots as required by this Plan, the Fire Department, and as required by the Fire Code. Alternative methods of compliance with this Plan can be submitted to the fire authority and MFR Fire Marshal for consideration.

It will be extremely important for all homeowners, property managers, and occupants to comply with the recommendations and requirements described and required by this FPTR on their property. The responsibility to maintain the fuel modification and fire protection features required for this Proposed Project lies with the homeowners and business owners. The HOA or similar entity will be responsible for ongoing education and maintenance of the common areas in perpetuity, while the fire authority will enforce the vegetation management requirements detailed in this Plan. Such requirements shall be made a part of deed encumbrances and CC&Rs for each lot, as appropriate.

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APPENDIX A

Photograph Log

MURRIETA HILLS

REPRESENTATIVE PHOTOGRAPHS

Photograph 1. View looking west along Keller Road. The northern Murrieta Hills property boundary is shown on the left-hand side (south side) of road.

Photograph 2. Photograph is taken at intersection of Keller Road and Zeiders Road, looking north.

Photograph 3. Another view of Zeiders Road with road improvements. A Portion of Zeiders Road is dirt, but passable by emergency and passenger vehicles.

Photograph 4. Opposite view as presented in photograph 3 of Zeiders Road looking north.

Photograph 5. View looking to the south along Gloria Road, which is unimproved but passable by emergency and passenger vehicles.

Photograph 6. Opposite view of photograph 5 looking north along Gloria Road

Photograph 7. Dry crop farming is occurring in the northeastern portion of the property. View is looking east toward I-215.

Photograph 8. View to the southeast and along proposed McElwain Road that connects with existing terminus north of Linnel Lane.

Photograph 9. A view of chamise chaparral habitat along western side of proposed McElwain Road.

Photograph 10. View of disturbed habitat located adjacent and north of existing Greer Ranch development.

Photograph 11. View of on-site fuel modification zones, consistent Zone 1 landscaping, protecting Greer Ranch residences along southern border of property.

Photograph 12. Another view of Zone 1 landscaping, looking west.

Photograph 13. A view of transition between chamise chaparral and Coast live oak (*Quercus agrifolia*) woodlands.

Photograph 14. Close-up view of plant species diversity and fuel loading underneath oak woodlands and fringe of eucalyptus tree canopy.

Photograph 15. Photograph of dense, chamise chaparral-covered hillsides. The chamise and mixed chaparral habitat dominates the property.

Photograph 16. Close-up view of chamise –chaparral fuel loading .

Photograph 17. A view of the eucalyptus woodland and leaf litter understory. Grove is located near abandoned structure.

Photograph 18. Close-up photograph of riparian habitat in the central portion of the property.

Photograph 19. A view looking from vacated nursery toward ridgeline in northwestern portion of property. Fuels (primarily coastal sage scrub) on this south-facing slope are less dense

Photograph 20. A significant target shooting area occurs on the property where the nursery used to reside.

Photograph 21. Numerous dirt roads occur on the property. View is looking east toward vacated nursery.

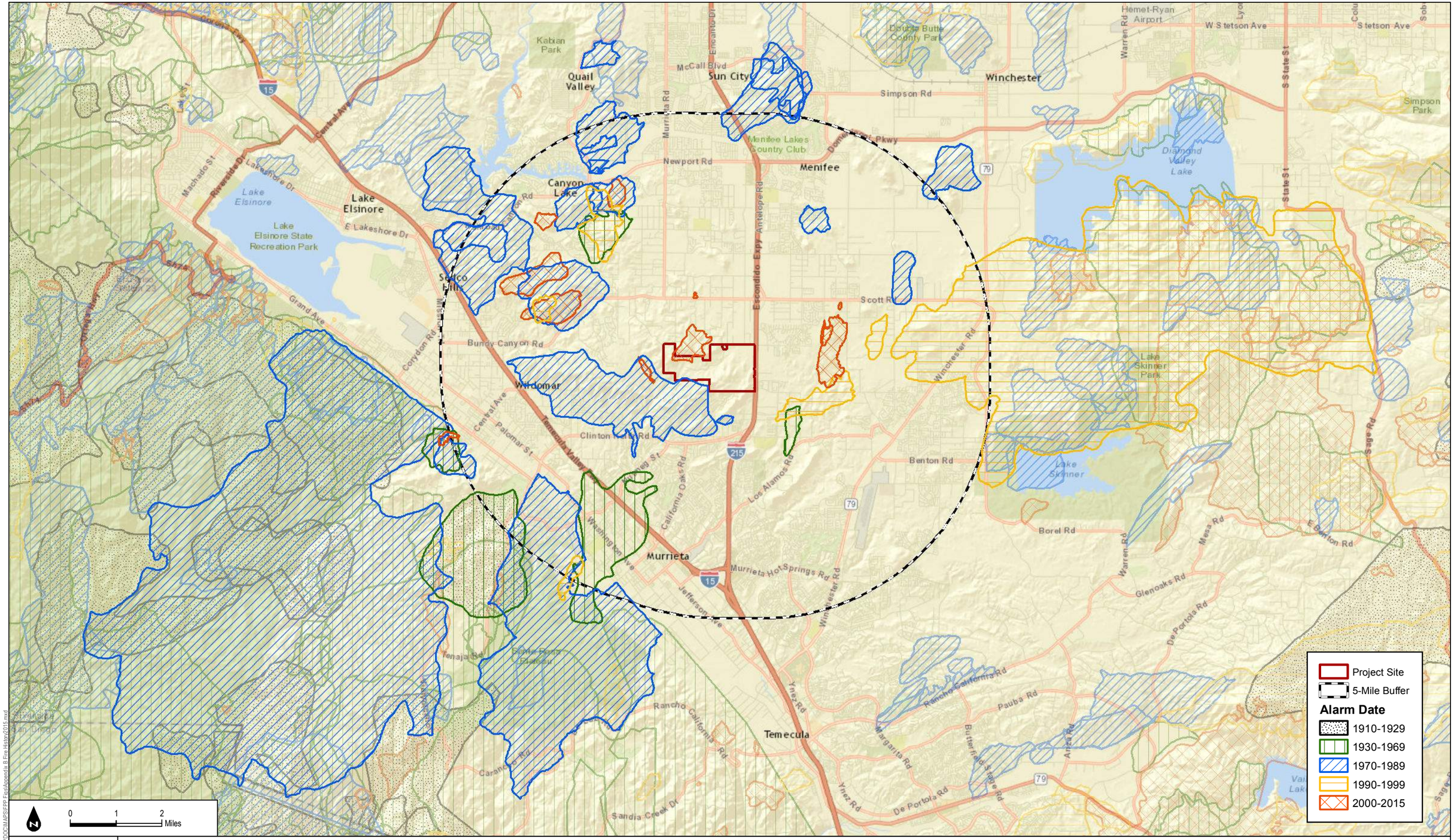
Photograph 22. A view of southwestern portion of property. Vegetation on slopes is coastal sage scrub and chaparral.

Photograph 23. A view of looking west toward Wildomar and Murrieta.

Photograph 24. View looking west. Note Santa Ana Mountains in background.

APPENDIX B

Fire History Exhibit



SOURCE: ESRI; Cal Fire 2015

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APPENDIX B

Project Vicinity Fire History

Murrieta Hills Fire Protection Plan

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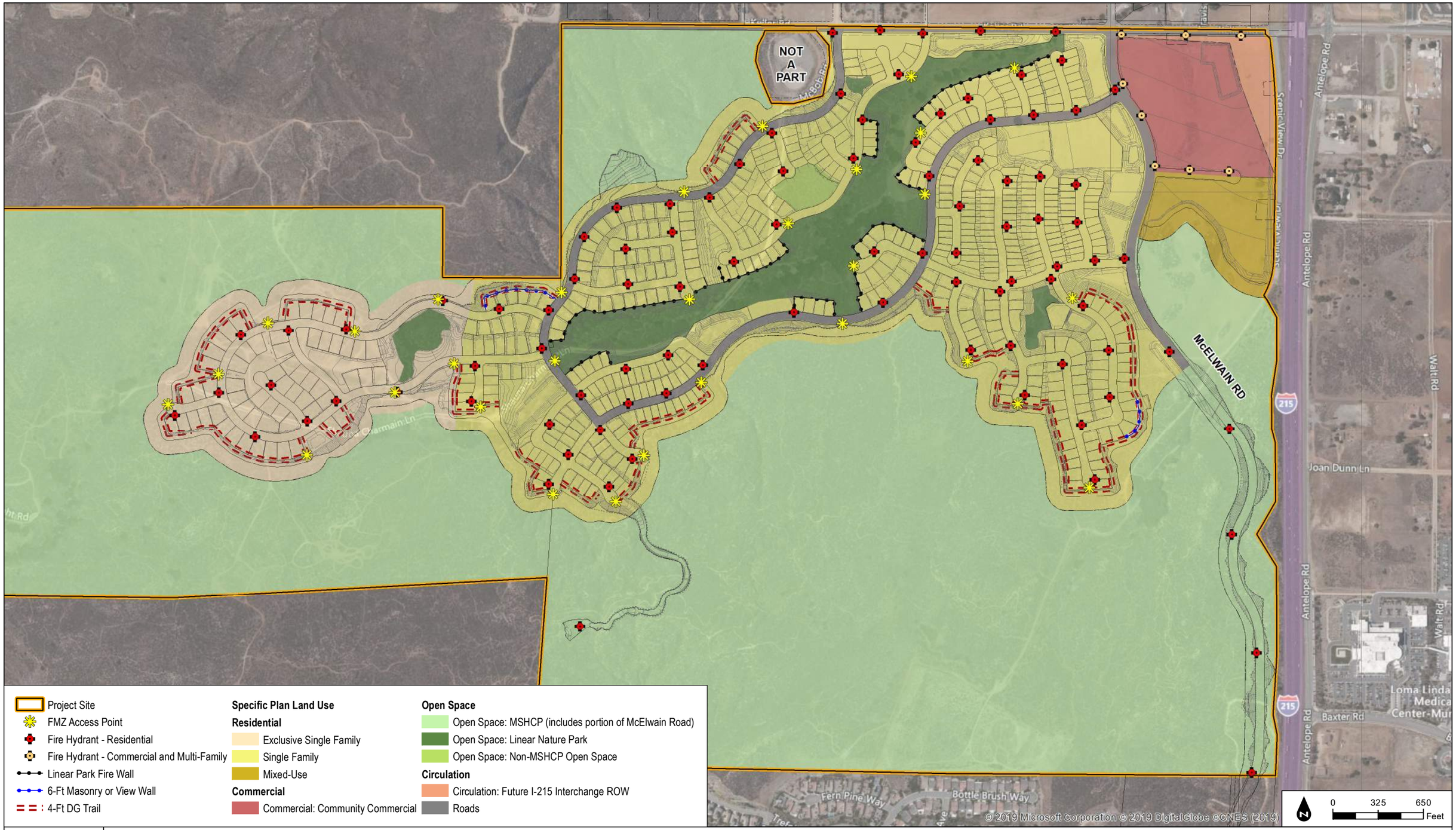
APPENDIX C

Murrieta Fire Rescue Approved Residential Hydrant Location Map



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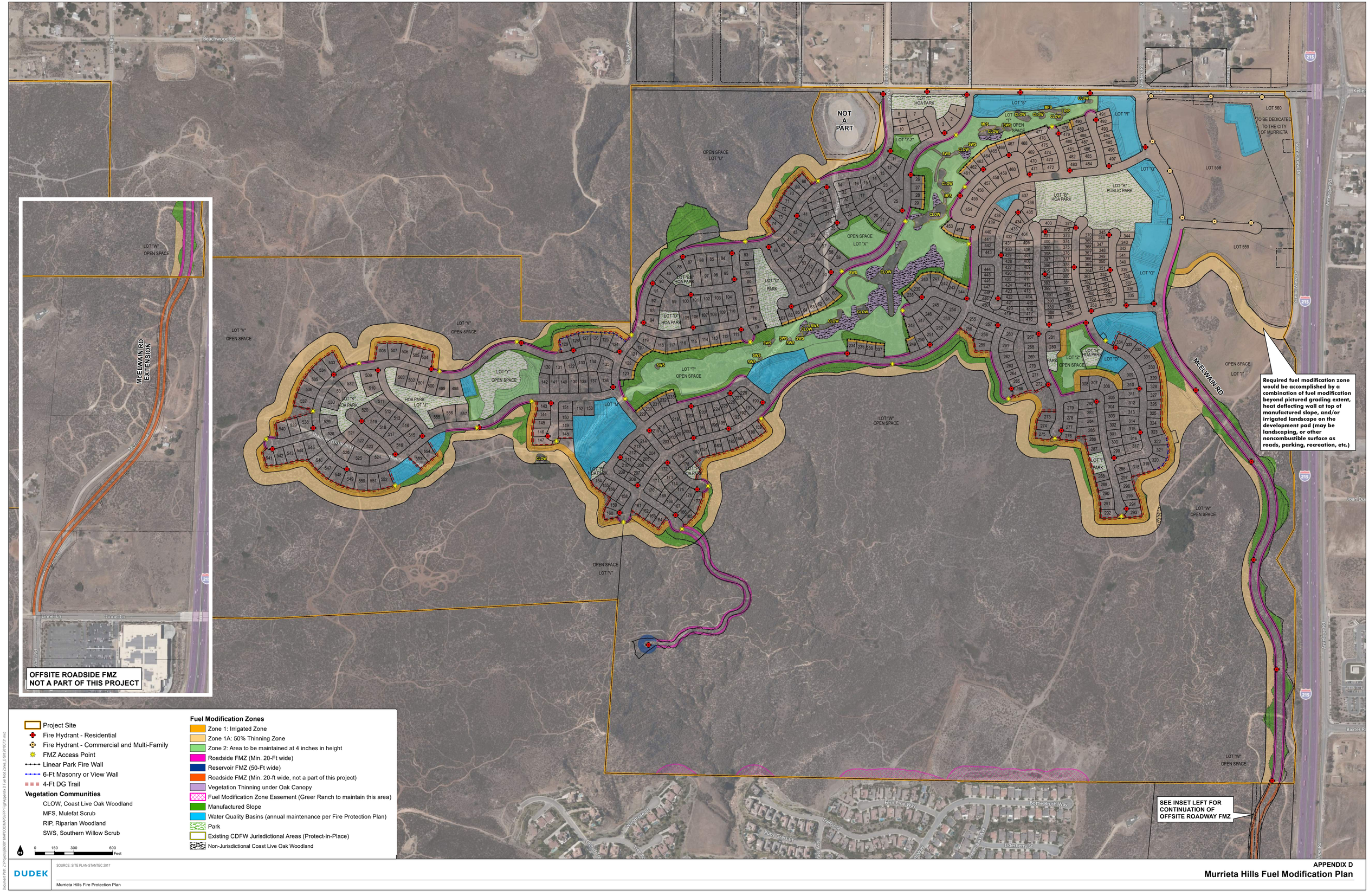
SOURCE: AERIAL-BING MAPPING SERVICE; DEVELOPMENT-MICHAEL BAKER INTERNATIONAL 2019

APPENDIX C

Murrieta Hills Site Plan with Approved Fire Hydrants

APPENDIX D

Fuel Modification Zones and Fire Safety Plan



Project Site
Fire Hydrant - Residential
Fire Hydrant - Commercial and Multi-Family
FMZ Access Point
Linear Park Fire Wall
6-Ft Masonry or View Wall
4-Ft DG Trail

Vegetation Communities

CLOW, Coast Live Oak Woodland
MFS, Mulefat Scrub
RIP, Riparian Woodland
SWS, Southern Willow Scrub

0 150 300 600 Feet

Fuel Modification Zones

Zone 1: Irrigated Zone
Zone 1A: 50% Thinning Zone
Zone 2: Area to be maintained at 4 inches in height
Roadside FMZ (Min. 20-Ft wide)
Reservoir FMZ (50-Ft wide)
Roadside FMZ (Min. 20-ft wide, not a part of this project)
Vegetation Thinning under Oak Canopy
Fuel Modification Zone Easement (Greer Ranch to maintain this area)
Manufactured Slope
Water Quality Basins (annual maintenance per Fire Protection Plan)
Park
Existing CDFW Jurisdictional Areas (Protect-in-Place)
Non-Jurisdictional Coast Live Oak Woodland

SOURCE: SITE PLAN-STANTEC 2017

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Murrieta Hills Fire Protection Plan

APPENDIX D
Murrieta Hills Fuel Modification Plan

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APPENDIX E

Example Acceptable Landscape Plant Palette

APPENDIX E
Example Acceptable Landscape Plant Palette

Trees and Palms

Botanical Name	Common Name	Entry Feature	Local Streets	Parks	Basins	Transitional/Naturalized	WUCOLS Region 4 Water Use
Aesculus californica	California Buckeye				✓	✓	L
*Arbutus "*Marina"	Strawberry Tree			✓	✓	✓	L
Brahea armata	Blue Hesper Palm	✓		✓			L
Celtis reticulata	Western Hackberry				✓	✓	L
Cercidium microphyllum	Little Leaf Palo Verde	✓		✓		✓	L
Cercis "Forest Pansy"	Eastern Redbud	✓					L
Cercis occidentalis	Western Redbud			✓	✓	✓	L
Chilopsis linearis "Burgundy"	Desert Willow	✓	✓	✓	✓	✓	L
Chitalpa tashkentensis "Pink Dawn"	Chitalpa	✓	✓	✓			L
Dracaena draco	Dragon Tree	✓	✓	✓			L
Fraxinus griffithii	Raywood Ash	✓	✓	✓			M
Geijera parviflora	Australian Willow	✓	✓	✓	✓	✓	M
Juglans californica	Southern California Black Walnut				✓	✓	L
Koelreuteria paniculata	Golden Rain Tree	✓	✓	✓			L
Lagerstroemia indica	Crape Myrtle	✓	✓	✓			M
Laurus nobilis	Sweet Bay	✓	✓	✓	✓	✓	L
Olea europaea "Swan Hill"	Fruitless Olive	✓		✓		✓	L
Parkinsonia "Desert Museum"	Palo Verde			✓	✓	✓	L
Pistacia chinensis	Chinese Pistache	✓	✓	✓			M
*Platanus x acerifolia "*Columbia"	London Plane Tree	✓	✓	✓			M
Platanus racemosa	California Sycamore			✓	✓	✓	M
Populus fremontii	Fremont Cottonwood				✓	✓	M
Prunus ilicifolia	Hollyleaf Cherry			✓	✓	✓	L
Pyrus calleryana	Callery Pear	✓	✓	✓			M

"Aristocrat"							
Quercus agrifolia	Coast Live Oak	✓		✓	✓	✓	L
Quercus ilex	Holly Oak	✓	✓	✓			L
Quercus engelmannii	Engelmann Oak			✓	✓	✓	M
Rhus lancea	African Sumac	✓	✓	✓	✓	✓	L
Sambucus mexicana	Mexican Elderberry			✓	✓	✓	L

Shrubs, Grasses, Succulents, Groundcovers, Vines

Botanical Name	Common Name	Ornamental	Basins	Transitional/Naturalized	WUCOLS Region 4 Water Use
Agave species	Agave	✓		✓	L
Arctostaphylos hookeri	Monterey Carpet Manzanita	✓	✓	✓	L
Atriplex lentiformis brewerii	Salt Bush		✓	✓	L
Baccharis pilularis "Pigeon Point"	Prostrate Coyote Bush	✓	✓	✓	L
Berberis spp.	Barberry	✓			L
Bulbine frutescens	Stalked Bulbine	✓			
Buddleja spp.	Butterfly Bush	✓		✓	L
Caesalpinia gilliessii	Red Bird of Paradise	✓		✓	L
Calliandra californica	Baja Fairy Duster	✓		✓	L
Callistemon "Little John"	Dwarf Bottlebrush	✓			M
Carex praegracilis	Western Meadow Sedge		✓		M
Ceanothus griseus horizontalis	California Wild Lilac	✓	✓	✓	L
*Cistus "*Sunset"	Orchid Rockrose	✓	✓	✓	L
Cistus salvifolius	Sageleaf Rockrose	✓	✓	✓	L
Cordia boissieri	Texas Olive	✓	✓	✓	L
Cordia parvifolia	Little Leaf Cordia	✓	✓	✓	L
Dalea capitata	Gold Dalea	✓	✓	✓	L
Dasylirion wheeleri	Desert Spoon			✓	L
Dodonaea viscosa "Purpurea"	Purple Hop Bush	✓	✓	✓	M
Elaeagnus pungens	Silverberry	✓	✓	✓	L
Encelia farinosa	Brittlebush		✓	✓	L
Eremophila glabra	Emu Bush	✓	✓	✓	L

Shrubs, Grasses, Succulents, Groundcovers, Vines

Botanical Name	Common Name	Ornamental	Basins	Transitional/Naturalized	WUCOLS Region 4 Water Use
Festuca ovina glauca	Blue Fescue	✓			M
Ficus pumila	Creeping Fig	✓			M
Grevillia "Noellii"	Noel"s Grevellia	✓			M
Hardenbergia violacea	Lilac Vine	✓			M
Hesperaloe parviflora	Red Yucca	✓		✓	L
Hesperaloe funifera	Giant Hesperaloe	✓	✓	✓	L
Heteromeles arbutifolia	Toyon	✓	✓	✓	L
Isomeris arborea	Bladderpod		✓	✓	L
Iva hayesiana	Poverty Weed		✓	✓	L
Lantana hyb. "New Gold"	New Gold Lantana	✓			M
Lavandula spp.	Lavender	✓			L
Lavatera assurgentiflora	Tree Mallow	✓	✓	✓	L
Leonotis leonurus	Lion"s Tail	✓	✓	✓	L
Leucophyllum spp.	Texas Ranger	✓	✓	✓	L
Leymus condensatus	Giant Wild Rye		✓	✓	L
Ligustrum japonicum "Texanum"	Texas Privet	✓			M
Lomandra longifolia "Breeze"	Dwarf Mat Rush	✓	✓		M
Lonicera hispidula	Twin Berry	✓			L
Lotus scoparius	Deer Weed		✓	✓	L
Lupinus spp.	Lupine	✓	✓	✓	L/M
Mahonia "Golden Abundance"	Golden Abundance Mahonia	✓			M
Mascagnia macroptera	Yellow Orchid Vine	✓			L
Mimulus aurantiacus	Sticky Monkey Flower		✓	✓	L
Myrtus communis	Common Myrtle	✓			M
Nasella pulchra	Purple Needle Grass	✓	✓	✓	L
Nolina parryi	Parry Beargrass	✓		✓	L
Optunia littoralis	Prickly Pear			✓	L
Parthenocissus tricuspidata	Boston Ivy	✓			M
*Pelargonium "*Red"	Geranium	✓			M
Penstemon spp.	Penstemon			✓	L

Shrubs, Grasses, Succulents, Groundcovers, Vines

Botanical Name	Common Name	Ornamental	Basins	Transitional/Naturalized	WUCOLS Region 4 Water Use
Photinia x fraseri	Fraser"s Photinia	✓			M
Pittosporum spp.	Dwarf Pittosporum	✓			M
Prunus illicifolia	Hollyleaf Cherry	✓	✓	✓	L
Pyracantha spp.	Firethorn	✓			M
Rhamnus californica	Coffee Berry	✓	✓	✓	L
Rhaphiolepis spp.	Indian Hawthorn	✓			M
Rhus ovata	Sugar Bush		✓	✓	L
Ribes aureum gracillimum	Golden Currant		✓	✓	L
Ribes speciosum	Fuschia-Flowered Gooseberry		✓	✓	M
Rosa banksiae	Lady Bank"s Rose		✓	✓	M
Rosa californica	California Rose			✓	L
Rosa "Noare"	Groundcover Rose	✓			M
Rosmarinus species	Rosemary	✓		✓	L
Russellia equisetiformis	Coral Fountain		✓	✓	L
Santolina chamaecyparissus	Lavender Cotton	✓			L
Sedum spp.	Stonecrop	✓			L
Simmondsia chinensis	Jojoba	✓	✓	✓	L
Sisyrinchium bellum	Blue-Eyed Grass	✓	✓	✓	L
Tecoma stans hybrid	Hybrid Tecoma	✓			L
Teucrium fruticans	Bush Germander	✓			L
Teucrium chamaedrys	Grermander	✓			L
Viburnum spp.	Viburnum	✓			M
Vitis californica	California Wild Grape	✓		✓	L
Westringia fruticosa	Coast Rosemary	✓		✓	L
Wisteria sinensis	Chinese Wisteria	✓			M
Yucca species	Yucca	✓	✓	✓	L

Acceptable Plant Species for Fuel Modification and Landscaping for Fire Retardance

Botanical Name	Common Name
California Native Trees	
Aesculus californica	California Buckeye
Cercis occidentalis	Western Redbud
Juglans californica	Black Walnut
Platanus racemosa	California Sycamore
Quercus acutidens	Scrub Oak
Quercus berberidifolia	Scrub Oak
Quercus agrifolia	Coast Live Oak
Quercus englemannii	Engleman Oak
California Native and Low Water Use Shrubs with Moderate to High Fire Retardance	
Ceanothus "Concha"	California Mountain Lilac
Ceanothus "Skylark"	California Mountain Lilac
Ceanothus crassifolius	Hoary-leaved Ceanothus
Cerccocarpus betuloides	Mountain Mahogany
Cistus species	Rockrose
Diplacus puniceus	Red Monkey Flower
Encelia farinosa	Brittlebush
Epilobium californicum	California Fuchsia
Eriogonum fasciculatum	California buckwheat
Heteromeles arbutifolia	Toyon
Keckiella antirrhinoides	Yellow Bush Snapdragon
Keckiella cordifolia	Heart Leaved Penstemon
*Leucophyllum frutescens "*Green Cloud"	Texas Ranger
Mahonia aquifolium	Oregon Grape
Mahonia nevinii	Nevin"s Barberry
Opuntia littoralis	Western Prickly Pear
Rhamnus californica "Eve Case"	Coffeeberry
Salvia mellifera	Black Sage
Senna artemesioides	Feathery Cassia
Senna phyllodenia	Silver Cassia
Rhus ovata	Sugar Bush
California Native and Low Water Use Ground Covers with Moderate to High Fire Retardance	
Artostaphylos hookeri "Monterey Carpet"	Monterey Carpet Manzanita
Baccharis pilularis "Pigeon Point"	Coyote Brush
Ceanothus griseus horizontalis "Yankee Point"	Carmel Mountain Lilac
Juncus patens	California Gray Rush
Myoporum parvifolium	Myoporum
Pentemon centranthifolius	Scalet Bugler
Penstemon eatonii	Firecracker Penstemon
Penstemon heterophyllus	Foothill Penstemon
Penstemon heterophyllus "BOP"	Blue Bedder

Acceptable Plant Species for Fuel Modification and Landscaping for Fire Retardance

Botanical Name	Common Name
Penstemon spectabilis	Beard Tongue
Santolina chamaecyparisis	Lavender Cotton
Santolina virens	Green Santolina
Yucca whipplei	Our Lord"s Candle

CITY OF MURRIETA FUEL MODIFICATION AND BRUSH MANAGEMENT NOTES

1. All habitable structures adjacent to open spaces shall be provided with two zones of brush management.
2. Fire safety in the landscape is achieved by reducing readily flammable fuel adjacent to structures.
3. Expanses of native / naturalized grasses should be cut to within two inches in height prior to the end of the growing season in April or May. Individual clumps of grass may be maintained year-round up to twenty-four inches in height when they are isolated from other fuels or where necessary to stabilize soil and prevent erosion.
4. Responsibility for the required brush management shall be confined to the respective owner's property. Adjacent properties that are primarily undeveloped may require a recorded easement for performing offsite brush management.
5. Ongoing, long-term maintenance of the brush management zones shall be the responsibility of the property owner unless another approved entity (such as a homeowner's association or property management company) has been designated to provide said maintenance.
6. Within Zone I (0 to 50 feet from the structure) all plant material shall be ornamental in nature, including existing California native plants. They shall be irrigated with a permanent irrigation system. All plants in zone I shall be maintained in a healthy, vigorous, and lush condition without excessive dead wood or twigs. Trees and tree canopies shall be kept a reasonable distance away from structures.
7. Within Zone II (50 to 150 feet from the structure) all plant material shall be thinned and pruned seasonally as required by the City of Murrieta Fire Department.
8. Debris and trimmings produced by thinning and pruning shall be removed from the site.
9. All dead and excessively twiggy growth shall be removed from the site.
10. A person knowledgeable about the use and maintenance of California native plants should oversee the selection, thinning and pruning.

11. The progression of work should proceed as follows:
    a. Remove dead Plants
    b. Thin out brush management areas to required coverage
    c. Prune remaining plants
    d. Dispose of mulch debris and trimmings
    e. Do not top trees
    f. Do not cut large shrubs back hard or hedge them into unnatural shapes
12. Vegetation, which is less than 12 years old may not require thinning if the plants have had proper care.
13. Plants and vegetation at 12 years and older requires thinning on a regular basis to lessen the fuel load and maintain erosion control.
14. Vegetation at or around 50 years of age may be considered highly combustible due to dead load and may become explosive. The owner shall contact the City of Murrieta Fire Department for specific fuel modification direction.
15. Thinning requires identification of the California native or naturalized species and a familiarity with their various characteristics such as rooting depth, fuel loads, flammability, as well as habitat and aesthetic value. Thinning should be prioritized as follows:
    a. Invasive, non-native species
    b. Non-California native species
    c. Flammable native species
    d. Native species
    e. Regionally sensitive species
16. After thinning of California native or naturalized vegetation, the fuel load should be further reduced by pruning. Plants shall be pruned to remove dead or twiggy branches or those touching the ground.
17. Pruning shrubs means cutting shrubs in a way that is known as a 'natural cut.' This does not include using gas or electric powered tools. Natural cut is meant to retain a shrub's shape and selectively cut specifically chosen stems to reduce or thin the shrub size by no more than one third (1/3) the height and spread.
18. Trees that reach relative maturity shall be limbed up six (6) feet off the ground. Topping will not be allowed. Dead wood and branches may be removed on an as needed basis. Oak trees should only be pruned in the dry season to prevent the spread of disease. It is

recommended that a tree trimming company, with a staff certified arborist, be on site during the trimming activity to prevent a violation based on damaging protected oak or other California native trees.

19. Broad spectrum herbicides shall not be used in fuel modification zones, except as necessary for spot treatment of invasive species.
20. Shrubs may be planted in addition to approved ground covers. Shrubs shall be spaced so that at maturity not more than 50% of the ground area contains shrubs.
21. See the attached list of acceptable trees, shrubs, perennials and ground cover for a comprehensive list of approved species. Additional species may be allowed, if approved in advance by the City of Murrieta Fire Department and by the City of Murrieta Landscape Architect.

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APPENDIX F

Project Prohibited Plant List

Appendix F
Examples of Prohibited Plants

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

Appendix F
Examples of Prohibited Plants

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

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Bambusa species	Bamboo	F, I
Bougainvillea species	Bougainvillea	F, I
Brassica species (B. campestris, B. nigra, B. rapa)	Mustard (Field, Black, Yellow)	F, I
Bromus rubens	Foxtail, Red brome	F, I
Castanopsis chrysophylla	Giant Chinquapin	F
Cardaria draba	Hoary Cress	I
Carpobrotus species	Ice Plant, Hottentot Fig	I
Cirsium vulgare	Wild Artichoke	F,I
Conyza bonariensis	Horseweed	F
Coprosma pumila	Prostrate Coprosma	F
Cortaderia selloana	Pampas Grass	F, I
Cytisus scoparius	Scotch Broom	F, I
Dodonaea viscosa	Hopseed Bush	F
Eriodictyon californicum	Yerba Santa	F
Eriogonum species (E. fasciculatum)	Buckwheat (California)	F
Fremontodendron species	Flannel Bush	F
Hedera species (H. canariensis, H. helix)	Ivy (Algerian, English)	I
Heterotheca grandiflora	Telegraph Plant	F
Hordeum leporinum	Wild barley	F, I
Juniperus species	Juniper	F
Lactuca serriola	Prickly Lettuce	I
Larix species (numerous)	Larch	F
Larrea tridentata	Creosote bush	F
Lolium multiflorum	Ryegrass	F, I
Lonicera japonica	Japanese Honeysuckle	F
Mahonia species	Mahonia	F
Mimulus aurantiacus	Sticky Monkeyflower	F
Miscanthus species	Eulalie Grass	F
Muhlenbergia species	Deer Grass	F
Nicotiana species (N. bigelovii, N. glauca)	Tobacco (Indian, Tree)	F, I
Pennisetum setaceum	Fountain Grass	F, I
Perovskia atroplicifolia	Russian Sage	F
Phoradendron species	Mistletoe	F

Appendix F
Examples of Prohibited Plants

Botanical Name	Common Name	Comment*
Pickeringia montana	Chaparral Pea	F
Rhus (R. diversiloba, R. laurina, R. lentii)	Sumac (Poison oak, Laurel, Pink Flowering)	F
Ricinus communis	Castor Bean	F, I
Rhus Lentii	Pink Flowering Sumac	F
Rosmarinus species	Rosemary	F
Salvia species (numerous)	Sage	F, I
Salsola australis	Russian Thistle	F, I
Solanum Xantii	Purple Nightshade (toxic)	I
Silybum marianum	Milk Thistle	F, I
Thuja species	Arborvitae	F
Urtica urens	Burning Nettle	F
Vinca major	Periwinkle	I

*F = flammable, I = Invasive

NOTES:

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

APPENDIX G

"Ready, Set, Go!" Personal Action Plan

READY! SET! GO!

YOUR PERSONAL WILDFIRE ACTION PLAN **Before The Fire**

Get Ready - Create a **DEFENSIBLE HOME.**

Get Set - Make a **EVACUATION PLAN** with your family.

Go - **LEAVE EARLY** when told to do so.

READY! SET! GO!

Wildfire Action Plan

Saving Lives and Property
Through Advanced Planning

INSIDE

Dear Murrieta Resident,

Our Community lies in the beautiful Murrieta Temecula Valley, surrounded by the Santa Rosa Mountains and Los Alamos hill country. While beautiful living in the urban setting comes with risk.

Wildfires fueled by dry vegetation can be driven into our community by strong Santa Ana winds. Many residents who live in the Wildland Urban Interface do not fully comprehend the impact a wildfire may have on them.

While the Murrieta Fire Department is prepared to protect you and your property from wildfire, we ask the citizens of Murrieta to be proactive and prepare their households and property prior to a wildfire occurring.

The **Ready, Set, Go!** Personal Wildfire Action Plan gives you the information necessary to prepare for such an event. It gives guidance on home retrofitting for fire resistive features as well as information on how to create defensible space while emphasizing early evacuation.

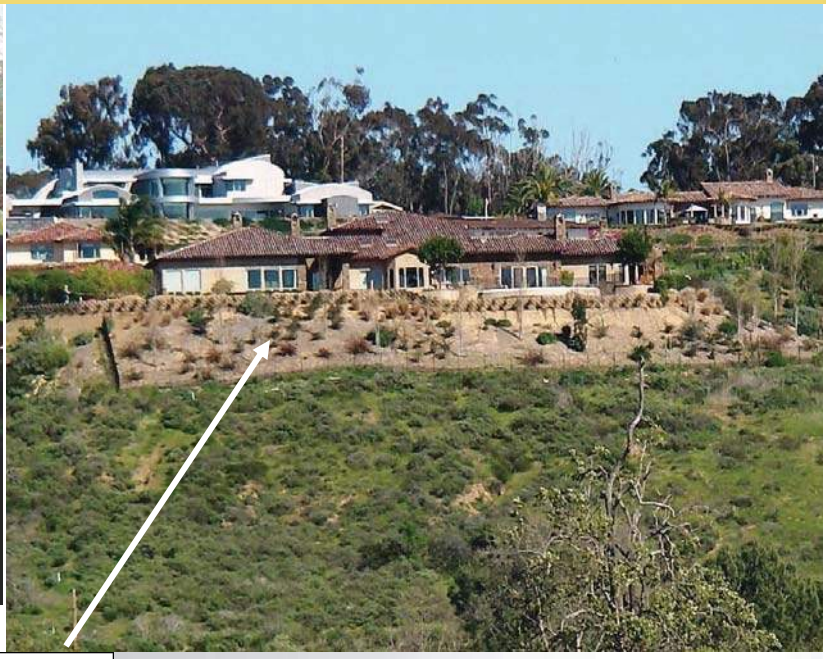
Use this **Ready, Set, Go!** Personal Wildfire Action Plan to educate your family, neighbors, and friends. The City of Murrieta Fire Department appreciates your willingness to take the time to become aware and better prepared next time a wildfire occurs.

Stay safe,

Murrieta Fire & Rescue

"Before The Fire" - "Get READY" - Create a Defensible Home

A defensible home is a home that has the greatest potential for survivability in the event of a wildfire during average wind conditions. Defensible homes are those homes that are in compliance with defensible space requirements or a fuel modification program and have been hardened in accordance with Chapter 7A of the California Building Code.

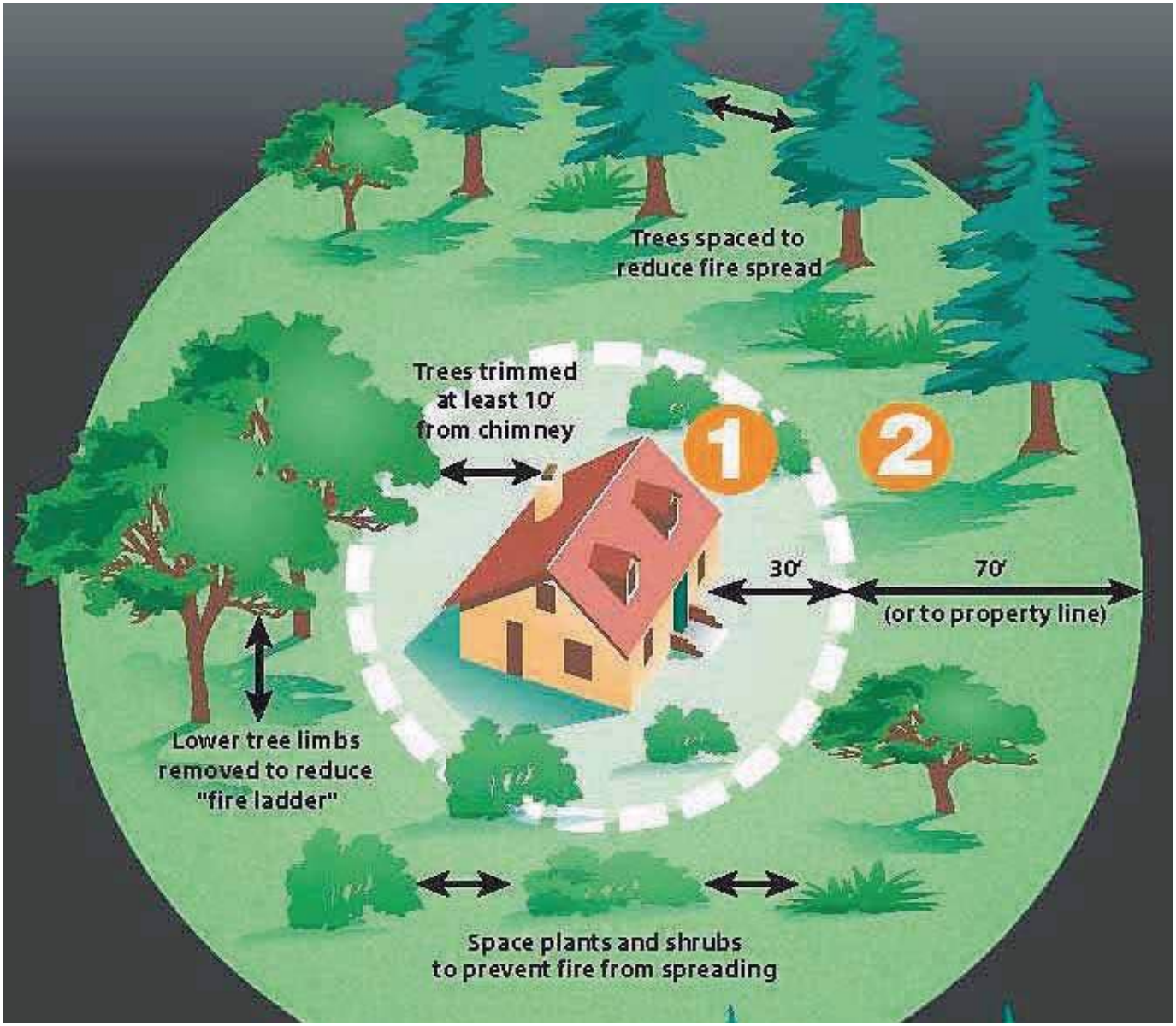


Natural vegetation has been thinned and/or replaced with fire resistant watered vegetation . This creates a buffer from direct flame impingement of the home. This buffer zone can vary in size depending on the location, vegetation threat, and construction type of the home.

Remove all dead and dying vegetation from your property. Remove tree limbs that overhang your roof. Move fire wood and other combustibles away from the house.

What is Defensible Space ?

Defensible Space is the required space between a structure and the wildland area that, under normal conditions creates a sufficient buffer to slow or halt the spread of wild fire to a structure. It protects the home from igniting due to direct flame impingement and radiant heat. Compliance is essential for structure survivability during wildfire conditions. Defensible space requirements apply to all structures regardless of



- Remove “Ladder Fuels”
- Cut or mow annual grass down to a maximum height of 4 inches.
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from other trees

What is Fuel Modification ?

Fuel modification is an engineered plan/program that protects neighborhoods and consists of a minimum of approximately 170 feet of irrigated and non irrigated zones, setbacks, and a selection of appropriate plant palettes for each. Fuel modification requirements generally do not apply to structures built prior to 1978.

Unmitigated fuel in the form of natural vegetation extending up to the home. A wind driven fire could push a fire from the bottom to the top of the hill in minutes.

Zone 1

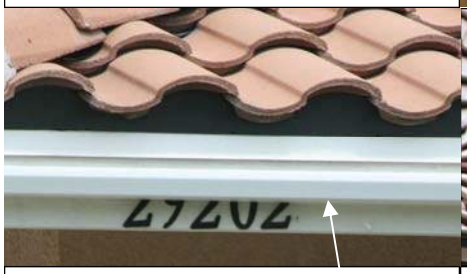
Extends 30 feet out from buildings, structures, decks, etc.

- Remove all dead or dying vegetation
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from structures and other trees
- Remove leaf litter (dry leaves and pine needles) from yard, roof, and rain gutters
- Relocate woodpiles and other combustible materials into Zone 2
- Remove combustible material and vegetation from around and under decks
- Remove or prune vegetation near windows
- Remove “ladder fuels” (low-level vegetation that allows the fire to spread from the ground to the tree canopy). Create a separation between low-level vegetation and tree branches. This can be done by reducing the height of low-level vegetation and/or trimming low tree branches.

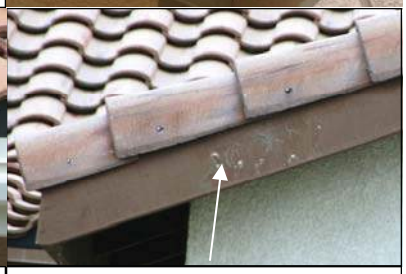
Zone 2

Extends 30-100 feet out from buildings, structures, decks. Reduce the community of fuels by removing dead material and removing and/or thinning vegetation. Minimum spacing between vegetation is 3 times the dimension of the plant.

Make sure Firefighters can identify your home address numbers



House address numbers are obscured by the rain gutter.



House address numbers are missing

Attach 1/8 to 1/4 inch mesh rust resistant metal screen

Clean roof tops and rain gutters

Roof materials may need to be re-placed to regain the initial fire rating.

Burning embers were blown through this vent screen and a fire started in the crawl space of this home.

Breaches in roof tiles have allowed embers to enter and spread fire through out the home

What is a Hardened Home ?

What gives a home the best chance to survive a wild fire are its construction materials and the quality of the defensible space surrounding it. Embers from wild fire find the weak link in your home's fire protection scheme and gain the upper hand because of a small, or overlooked or seemingly inconsequential factor. However, there are measures listed below, each will increase your home's and possibly your families safety and survival during a wildfire.

ROOFS

Roofs are the most vulnerable surface where embers land because they lodge and start a fire. Roof valleys, open ends of barrel tiles, and rain gutters are all a point of entry.

EAVES

Embers gather under open eaves and ignite exposed wood or other combustible material.

VENTS

Embers enter the attic or other concealed spaces and ignite combustible materials. Vents in eaves and cornices are particularly vulnerable, as are any unscreened vents.

WALLS

Combustible siding and other combustible or overlapping materials provide a surface and crevice for embers to nestle and ignite.

WINDOWS & DOORS

Embers can enter gaps in doors, including garage doors. Plants or combustible storage near windows can be ignited from embers and generate heat that can break windows and/or melt combustible frames.

BALCONIES & DECKS

Embers collect in or on combustible surfaces or undersides of decks and balconies, ignite the material, and enter the home through walls or windows.

To harden your home even further, consider protecting your home with a residential fire sprinkler system. In addition to extinguishing a fire started by an ember that enters your home, it also protects you and your family 24/7, year-round, from any fire that may start in your home.

Create Your Own Wildfire Action Plan

Your Wildfire Action Plan must be prepared with all members of your household well in advance of a fire. Use these checklists to help you prepare your Wildfire Action Plan.

Each family's plan will be different, depending on their situation.

Once you finish your plan, rehearse it regularly with your family and keep it in a safe and accessible place for quick implementation.

- ◊ Create a Family Disaster Plan that includes meeting locations and communication plans, and rehearse it regularly. Include in your plan the evacuation of large animals, such as horses.
- ◊ Ensure that your family knows where your gas, electric and water main shut-off controls are and how to use them.
- ◊ Plan several different escape routes.
- ◊ Designate an emergency meeting location outside of the fire hazard area.
- ◊ Assemble an emergency supply kit as recommended by the American Red Cross.
- ◊ Appoint an out-of-area friend or relative as a point of contact so that you can communicate with family members who have relocated.
- ◊ Maintain a list of emergency contact numbers posted near your phone and in your emergency supply kit.
- ◊ Keep an extra emergency supply kit in your car in case you can't get to your home because of fire.
- ◊ Have a portable radio or scanner so that you can stay updated on the fire.

Before the Fire Approaches

Make A Kit:

◊ Keep the six “P’s” ready, in case an immediate evacuation is required:

◊ People and pets

◊ Papers, phone numbers, and important documents

◊ Prescriptions, vitamins, and eyeglasses

◊ Pictures and irreplaceable memorabilia

◊ Personal computers (information on hard drive and disks)

◊ “Plastic” (credit cards, ATM cards) and cash

Keep a pair of old shoes and a flashlight handy for a night evacuation.

Alert Family and Neighbors:

◊ Dress in appropriate clothing (i.e., clothing made from natural fibers, such as cotton, and work boots).— Avoid shorts or tank tops

◊ Have goggles and a dry bandana or particle mask handy.

◊ Ensure that you have your brush fire survival kit on hand that includes necessary items, such as a

◊ battery-powered radio, spare batteries, emergency contact numbers, and ample drinking water.

◊ Stay tuned to your TV or local radio stations for updates, or check your Fire Department’s website.

Outside Checklist

◊ Gather up flammable items from the exterior of the house and bring them inside (e.g., patio furniture, children’s toys, doormats, etc.) or place them in your pool, or away from the structure.

◊ Turn off propane tanks.

◊ Connect garden hoses to outside taps.

◊ Don’t leave sprinklers on or water running - they can waste critical water pressure.

◊ Leave exterior lights on.

◊ Back your car into the garage. Shut doors and roll up windows.

◊ Have a ladder available.

◊ Patrol your property and extinguish all small fires.

◊ Seal attic and ground vents with pre-cut plywood or commercial seals.

◊ Unlock gates and lock open electrically operated property entrance gates.

Inside Checklist:

◊ Shut all windows and doors, leaving them unlocked.

◊ Remove flammable window shades and curtains and close metal shutters.

◊ Remove lightweight curtains.

◊ Move flammable furniture to the center of the room, away from windows and doors.

◊ Shut off gas at the meter. Turn off pilot lights.

◊ Leave your lights on so firefighters can see your house under smoky conditions.

◊ Shut off the air conditioning.

"GO" Early

By leaving early, you will give your family the best chance of surviving a wildfire. You also help firefighters by keeping roads clear of congestion, enabling them to move more freely and do their job.

WHEN TO LEAVE

Leave early enough to avoid being caught in fire, smoke, or road congestion. Don't wait to be told by authorities to leave. In an intense wildfire, they may not have time to knock on every door. **If you are advised to leave by media or actual door to door notification, don't hesitate!**

WHERE TO GO

Leave to a predetermined location (it should be a low-risk area, such as a well-prepared neighbor or relative's house, a Red Cross shelter or evacuation center, motel, etc.)

HOW TO GET THERE

Have several travel routes in case one route is blocked by the fire or by emergency vehicles and equipment. Choose an escape route away from the fire.

WHAT TO TAKE

Take your emergency supply kit containing your family and pet's necessary items, such as cash, water, clothing, food, first aid kits, medications, and toys. Also, don't forget valuables, such as your computer, photos, and important documents.

Organize your family members and make arrangements for your pets.

IF YOU ARE TRAPPED: SURVIVAL TIPS

- ◊ Shelter away from outside walls.
- ◊ Patrol inside your home for spot fires and extinguish them.
- ◊ Wear long sleeves and long pants made of natural fibers such as cotton.
- ◊ Stay hydrated.
- ◊ Ensure you can exit the home if it catches fire (remember if it's hot inside the house it is four to five times hotter outside).
- ◊ After the fire has passed, check your roof and extinguish any fires, sparks or embers.
- ◊ Check inside the attic for hidden embers.
  Patrol your property and extinguish small fires.
- ◊ If there are fires that you cannot extinguish with a small amount of water or in a short period of time, call 9-1-1.

Write up your Wildfire Action Plan and post it in a location
where every member of your family can see it.
Rehearse it with your family.

My Personal Wildfire Action Plan

During **High Fire Danger** days in your area, monitor your local media for information on brush fires and be ready to implement your plan. Hot, dry, and windy conditions create the perfect environment for a wildfire.

Important Phone Numbers

Put these #'s in your "contacts" of your phones and school family profile check list

Emergency: _____ _____ _____
_____ _____ _____

School: _____ _____ _____
_____ _____ _____

Family: _____ _____ _____
_____ _____ _____

Friends: _____ _____ _____
_____ _____ _____

When to go: _____
_____

Where to go: _____
_____

How to get there: _____
_____

What to take: _____
_____
_____

Who to tell (before and after)

_____
_____
_____
_____

Tune your radio to 1640 AM for local up to date emergency information

Nonemergency Important Information

Services

Fire
(951) 304-FIRE

Police
(951) 304-COPS

City Hall
(951) 304-CITY

Parks & Recreation
(951) 304-PARK

Library
(951) 304-BOOK

Code Enforcement
(951) 461-6330

County Assessor
(951) 955-6200

Animal Control
(951) 674-0618

Water

Eastern Municipal Water District
(800) 426-3693

Elsinore Valley Water District
(951) 674-3146

Rancho California Water District
(951) 296-6900

Western Municipal Water District
(951) 789-5000

Cable

Time Warner Cable
(888) 683-1000

Verizon FIOS
(877) 500-1243

Hospitals

Rancho Springs Hospital
(951) 696-6000

Inland Valley Regional Medical Center
(951) 677-1111

If you have an emergency call 911

If you have Questions?

Call us at:

(951) 304-FIRE (3473)

Murrieta Fire & Rescue

Tune your radio to 1640 AM

for local up to date emergency information

MURRIETA FIRE & RESCUE

Fire Prevention Bureau

41825 Juniper Street, Murrieta, CA 92562 (951) 304-3473

July 9, 2019

Mr. Michael Huff
Principal/Senior Fire Protection Planner
Dudek
605 Third Street
Encinitas, CA 92024

RE: **Fire Protection Plan SP 012-3164, TTM 35853 Murrieta Hills**

Dear Mr. Huff:

We are in receipt of the final fire protection plan for the above referenced project and find that it conforms to the fire protection plan requirements of Murrieta Fire & Rescue and is subjected to the public review and comment requirements of the environmental process. Based on that process additional edits and/or additions may be necessary at that time. Following that process, the fire protection plan will be accepted by Murrieta Fire & Rescue as complete with the final approving authority the City of Murrieta Planning Department.

If you should have any further questions, please feel free to contact us immediately.

Yours in Service,

Christopher P. Jensen

Christopher P. Jensen
Fire Marshal