Appendix L-1
Fire Protection Plan

DRAFT

Fire Protection Plan

Mesa Verde Specific Plan Area 2 Amendment 2 Project - City of Calimesa, Riverside County

MAY 2025

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	Above Mean Sea Level
APN	Assessor's Parcel Number
BTU	British Thermal Unit
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CCS	Chaparral and Coastal Sage Scrub
CC&Rs	Covenants, Conditions and Restrictions
CEQA	California Environmental Quality Act
CFC	California Fire Code
CFD	Calimesa Fire Department
CUP	Conditional Use Permit
FAHJ	Fire Authority Having Jurisdiction
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information Systems
I-10	Interstate 10
IFC	International Fire Code
ISO	Insurance Service Office
LRA	Local Responsibility Area
MPH	Miles Per Hour
NFPA	National Fire Protection Association
OS - N	Open Space – Natural
OS - PP	Open Space – Public Park
OS - PR	Open Space – Private Recreation
PRC	Public Resource Code
Project	The Mesa Verde Specific Plan Area 2 Amendment 2
RCFD	Riverside County Fire Department
SRA	State Responsibility Area
USGS	United States Geological Survey
VHFHSZ	Very High Fire Hazard Severity Zone
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface
YVWD	Yucaipa Valley Water District

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Executive Summary

This Fire Protection Plan (FPP) has been prepared for Mesa Verde Specific Plan Area 2 Amendment 2 (Project), comprised of 1,463.1 acres of undeveloped land located in the northwestern portion of the City of Calimesa, in the County of Riverside, California. The Project is generally located in the northwestern portion of the City, just south of the border of San Bernardino County. Regional access to the Project site is provided via Interstate 10 (I-10) at the Calimesa Boulevard (leading to Sandalwood Drive) and County Line Road exits. The Project site is generally a linear swath of land that is east-west oriented and includes 14 parcels[1] and is found within the El Casco and Yucaipa 7.5-Minute Quadrangles, as mapped by the U.S. Geological Survey. This FPP evaluates and identifies the potential fire risk associated with the Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria. The purpose of this plan is to generate and memorialize the fire safety requirements and standards of the Calimesa Fire Department (CFD) along with Project-specific measures based on the Project site, its intended use, and its fire environment.

This document provides analysis of the Project site's fire environment and its potential impact on the Project as well as the Project's potential impact on the existing fire protection service. Requirements and recommendations herein are based on Project site-specific fire environment analysis and Project characteristics and incorporates area fire planning documents, Project site risk analysis, and standard principles of fire protection planning.

As determined during the analysis of the Project site and its fire environment, the Mesa Verde Specific Plan Project site, in its current condition, may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire spread. Under extreme conditions, wind-driven wildfires from the foothills of San Bernardino mountains and undeveloped land could cast embers onto the property. Once built, the Project's on-site fire potential will be much lower than its current condition due to conversion of wildland fuels to building footprints, parking areas, managed landscapes, fuel modification areas, improved accessibility for fire personnel, and structures built to the latest ignition and ember resistant fire codes.

It is important to note that the fire safety requirements that will be implemented on the Project site, including ignition resistant construction standards, along with requirements for water supply, fire apparatus access, fuel modification and defensible space, interior fire sprinklers and five minute or less fire response travel times were integrated into the code requirements and internal guidelines based on results of post-fire assessments, similar to the After Action Reports that are now prepared after large fire events. When it became clear that specifics of how structures were built, how fire and embers contributed to ignition of structures, what effects fuel modification had on structure ignition, how fast firefighters could respond, and how much (and how reliable) water was available, were critically important to structure survivability, the fire and building codes were revised appropriately.

The proposed Mesa Verde Specific Plan Area 2 Amendment 2 Project is an amendment to the Mesa Verde Specific Plan Area 2 Amendment 1 which was approved in 2017. The Project site is comprised of 1,463.1 acres of undeveloped land, with the exception of a portion along Sandalwood Drive. The proposed Mesa Verde Specific Plan Area 2 Amendment 2 is to provide a foundation for the proposed land uses on the Project site through the application of regulations, standards and design guidelines. The Mesa Verde Specific Plan Area 2 Amendment 2 would be implemented in phases over time and would allow for development of various land uses, including

[1] Assessor's Parcel Numbers (APNs) 411-210-010, 411-210-028, 413-030-025, 413-040-013, 413-040-017, 413-040-018, 413-040-020, 413-040-023, 413-160-011, 413-200-003, 413-200-040, 413-200-042, 413-200-044, and 413-200-048.

residential, mixed-use, commercial, business park employment-based land uses, two elementary school sites, open space and public/private parks, utility infrastructure, public works uses, and roadways. The entire Project site has been designed with fire protection as a key objective. The Project site improvements are designed to facilitate emergency apparatus and personnel access throughout the Project site. Driveway and road improvements with fire apparatus turnarounds provide access to the sides of every building. Water availability and flow will be consistent with requirements including fire flow and hydrant distribution required by local and state codes. These features along with the ignition resistance of all buildings, the interior sprinklers, and the pre-planning, training and awareness will assist responding firefighters through prevention, protection and suppression capabilities.

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

Early evacuation for any type of wildfire emergency at the Project is the preferred method of providing for occupant and business safety, consistent with the Owner's and CFD current approach for evacuation utilizing the City of Calimesa Local Hazard Mitigation Plan[2] and the Mesa Verde Wildfire Emergency Evacuation/Shelter-In Place-Plan[3]. As such, the Project's Owner and Property Management Company will formally adopt, practice, and implement a "Ready, Set, Go!" approach to Project site evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the state of California and most fire agencies, including; Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing potential for errors, maintaining the Project site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and Project site uses during periods of fire weather extremes. Further, the site is recommended to apply for and obtain recognition as a Firewise community through Firewise USA. A list of the requirements to become a Firewise Community have been outlined below in Section 2.3.5.

Based on the results of this FPP's analysis and findings, the following FPP code-required implementation measures will be provided by the Mesa Verde Specific Plan Project as part of the proposed development plan. These measures are discussed in more detail throughout this FPP.

1. As required for building in fire hazard severity zone areas, the project buildings will be constructed of ignition resistant[4] construction materials and include the installation of National Fire Protection Association (NFPA) 13D automatic interior fire sprinkler systems within all one- and two-family dwellings, NFPA 13R interior fire sprinkler systems within each multi-family unit, and NFPA 13 automatic fire sprinkler systems for all Business Park, commercial, and school occupancies, based on the latest adopted building and fire codes for occupancy types.
2. Fuel Modification will be provided around the perimeter of all buildings, as required by CFD and will be a minimum of 100 feet in width.

[2] 2017 City of Calimesa Local Hazard Mitigation Plan
[3] 2023 Mesa Verde Wildfire Emergency Evacuation/Shelter-In-Place Plan
[4] A type of building material that resists ignition or sustained flaming combustion sufficiently to reduce losses from wildland-urban interface conflagrations under worst-case weather and fuel conditions with wildfire exposure of burning embers and small flames, as prescribed in 2022 CBC, Chapter 7A and State Fire Marshal Standard 12-7A-5, Ignition-Resistant Materials.

3. Landscape plantings will not utilize prohibited plants that have been found to be highly flammable.
4. FMZ Inspections – The Project's HOA and/or Property manager(s) would hire a 3rd party, CFD-approved, FMZ inspector and landscape plan reviewer to provide annual certification (written report submitted to CFD by May 1) that the HOA maintained properties including all FMZs and meet the requirements of this FPP.
5. Fire apparatus access roads (i.e., public and private streets) will be provided throughout all areas of development, including throughout the residential, light industrial, and commercial development areas, and will vary in width and configuration but will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances required by applicable codes. Primary access and internal circulation will comply with the requirements of the CFD.
6. Buildings will be equipped with automatic fire sprinkler systems meeting 2022 CFC requirements.
7. Water capacity and delivery provide for a reliable water source for operations and during emergencies requiring extended fire flow.
8. The business owners of the Mesa Verde Specific Plan Project will be provided a proactive educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components and how to prepare for wildfire. CFD has adopted National Fire Protection Association (NFPA)'s Firewise USA[5] curriculum as resources for the community[6] and "Ready, Set, Go!" plans prepared.
9. Achievement of becoming a Firewise Community site recognition through Firewise USA including annual recertification. In order to become a Firewise Community site, a board or committee will need to be created, and the committee or board will then need to obtain a wildfire risk assessment that will need to be updated at least every 5 years. The board or committee will then need to develop an action plan that is required to be updated at least every 3 years. In addition to the wildfire risk assessment and action plans being created, the board or committee members will annually be required to host an educational event and meet the minimum investment requirements, as well as submit an annual renewal. A detailed list of the requirements the Mesa Verde community will need to follow has been included in Section 2.3.5, as well as in section 6 of this FPP.

[5] NFPA - Firewise USA®
[6] https://yubafiresafe.org/home-preparedness/

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1 Introduction

This FPP has been prepared for the Mesa Verde Specific Plan Area 2 Amendment 2 Project in the northwestern portion of Riverside County, California, and within the City of Calimesa. The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. Additionally, this plan generates and memorializes the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the CFD. Requirements and recommendations are based on Project site-specific characteristics and incorporate input from the Project applicant and the FAHJ.

As part of the assessment, the plan has considered the property location, topography, surrounding combustible vegetation (fuel types), climatic conditions, and fire history. The plan addresses water supply, access, structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect one or more at-risk communities and essential infrastructures. The following tasks were performed toward the completion of this plan:

- Gather Project site specific climate, terrain, and fuel data.
- Collect Project site photographs[7].
- 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 risk associated with the Project and the Project site, and
- Prepare this FPP 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 Applicable Codes and Existing Regulations

This FPP demonstrates that Mesa Verde Specific Plan Area 2 Amendment 2 Project will comply with applicable portions of Calimesa Municipal Code, including Title 15, Chapter 15.05 – Adoption of the 2022 Edition of the California Building Code (CBC), (Part 2 of Title 24 of the California Code of Regulations (CCR), including Chapter 7A and local City amendments, and Chapter 15.10 Adoption of the 2022 Edition of the California Fire Code (CFC), including Chapter 49 and local City amendments. The Project would also be consistent with applicable sections of the 2021 edition of the International Fire Code (IFC) as adopted by the CFD. The Project would also comply with the 2022 California Residential Code (CRC), Section 237 as adopted by the County. The Project would also be subject to the provisions of section 4291 of the Public Resources Code (PRC) regarding brush clearance standards around

[7] Field observations were utilized to augment existing digital Project site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Refer to Appendix A for Project site photographs of existing conditions.

structures, and the CFD Weed Abatement and Defensible Space guidelines. Chapter 7A of the 2022 CBC focuses primarily on preventing ember penetration into buildings, a leading cause of structure loss from wildfires.

Thus, it is an important component of the requirements of this FPP given the Project's wildland-urban interface (WUI) location is in an area statutorily designated as a Very High Fire Hazard Severity Zone (VHFHSZ) local responsibility area (LRA) by California Department of Forestry and Fire Protection (CAL FIRE) (California State Fire Marshal's Office, updated April 1, 2024). It should be noted that CAL FIRE recently updated the FHSZ map for SRA lands with effective dates starting on April 1, 2024, and for LRA in early 2025 which were released in four phases (Phase1 - February 10, 2025, Phase 2- February 24, 2025, Phase 3 - March 10, 2025, and Phase 4 - March 24, 2025). In early 2025, CAL FIRE released the updated LRA maps to local agencies for review and their adoption by ordinance. The City of Calimesa has received the updated LRA maps for their jurisdiction and is currently in the process of reviewing and adopting their maps. The designations of Fire Hazards are based on topography, vegetation, and weather, amongst other factors with more hazardous sites, which include steep terrain, un-maintained fuels/vegetation, and WUI locations. As described in this FPP, the Project will meet all applicable fire and building code requirements for building in these higher fire hazard areas or meet the intent of the code through the application of Project site-specific fire protection measures. These codes have been developed through decades of after fire structure save and loss evaluations to determine what causes building loss during wildfires. The resulting fire codes now focus on mitigating former structural vulnerabilities through construction techniques and materials so that the buildings are resistant to ignitions from direct flames, heat, and embers, as indicated in the 2022 CBC (Chapter 7A, Section 701A Scope, Purpose and Application).

1.2 Proposed Project Summary

The Mesa Verde Specific Plan Area 2 Amendment 2, which is an amendment to the Mesa Verde Specific Plan Area 2 Amendment 1 approved in 2017, would serve as the policy and regulatory document for the development of the Mesa Verde Specific Plan Area. The Mesa Verde Specific Plan Area 2 Amendment 2 would be implemented in phases over time. The Project would permit a maximum of 3,650 residential units (which is the same overall unit count as in the current Mesa Verde Specific Plan Area 2 Amendment 1), including a mix of single-family detached, single-family attached, and multi-family units. The projected number of units within each of the residential zones include: 790 units of High Residential; 594 units of Medium High; 1,450 units of Medium; 677 units of Low Medium; and 139 units of Low. The Project would permit up to 4.44 million square feet of building area with the Business Park zone (allowing for industrial, logistics, office, and/or educational uses), up to 300,000 square feet of commercial building area within the Commercial and Mixed-Use zones, two school sites, open space and public/private parks, utility infrastructure, and roadways. An internal network of trails would connect the Project's land uses and parks.

1.2.1 Project Location

The Project site is comprised of approximately 1,463.1 acres of undeveloped land, with the exception of a portion of Sandalwood Drive, located within the City of Calimesa, in the County of Riverside, California. The Project area is generally located in the northwest portion of the City, just south of the border of San Bernardino County. Regional access to the Project site is provided via I-10 at the Calimesa Boulevard (leading to Sandalwood Drive) and the County Line Road exits. The Mesa Verde property is generally bounded on the east by I-10, on the north by the Riverside/San Bernardino County Line, and on the south by Garden Air Wash, as shown in Figure 1, Project Location and Vicinity Map).

As noted above, the Project site is located within an area designated as a LRA VHFHSZ as designated by the CAL FIRE OSFM; land immediately adjacent is also LRA VHFHSZ; farther west and south of the Project site are areas of lands that are designated as State Responsibility Area (SRA) VHFHSZ by CAL FIRE, as shown in Figure 2, Fire Hazard Severity Zone Map). It should be noted that CAL FIRE recently updated the FHSZ map for SRA lands with effective dates starting on April 1,2024, and for LRA in early 2025.

1.2.2 Current Land Use

1.2.2.1 On-site Conditions

The Project site is currently vacant and is made up of mostly undeveloped terrain with natural watercourses, valleys, and hillside areas; however, there are currently two paved roadways on the Project site (a portion of Sandalwood Drive and Mustang Way), as well as a network of trails. The site is also intersected by incised drainages and numerous dirt roads. The majority of the study area burned in 2017 and 2019 during the Palmer and Sandalwood Fires, respectively. Evidence of motor vehicle off-roading is present throughout the study area.

1.2.2.2 Surrounding Land Uses

The Project site is located within the City and is surrounded by a mix of land uses, including open space, residential, commercial, and industrial areas. The Project site is bordered to the north by undeveloped hillsides, a wastewater treatment facility, and rural development, with its northern boundary aligning with the boundary between Riverside and San Bernardino counties. To the east lies residential, school, and urban uses in the City, while the areas to the south and west comprise mainly of undeveloped hillsides with some rural development, including roadways. The following provides an overview of the surrounding land uses.

Land Uses to the North

Land uses to the north of the Project site include undeveloped hillside open space, the Yucaipa Valley Water District (YVWD) water treatment facility, Yucaipa Creek, and rural development along Live Oak Canyon Road. Land uses to the northeast of the Project include primarily single-family residential development north of West Avenue L and to the north and south of County Line Road, with some commercial development located closer to 7th Place and the I-10 interchange. The City of Calimesa General Plan Land Use Chapter designates the area to the northeast of the Project site's boundary as Residential Low Medium, Residential Rural, Quasi-Public, and Community Commercial. The area adjacent to the Project site's northern boundary is located in the cities of Yucaipa and Redlands. The area within Yucaipa is designated as Open Space and Single Residential by the Yucaipa General Plan and Yucaipa Freeway Corridor Specific Plan. The area within Redlands is designated as Resource Preservation by the Redlands 2035 General Plan.

Land Uses to the East

Land uses to the east of the Project site include single family residential land uses, the Mesa View Middle School, I-10, and urban land uses within the City of Calimesa. The City of Calimesa General Plan Land Use Chapter designates the area on the west side of I-10 and east of 7th Street as Community Commercial and Light Industrial, and the area opposite of I-10 as Downtown Village Commercial and Downtown Neighborhood Commercial.

Land Uses to the South

Land uses to the south of the Project site include undeveloped hillside open space within the City of Calimesa, Garden Air Wash, San Timoteo Canyon Creek, and rural land uses along San Timoteo Canyon Road. The City of Calimesa General Plan Land Use Chapter designates the area adjacent to the Project site's southern boundary as Summerwind Ranch Specific Plan.

Land Uses to the West

Land uses to the west of the Project site include undeveloped hillside open space within the City of Calimesa and unincorporated Riverside County. The San Timoteo Canyon Park Property is located to the southwest of the Project site. The City of Calimesa General Plan Land Use Chapter designates the area to the west of the Project site's western boundary as Residential Estate.

1.2.3 Project Description

This section describes the Mesa Verde Specific Plan Area 2 Amendment 2 (Project and/or Specific Plan Amendment) proposed by Mesa Verde Owners, LLC (Applicant). The Project would be implemented in phases over time and would permit a maximum 3,650 residential units (which is the same overall unit count as in the current Mesa Verde Specific Plan Area 2 Amendment 1), including a mix of single-family detached, single-family attached, and multi-family units. The projected number of units within each of the residential zones include: 790 units of High Residential; 594 units of Medium High; 1,450 units of Medium; 677 units of Low Medium; and 139 units of Low. The Project would allow up to 4.44 million square feet (MSF) of building area with the Business Park zones (allowing for industrial, logistics, office, and/or educational uses), up to 300,000 square feet of commercial building area within the Commercial and Mixed-Use zones, two school sites, open space and public/private parks, utility infrastructure, and roadways. An internal network of trails would connect the Project's land uses and parks.

Figure 3, Proposed Land Use Plan, identifies the distribution of the proposed Planning Areas and associated zones as well as the proposed internal roadways within the bounds of the Specific Plan. The Specific Plan Area is divided into Phases, and the Phases are divided into Planning Areas. Planning Areas are categorized by land uses, including five residential "districts" (High, Medium High, Medium, Low Medium, and Low-Density zoning designations), and mixed-use, commercial, business park, natural open space, park and private recreation, school, public/quasi-public facilities, and Calimesa Public Works Planning Areas. Table 1, Proposed Land Uses, Zones, and Acreage, provides the proposed land use and number of Planning Areas for each use, zoning designations, associated acreages, and percentage of total Specific Plan area.

Table 1. Proposed Land Uses, Zones, and Acreage

Land Use	Zoning Designations	Acres	Percent of Total Site
Mixed-Use	Mixed-Use (MU)	20.7	1.4%
Business/Industrial	Business Park (BP)	241.9	16.5%
Commercial	Commercial (C)	4.4	0.3%
Residential	High (H); Medium High (MH); Medium (M); Low Medium (LM); Low (L);	474.6	32.4%
Schools	Elementary School (ES)	22.0	1.5%
Private Recreation	Open Space- Private (OS-PR)	16.1	1.1%
Public Parks	Open Space- Public (OS-PR)	50.3	3.4%
Calimesa Public Works	Calimesa Public Works (CPW)	5.3	0.4%
Public Utilities/Lift Station	Public Facility (PF)	1.5	0.1%
Water Tank	Public Facility (PF)	3.2	0.2%
Basins	Public Facility (PF)	26.2	1.8%
Open Space	Open Space- Natural (OS-N)	495.9	33.9%
	Total Development Area	1362.1	93.1%
	Public Streets	101.0	6.9%
	Total Project Area	**1,463.1**	**100.0%**

1.2.3.1 Residential, Mixed-Use, and Commercial

Residential Planning Areas

Chapter 2, Residential, Mixed-Use, and Commercial of the Specific Plan Amendment addresses the allowable land uses and development standards for these zones. As shown on Figure 3, approximately 474.6 acres of the Project site are proposed for residential development. The Specific Plan Amendment proposes five different residential zoning designations identified as zoning "districts". The five residential districts would dictate the development standards for residential development. The allowable uses within each of the districts would correspond with the same residential zone identified in the CMC, Chapter 18.20, Residential Zone Districts, plus the additional uses permitted described in the Specific Plan Amendment. Table 2, Proposed Residential Zone Districts, identifies the proposed zone district and corresponding adopted zone district in the CMC.

Table 2. Proposed Residential Zone District

Planning Areas	Zone District	Corresponding City Zone District	Maximum Density	Gross Acreage	Number of Units
14, 43	Residential Low (L)	Residential Low (R-L)	8 du/ac	36.8	139
28, 31- 33, 37-39	Residential Low Medium (LM)	Residential Low Medium (R-L-M)	10 du/ac	112.8	677
13, 15-19, 26, 27, 29, 30, 34-36, 40-42, 74, 75, 80	Residential Medium (M)	Residential Medium (R-M)	16 du/ac	223.2	1,450
20-25, 78, 79	Residential Medium High (MH)	Residential Medium (R-M)	20 du/ac	59.3	594
9-12	Residential High (H)	Residential High (R-H)	24 du/ac	42.5	790
			TOTAL	474.6	3,650

Notes: Total acreage may not be exact due to rounding.

Per the Specific Plan Amendment, dwelling units within each Residential Planning Area may be transferred to other Residential Planning Areas as long as the minimum number of units is 3,000 and the maximum number of units does not exceed 3,650 units and the maximum density for the residential zoning designation. The Specific Plan Amendment allows for age-restricted residential development.[8] The maximum number of age restricted units is 900, which could be located within contiguous or noncontiguous Planning Areas, as identified in the development plan review process.

The Specific Plan Amendment sets forth development standards for the residential districts, including required setbacks from front, side, and rear yards, as well as from living areas and integrated porches; lot coverage, maximum building height (ranging from 35 feet to 50 feet), and requirements to comply with the Calimesa Municipal Code (CMC) Chapter 18.45 related to off-street parking.

Mixed Use and Commercial Planning Area

The proposed Project includes approximately 20.7 acres of Mixed-Use (MU) zone located on the south side of Sandalwood Drive within Planning Area 1, and approximately 4.4 acres of Commercial (C) zone located on the north side of Sandalwood Drive within Planning Area 114. These two Planning Areas are in proximity to I-10 Freeway, on the eastern edge of the Project site, as shown in Figure 3. The Specific Plan assumes a maximum of 300,000 square feet of commercial development within Planning Areas 1 and 114.

Mixed-Use Zone

The Mixed-Use zone allows flexibility for development of residential, commercial, or both uses. The proposed Project does not assign any dwelling units to the mixed-use area; however, it is anticipated units may be transferred from the residential zone districts, as allowed as part of development requirements. The total number of dwelling units within the Project site would not exceed 3,650 residential units. Residential dwelling units could be developed up to a maximum density of 24 dwelling units per gross acre in the Mixed-Use zone. The Mesa Verde Specific Plan Area 2 Amendment 2 outlines development standards and allowable uses specific to the Mixed-Use planning area. Allowable uses vary widely, including retail uses (e.g., clothing, florists, jewelry, and bookstores) and traditional

[8] Seniors (age 55 plus) may purchase or rent in any residential district. Age Restricted only refers to housing that has an age requirement. Age Restricted Planning Areas may have Private Gate Access

commercial uses (e.g., restaurants, grocery, laundromats, hardware store). Some uses would be subject to a Conditional Use Permit (CUP), such as day spas, businesses selling alcohol, fast food, and automotive service stations, as well as the additional accessory uses (e.g., walls, monumentation, signage, accessory structures on the same site). Office and related uses would be permitted. A maximum of 24 dwelling units per gross acre would be allowed for residential development and a maximum floor-area-ratio (FAR) of 1.0 would be allowed in mixed-use or commercial development. The maximum building height would be 3 stories or 45 feet.

Commercial and Business Park

The Commercial zone is anticipated to provide retail uses to serve the residents of the Project, the future Summerwind Ranch Specific Plan development to the south, and nearby neighborhoods. Business Park Planning Areas

A total of 241.9 acres of the Project are proposed for the Business Park zone, comprised of seven Planning Areas contiguously in the southeastern portion of the Project site, as shown on Figure 3[9]. Development standards set forth in the Specific Plan Amendment for this zone include: minimum site area of 20,000 square feet, average FAR of 0.5 feet, and maximum building height of 70 feet for all Planning Areas with the exception of Planning Area 3, which includes a maximum height of 60 feet. The Specific Plan Amendment sets forth numerous requirements, including but not limited to: restrictions on hazardous materials; access and architecture/design standards; fencing/wall standards; utility infrastructure; standards for self-storage, warehouse, and storage/distribution facilities; size, number, and type of parking spaces; compliance with California Building Code for carpools, vanpools, and electric vehicles; lighting restrictions; and loading facilities. The maximum size of any single building for any single structure housing a warehouse, storage facility or distribution facility shall not exceed 700,000 net square feet, and the Specific Plan Amendment sets a maximum development limit of 4,440,000 square feet of Business Park use.

Per the allowable development set forth the proposed Specific Plan Amendment, this Project's SEIR assumes a maximum development of 4,440,000 square feet of Business Park use, which consist of 2,800,000 square feet of general light industrial, 1,400,000 square feet of High-Cube Fulfillment Center, and 240,000 square feet of office use.

1.2.3.2 Public/Quasi-Public Facilities and Open Space Planning Areas

Public and Quasi-Public facility uses include two proposed school sites, storm water detention basins, water tank, and the utilities/sewer lift station. Planning Area 56 is designated Calimesa Public Works (CPW), which is a 5.3-acre site intended for the use of the City's Public Works Department. It is anticipated that the City will use this Planning Area for public works-related needs, including offices, equipment storage, vehicle parking, and other uses as determined by the Public Works Department. The City has also determined the need for a new Fire Department station, which would also be located within Planning Area 56.

Open Space of the Specific Plan Amendment includes the following three zoning districts for open space: Open Space – Natural (OS-N), Open Space – Public Park (OS-PP), and Open Space – Private Recreation (OS-PR), which govern the standards for open space conservation and improvements. Permitted uses in the OS-PR zone include

[9] Planning Areas 70 and 71 are small corner lots adjacent to Sandalwood Drive that are designated for monumentation/signage and not development of Business Park uses.

clubhouses, gymnasium and recreation centers, spas, swimming pools. Permitted uses in the OS-N zone include fuel modification, manufactured slopes, a Street B bridge, and telecommunication equipment.

The OS-N zone includes all the preserved Natural Open Space areas of the Project and would be owned and maintained by the City or other agency(cies) acceptable to the City. A portion of the OS-N zone would include areas of permitted land uses such as fuel modification, manufactured slopes, Street B bridges, and telecommunication equipment, that require routine maintenance. The remaining portion of the OS-N zone would be permanently conserved as part of the Project's mitigation requirement, as described in the Biological Resources chapter of the SEIR. Fuel modification and manufactured slope areas within the OS-N zone would continue to provide habitat for species after Project buildout and would continue to facilitate species dispersal and foraging, as well as serve as a protective buffer between the Project site and open space conserved lands. Therefore, the entire OS-N zone may include wildlife corridors, existing trails, natural drainage courses, manmade drainage facilities, fuel modification areas, emergency access roads, manufactured slopes, conserved oak woodlands, and other conserved natural vegetation communities. Existing on-site trails within the OS-N zone would not be altered with Project implementation. No trail connections or trailheads would facilitate connection to trails within the OS-N zone and no new trails are proposed within the OS-N zone.

Seven Park sites in the OS-PP totaling 50.3 acres are planned to meet City's requirement of 50 acres (based on 2.75 persons per dwelling unit [i.e., 10,038 future residents] and 5 acres of public parkland per 1,000 people). The OS-PR zone includes approximately 16.1 acres within three Planning Areas.

1.2.3.3 Infrastructure

Circulation

Sandalwood Drive would be the primary access to the southern portion of the Project site (e.g. the Business Park, Commercial, Mixed-Use, Calimesa Public Works, and Open Space-Public Parks uses) and is currently improved starting at the 7th Street intersection to Mustang Way. However, the width and northern alignment of Sandalwood Drive would change from the existing condition. It is currently a two-lane road but has been graded to accommodate a future four-lane road. As development occurs, Sandalwood Drive would be fully improved, extending north into the Project site and terminating at proposed Street B, adjacent to Mesa View Middle School. The portion of Mustang Way extending onto the Project site would be removed and access to the school would be provided directly from Street B via Sandalwood Drive.

County Line Road is located to the northeast of the Project site, and it currently serves as a meandering secondary access to the Project site through the existing 7th Place, West Avenue L, and 7th Street to Sandalwood Drive. There is a short segment of County Line Road within the northeast corner of the Project site that is paved and gated, prohibiting public access to the Project site. In accordance with the City's request, County Line Road would join with the proposed Street A and would serve as the primary access to the northern portion of the Project site (e.g. Residential and Open Space-Private Parks uses).[10] Roberts Road would provide a third future access point to the Project site. Roberts Road south of Sandalwood Drive is planned to be fully developed with a bridge built by others at Summerwind Ranch Specific Plan crossing over Garden Air Wash, thereby linking the two master planned communities. The Project Applicant/Developer will pay its fair share for the bridge but would not construct any off-site bridge improvements.

[10] Refer to Section 3.5, Off-Site Improvements, for a discussion of required off-site improvements to County Line Road.

On-site Circulation

Chapter 6 of the Specific Plan Amendment describes the proposed roadway infrastructure that would be implemented as part of the proposed Project. As shown in the Circulation Master Plan, the proposed circulation improvements include major roads, secondary roads, collector roads, and school access.

The future and proposed extension of Roberts Road between Sandalwood Drive (within the Project site) and Singleton Road (within Summerwind Ranch Specific Plan) provides a parallel alternative to the I-10 Freeway, in a manner similar to Calimesa Boulevard on the east side of I-10 Freeway. It would also connect the Summerwind Ranch community to the Sandalwood Drive interchange north of its boundary.

Sandalwood Drive currently provides an east-west connection from I-10 Freeway to the Project site. As part of the Project, Sandalwood Drive would be extended northward, connecting to proposed Street B near the southeast corner of Mesa View Middle School. Street B would extend to the Street F intersection, where it would turn into Street A and loop northeast to connect to Streets D and E. Therefore, Street A and Street B would create a looped road traversing throughout the residential community of the Project site, connecting residential areas, schools, and parks. Streets D and E would serve as south to north connectors from proposed Street B to Street A, while proposed Streets F, G, and H would serve as internal collectors leading to a cul-de-sac from Street B.

The entry to Mesa View Middle School would be from Street B. Mesa View Middle School would be served by the relocated Mustang Way at the school entry that intersects with Street B.

Proposed Street J, Street L, and Street K would complete a looped road that would mainly serve as the backbone circulation system for trucking and employment needs for the Business Park Planning Areas.

Roberts Road is a south- to- north connection between the future development of the Summerwind Ranch Specific Plan area to the south of the Project site, and Sandalwood Drive/7th Street. Roberts Road would begin at the south Project site boundary and extending northward, cross Sandalwood Drive and connect to 7th Street. The 7th Street generally runs south to north and connects to West Avenue L. Half width street improvements along the Project-site frontage of 7th Street would occur as needed.

The circulation system for the Specific Plan Area provides multi-modal access serving vehicles, bicycles, and pedestrians. These components are designed to provide safe and efficient access to the residential neighborhoods, Business Park land use, Commercial/Mixed-Use land uses, natural open space, and recreational amenities within open space areas. Figure 3-6, Roadway Cross-Sections, provides numerous example cross-sections of roadway widths, sidewalk, curb/gutter, median, and bicycle lane standards for all roadways within the Project area.

Access paths would provide access to the major drainage areas for the purpose of maintenance of infrastructure, as well as for emergency vehicles.

Water and Recycled Water Master Plan

The Yucaipa Valley Water District (YVWD) would provide water service for the Project, including a dual water system for potable and recycled water. The YVWD has adopted a sustainability plan and design standards that requires all new homes to install two water meters – one drinking water meter and one recycled water meter. The drinking water service would be used to provide drinking water to the home, pools, spas, and hose bibs connected to a house. The recycled water service would be connected to a separate recycled water pipeline that would provide

recycled water to irrigate lawns, greenbelt areas, parks, school fields, and roadway medians. The domestic system would include pipes for backbone services ranging in size from 8 inches to 24 inches in diameter for potable water in backbone streets. Standard water line sizes would extend into the individual Planning Areas as they develop. Recycled water would be provided by pipes for backbone services ranging in size from 8 inches to 24 inches in diameter for irrigation or other applicable uses in backbone roads as well.

Pressure Zones 11 and 12 are serviced by either existing or future water line systems. The service elevation for the proposed development ranges from approximately 2,100 feet to 2,601 High Water Line (HWL) feet, resulting in a total differential of about 280 feet. To effectively serve the Project site, YVWD has identified three operating pressure zones: Zones 10, 11, and 12. Zone 10 has a HWL of approximately 2,323 feet and would serve the development located within elevation range of 2,034 feet to 2,177 feet. Planning Area 59 is a possible on-site potable water reservoir to serve Pressure Zone 10, subject to YVWD needs. The non-potable (recycled) water to Pressure Zone 10 planning areas would be served from existing off-site reservoirs.

The second pressure zone designated as Pressure Zone 11 has a HWL of approximately 2,463 feet that would serve the development located within an elevation range of 2,174 feet to 2,317 feet. The majority of the Project would be serviced within Pressure Zone 11. Pressure Zone 12, with a HWL of approximately 2,601 feet, would serve the development located within an elevation range of 2,312 feet to 2,455 feet. Pressure Zone 12 would serve Planning Areas in the southeastern portion of the Project site.

Based on the Water Supply Assessment prepared for the Project by the YVWD, two onsite wells and well pumping plants are required to accommodate the necessary water supply to the Project. The wells would be constructed and maintained by YVWD, but would be located on site, likely within the Planning Areas 65 and 67. Offsite water infrastructure required to adequately serve the Project includes a potable pressure reducing station, a recycled pressure reducing station, a recycled booster station, a hydropneumatics tank, and two Zone 11 Reservoirs. The Project would be required to make fair-share payments to cover the cost of these improvements.

Public Facilities and Services

Utilities and public services would be provided to the Project site by the agencies/entities discussed in Chapter 2, Environmental Setting, of this SEIR. The Project would be subject to development fees that contribute towards public services, including fire protection, police protection, schools, parks and recreation, and libraries. Established fees would be subject to the Development Agreement Amendment for the Mesa Verde Specific Plan Area 2 Amendment 2. All electric, telephone, and cable television (telecommunication) lines would be installed underground. The Project would not implement any extensions of natural gas infrastructure to the Project site. Utility lines would primarily follow street alignments and connect into existing lines located in the Project site vicinity.

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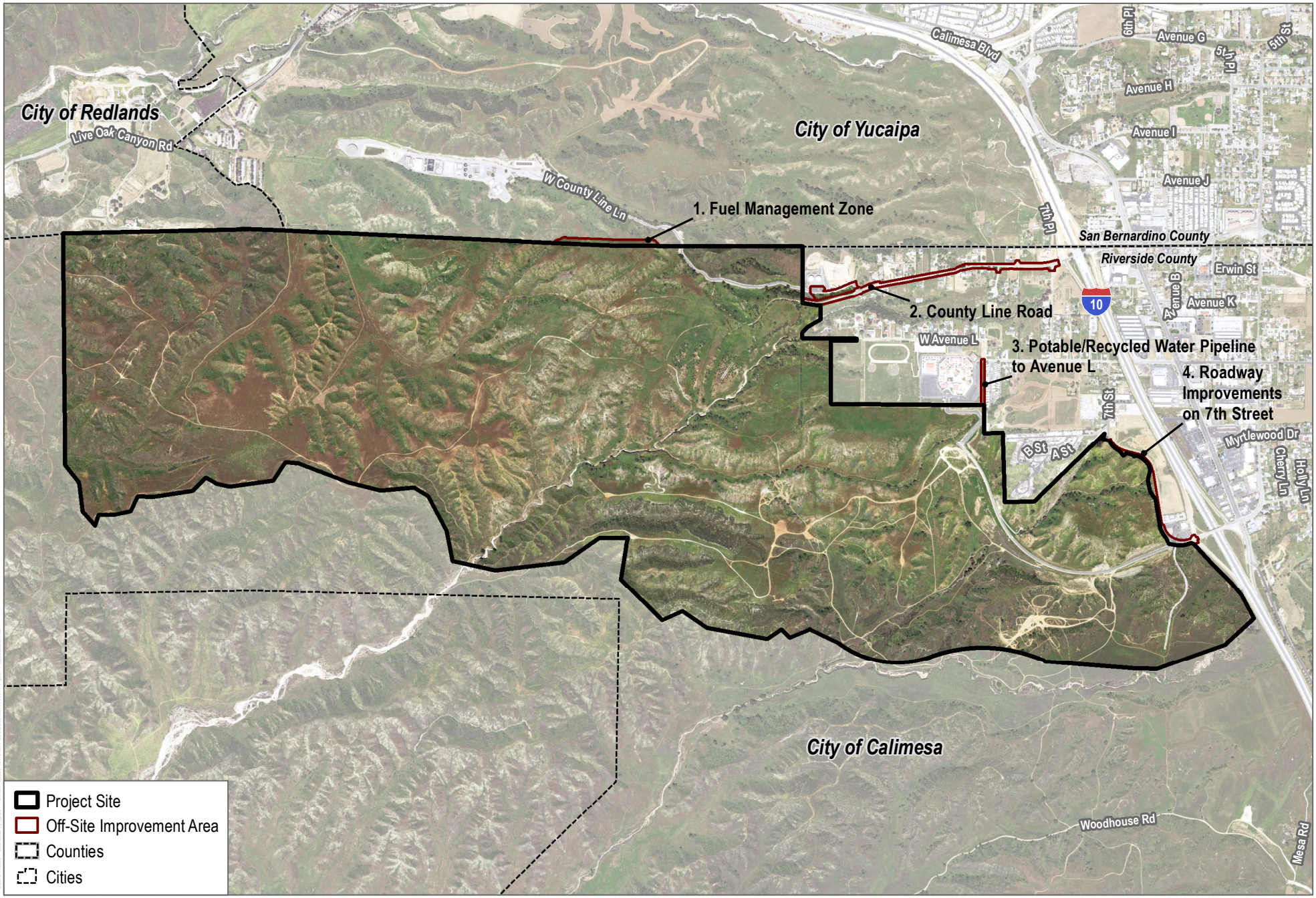

SOURCE: Hunsaker 2024; County of San Bernardino; County of Riverside; Open Street Map; NAIP 202

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0 1,000 2,000 Feet

0 250 500 Meters

FIGURE 1

Project Location

Fire Protection Plan for the Mesa Verde Specific Plan Project

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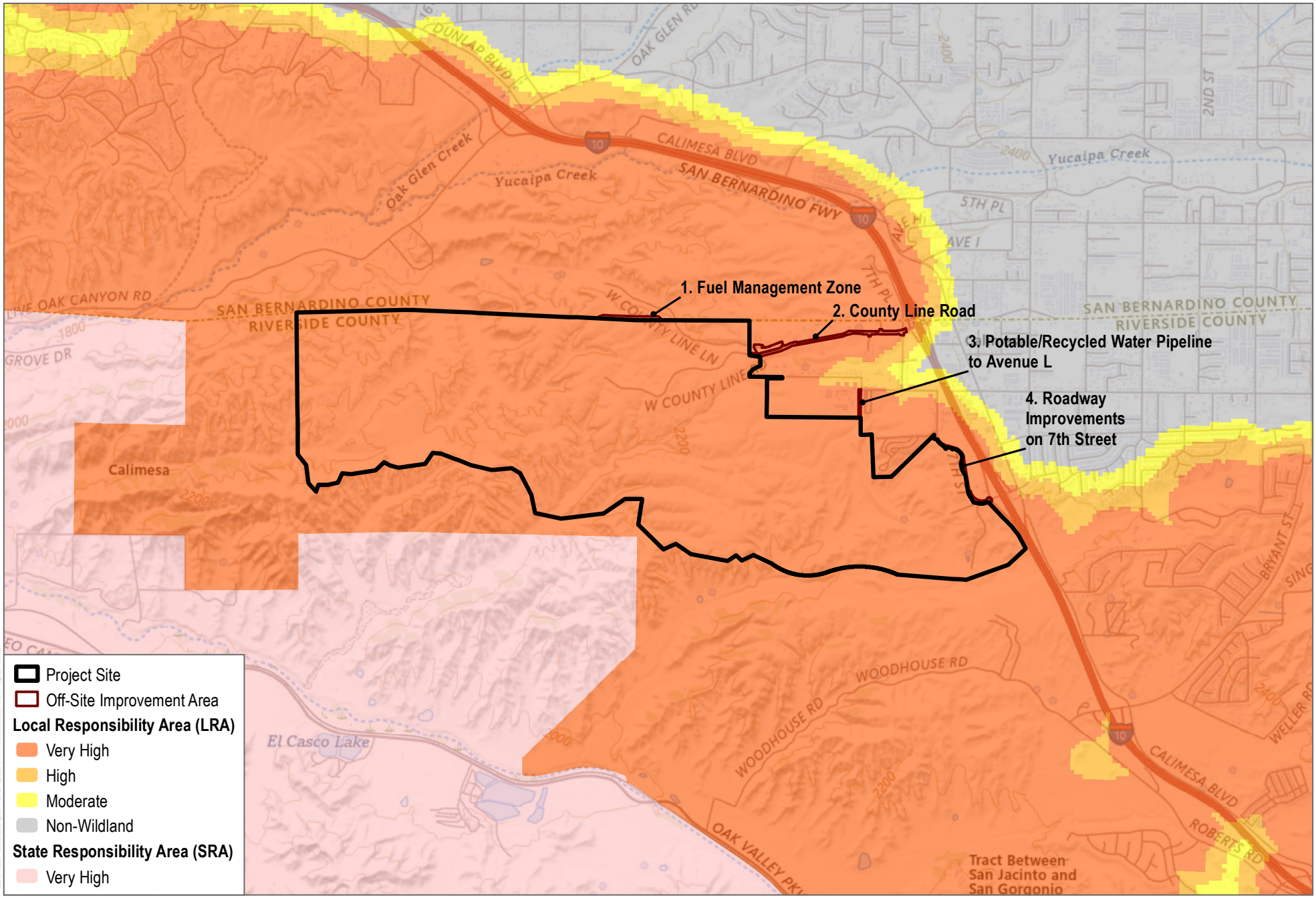

SOURCE: CalFIRE 2024; USGS Basemap

FIGURE 2

Fire Hazard Severity Zones

Fire Protection Plan for the Mesa Verde Specific Plan Project

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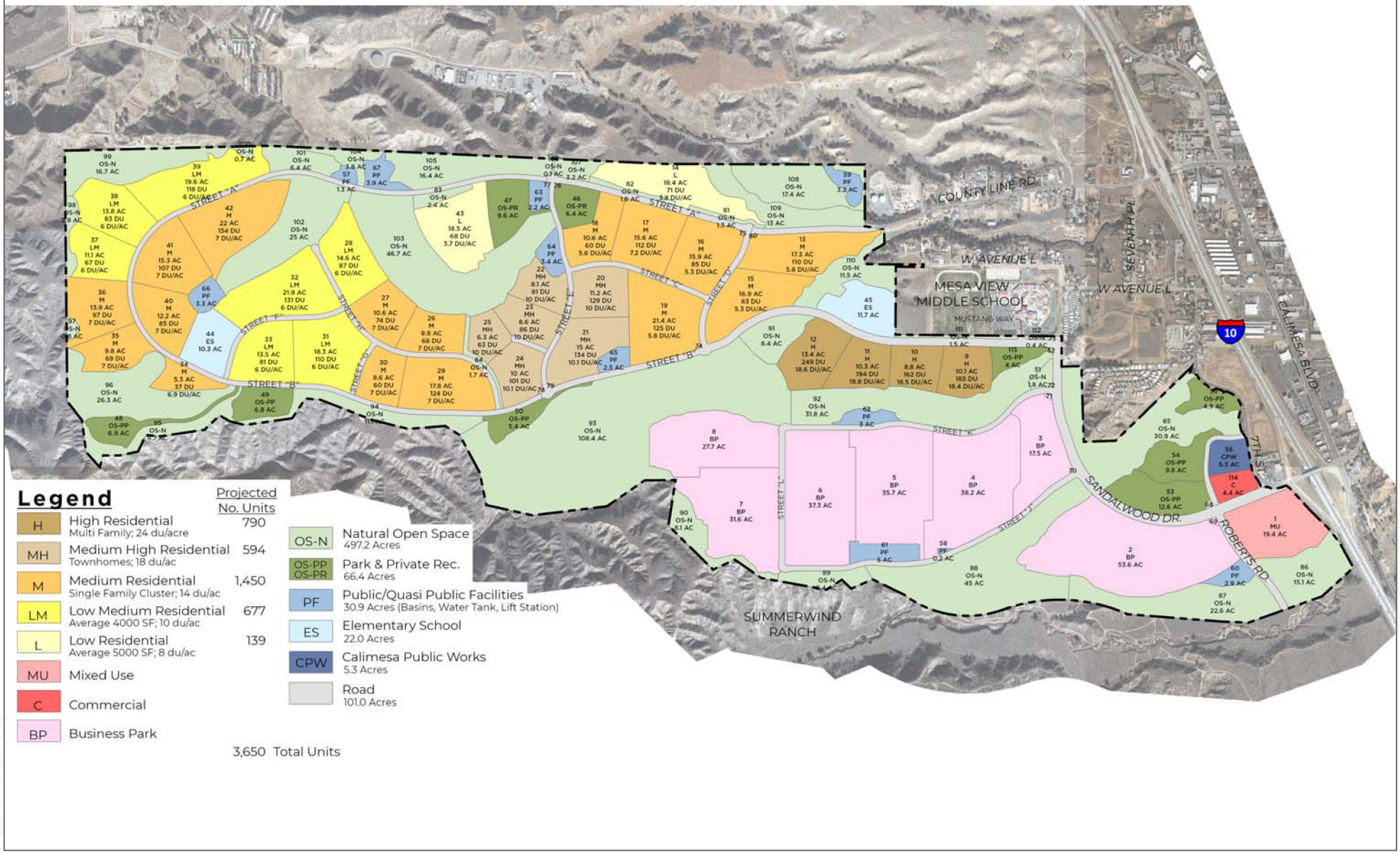

SOURCE: FORMA, April 2025

FIGURE 3

Proposed Land Use Plan

Fire Protection Plan for the Mesa Verde Specific Plan Project

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2 Project Site Risk Analysis

2.1 Environmental Setting and Field Assessment

After review of available digital Study Area information, including topography, vegetation types, fire history, and the Project's Development Footprint, a Dudek Fire Protection Planner conducted a field assessment of the Project area in September 2023, in order to confirm/acquire site information, document existing site conditions, and to determine potential actions for addressing the protection of the proposed project's structures. While on-site, Dudek's Fire Planner assessed the area's topography, natural vegetation, and fuel loading, surrounding land use, and general susceptibility to wildfire. Among the field tasks that were completed included:

- Topography evaluation.
- Vegetation/fuel assessments.
- Photograph documentation of the existing condition.
- Confirmation/verification of hazard assumptions.
- Off-site, adjacent property fuel and topography conditions.
- The surrounding land use confirmations.
- Necessary fire behavior modeling data collection.
- Ingress/egress documentation.
- Nearby Fire Station reconnaissance.

Study Area photographs were collected (refer to Appendix A, *Representative Site Photographs*), and fuel conditions were mapped using aerial images. Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the requirements and recommendations detailed in this FPP report.

2.2 Project Site Characteristics and Fire Environment

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

The following sections discuss the project site's characteristics and the surrounding region, local climate, and fire history within and adjacent to the property at a regional scale. The Mesa Verde Specific Plan Project is similar concerning topography, vegetative cover, and proximity to adjacent residential areas, available access, and

planned use. The intent of evaluating conditions at a macro-scale provides a better understanding of the regional fire environment, which is not constrained by property boundary delineations.

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope in the absence of wind. Terrain that forms a funneling effect, such as chimneys, chutes, or saddles 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 wind.

The topography of the Project site is characterized by flat mesas and ridges transected by primarily southwesterly draining valleys and canyons. The mesas and ridges lie at approximately the same elevation and represent a relatively flat to undulating topography and a gently southwest-facing sloping surface collectively referred to informally as the Calimesa surface. Elevations of the Calimesa surface are highest within the northeastern parts of the Project site where the elevations are just over 2,300 feet above sea level. Elevations of the Calimesa surface gradually decrease toward the southwest, providing an elevation difference across the Project site of about 200 feet.

2.2.2 Climate

Throughout southern California, and specifically at the Project site, climate has a large influence on fire risk. The climate of the City of Calimesa within Riverside County is typical of a Mediterranean area, with hot, arid, and mostly clear summers and long, cold, wet, and partly cloudy winters. The hot season typically lasts from June to September with average daily high temperatures above 87°F. The hottest month of the year in Calimesa typically is August with an average high of 93°F and low of 67°F. The cool season typically lasts from November to March with average daily high temperatures below 68°F. The coldest month of the year in Calimesa typically is December with an average low of 39°F and high of 62°F. Precipitation in the region has been averaging less than 10 inches and typically occurs between November and March (Weatherspark, 2023). The prevailing wind is an on-shore flow between 7 and 14 mph from the Pacific Ocean.

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

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

2.2.3 Vegetation (Fuels)

The study area predominantly encompasses open space but is intersected by incised drainages and numerous dirt roads. The majority of the study area burned in 2017 and 2019 during the Palmer and Sandalwood Fires, respectively. Evidence of motor vehicle off-roading (i.e., tire tracks and road ruts) is present throughout the study area. The study area is located just north of San Timoteo Canyon and north of the Badlands. Areas north of the study area comprise the City of Yucaipa and the foothills of San Bernardino National Forest. The Project property and surrounding areas primarily support sage scrub plant community, non-native grasslands and disturbed habitat. Vegetation types were derived from on-site biological field surveys of the Project site conducted by a Dudek Biologist between March 2022 and February 2024.

Thirty-three (33) vegetation communities or land cover types were mapped within the study area. Predominant species include non-native grasslands, chamise chaparral, chamise-sage chaparral, brittle bush scrub, brush mallow scrub, California buckwheat scrub, and coast live oak woodland and forest areas. The Vegetation Communities throughout the Mesa Verde Specific Plan project areas are shown in Figures 4a through 4j, Vegetation *Communities Map.*

The vegetation cover types were assigned a corresponding fuel model for use during site fire behavior modeling. Section 3.0 describes the fire modeling conducted for the Project area.

Extensive vegetation type mapping is useful for fire planning because it enables each vegetation community to be assigned a fuel model, which is used in a software program to predict fire behavior characteristics, as discussed in Section 3.1, Fire Behavior Modeling. The area proposed for development and within the Project grading limits will be converted to ignition resistant landscapes, roads, structures, and landscaped vegetation following Project completion. Vegetative fuels within proposed fuel modification zones will be removed or structurally modified as a result of development, altering their current structure and species composition, irrigation and maintenance levels, resulting in a perimeter wildfire buffer.

2.2.3.1 Vegetative Fuel Dynamics

The vegetation characteristics described above are used to model fire behavior, discussed in Section 3.0 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, non-native grass-dominated plant communities become seasonally prone to ignition and produce lower intensity, higher spread rate fires. In comparison, sage scrub and chaparral vegetation communities can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels. The corresponding fuel models for each of these vegetation types are designed to capture these differences. Vegetation distribution throughout the Project site varies by location and topography. Areas where the development footprint

would be located, are primarily low growing ruderal/grazed lands, non-native grassland vegetation, and chamise chaparral.

As described, vegetation plays a significant role in fire behavior, and is an important component of fire behavior models discussed in the report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high-frequency fires tend to convert shrublands to grasslands or maintain grasslands, while fire exclusion tends to convert grasslands to shrublands, over time. In general, biomass and associated fuel loading will increase over time, assuming that disturbance (fire, grazing, or grading) or fuel reduction efforts are not diligently implemented.

It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed fuel modification zones on-site. The fuel modification zones for the project will consist of paved areas and irrigated and maintained landscapes as well as thinned native fuel zones that will be subject to regular “disturbance” in the form of maintenance and will not be allowed to accumulate excessive biomass (live or dead) over time, which results in reduced fire ignition, spread rates, and intensity. Conditions adjacent to the Project’s footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are classified as low to medium fuel loads due to the dominance of non-native grassland areas intermixed with sparse chaparral and sage scrub-grass fuels.

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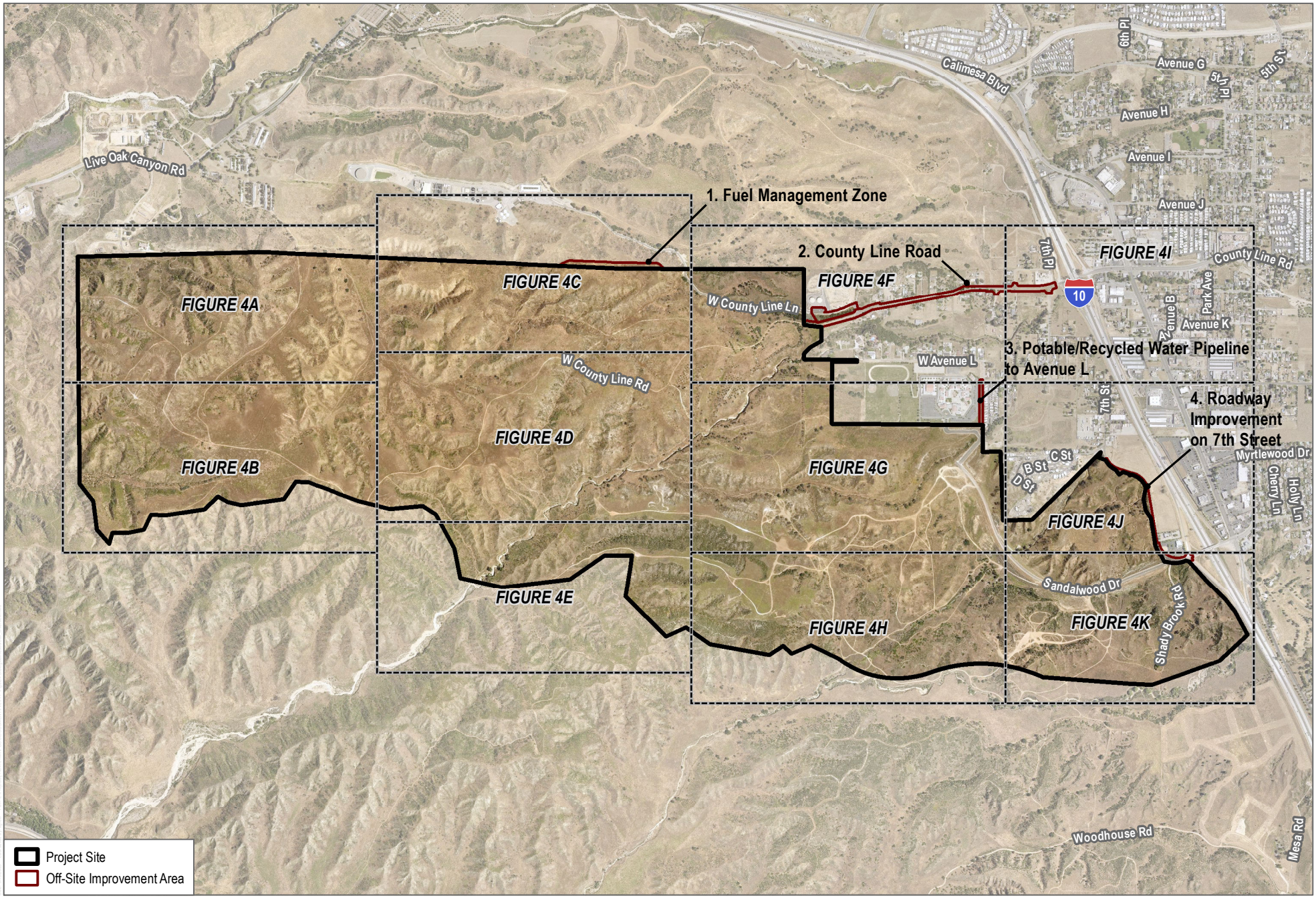

SOURCE: Hunsaker 2024; Riverside County; Open Street Map

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FIGURE 4

Biological Resources Overview

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Suitable Burrowing Owl Burrows
- Rare/Sensitive Vegetation Communities
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Adefas-Salmel - Chamise-Sage chaparral
  - Arcgla-Adefas-Quewis - Eastwood manzanita chaparral
  - Ceacra-Adefas-Salmel - Hoary leaf ceanothus chaparral
  - Rhuova - Sugarbush chaparral
- **Grass and Herb Dominated**
  - Corfil - Sand-aster and perennial buckwheat fields
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Artcal-Lotsco - California sagebrush-(purple sage) scrub
  - Erifas/Encfar - California buckwheat scrub
  - Kecant - Bush penstemon scrub
  - Lotsco - Deerweed-silver lupine-yerba santa scrub
  - Malfas - Bush mallow scrub
  - Salmel/Erifas/BrorubBlack sage scrub
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - DH - Disturbed Habitat

SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

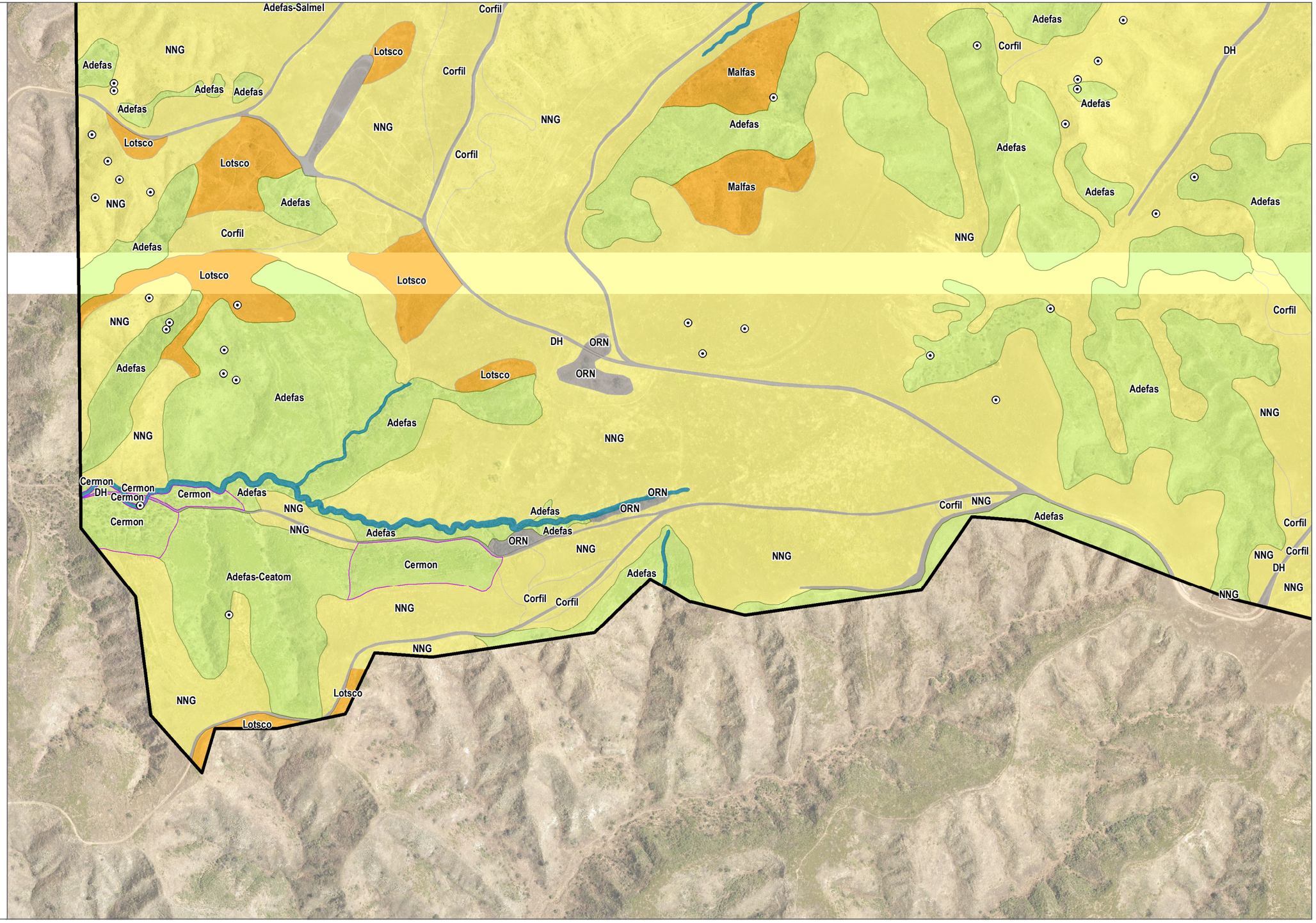
0 150 300 Feet

FIGURE 4A

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Suitable Burrowing Owl Burrows
- Rare/Sensitive Vegetation Communities
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Adefas-Salmel - Chamise-Sage chaparral
  - Cermon - Hairy leaf-woolly leaf ceanothus chaparral
- **Grass and Herb Dominated**
  - Corfil - Sand-aster and perennial buckwheat fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Lotsco - Deerweed-silver lupine-yerba santa scrub
  - Malfas - Bush mallow scrub
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat



SOURCE: Hunsaker 2024; Riverside County; NAIP

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0 150 300 Feet

FIGURE 4B

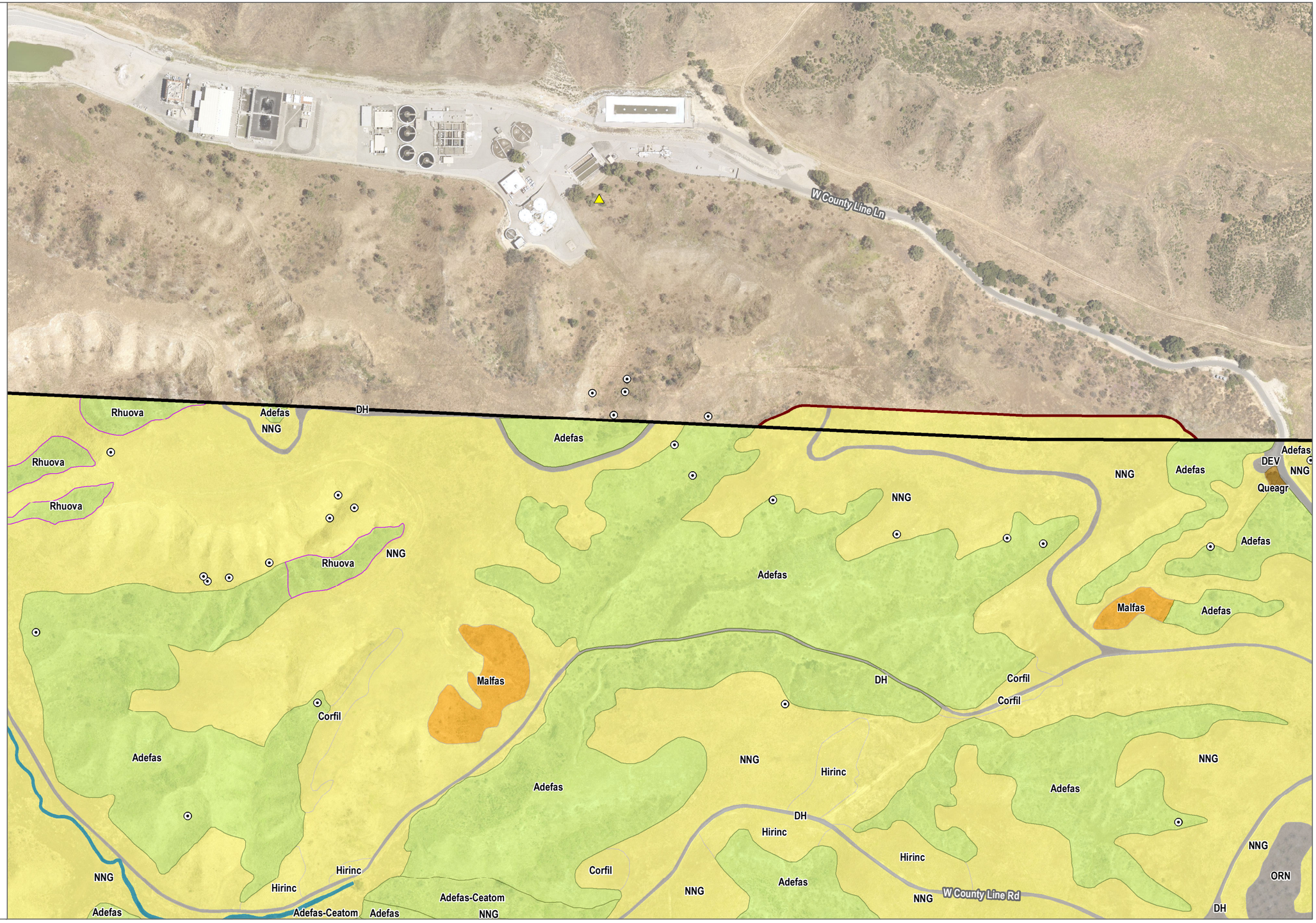
Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows

Special-Status Wildlife

- yellow warbler
- Rare/Sensitive Vegetation Communities
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Rhuova - Sugarbush chaparral
- **Grass and Herb Dominated**
  - Corfil - Sand-aster and perennial buckwheat fields
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Malfas - Bush mallow scrub
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat
  - DEV - Urban/Developed



SOURCE: Hunsaker 2024; Riverside County; NAIP

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0 150 300 Feet

FIGURE 4C

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Suitable Burrowing Owl Burrows
- Rare/Sensitive Vegetation Communities
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Adefas-Salmel - Chamise-Sage chaparral
- **Grass and Herb Dominated**
  - Corfil - Sand-aster and perennial buckwheat fields
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Kecant - Bush penstemon scrub
  - Lotsco - Deerweed-silver lupine-yerba santa scrub
  - Malfas - Bush mallow scrub
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat

SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

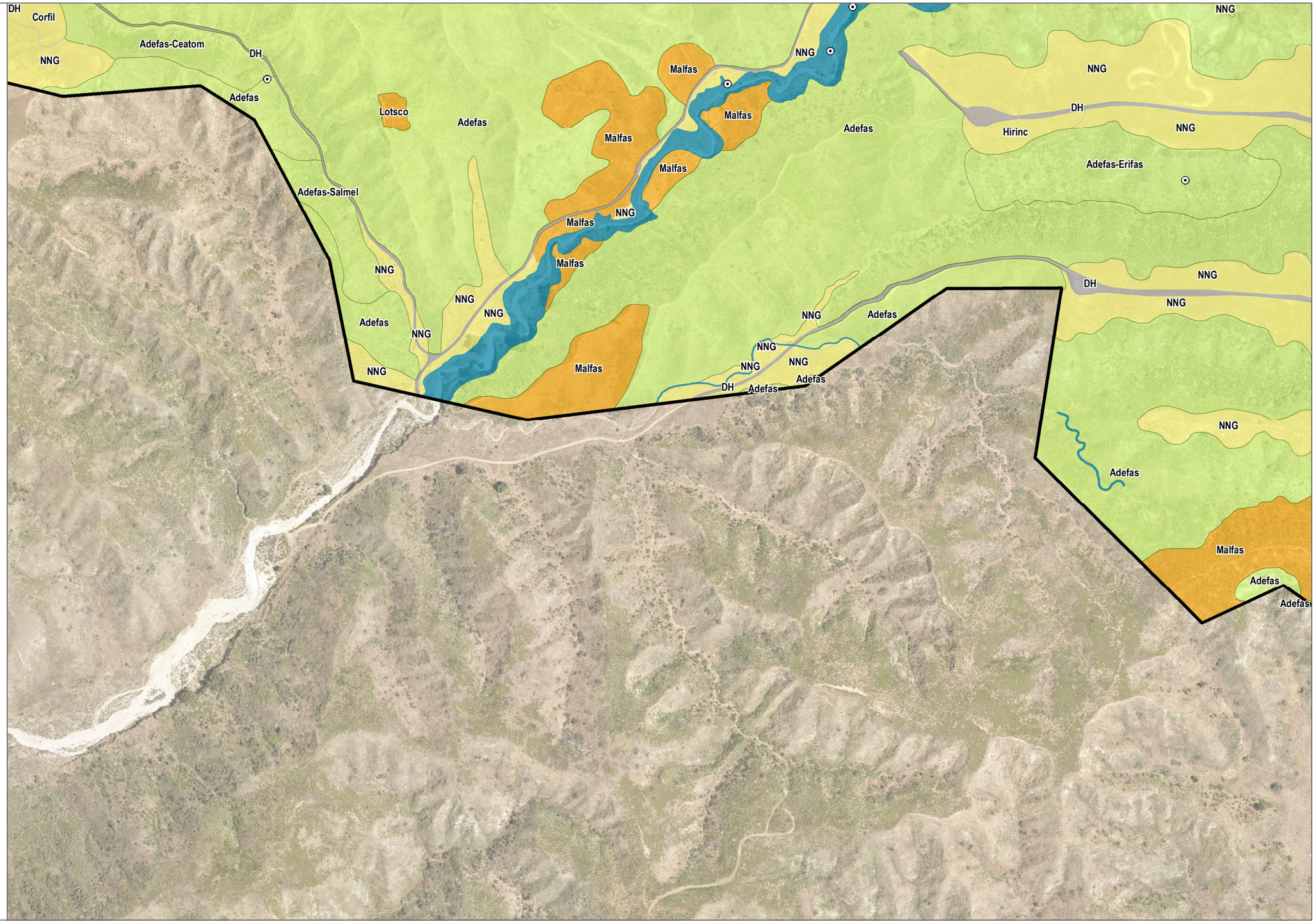
0 150 300 Feet

FIGURE 4D

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Suitable Burrowing Owl Burrows
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Adefas-Salmel - Chamise-Sage chaparral
- **Grass and Herb Dominated**
  - Corfil - Sand-aster and perennial buckwheat fields
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Lotsco - Deerweed-silver lupine-yerba santa scrub
  - Malfas - Bush mallow scrub
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - DH - Disturbed Habitat



SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4E

Biological Resources

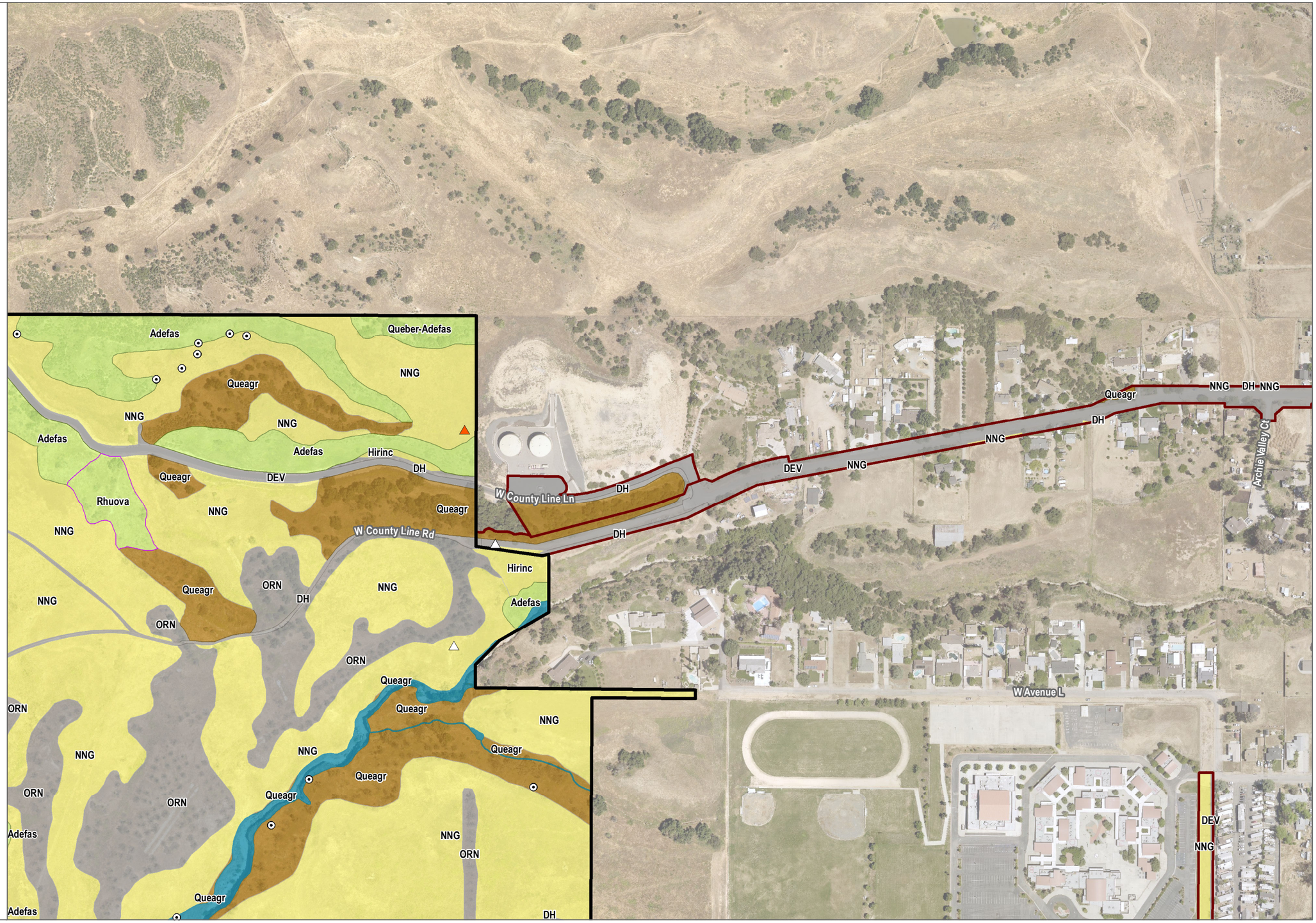
Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows

Special-Status Wildlife

- red diamond rattlesnake
- white-tailed kite
- Rare/Sensitive Vegetation Communities

- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Queber-Adefas - Scrub oak chaparral
  - Rhuova - Sugarbush chaparral
- **Grass and Herb Dominated**
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat
  - DEV - Urban/Developed



SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4F

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows

Special-Status Wildlife

- northern harrier
- Rare/Sensitive Vegetation Communities

Chaparral

- Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
- Adefas-Salmel - Chamise-Sage chaparral
- Queber-Adefas - Scrub oak chaparral
- Rhuova - Sugarbush chaparral

Grass and Herb Dominated

- Hirinc - Upland mustards or star-thistle fields
- NNG - Non-Native Grassland
- Naspul-Ave-Bro - Needle grass-Melic grass grassland

Scrub

- Encfar - Brittle bush scrub
- Erifas/Encfar - California buckwheat scrub

Woodland

- Queagr - Coast live oak woodland and forest

Riparian

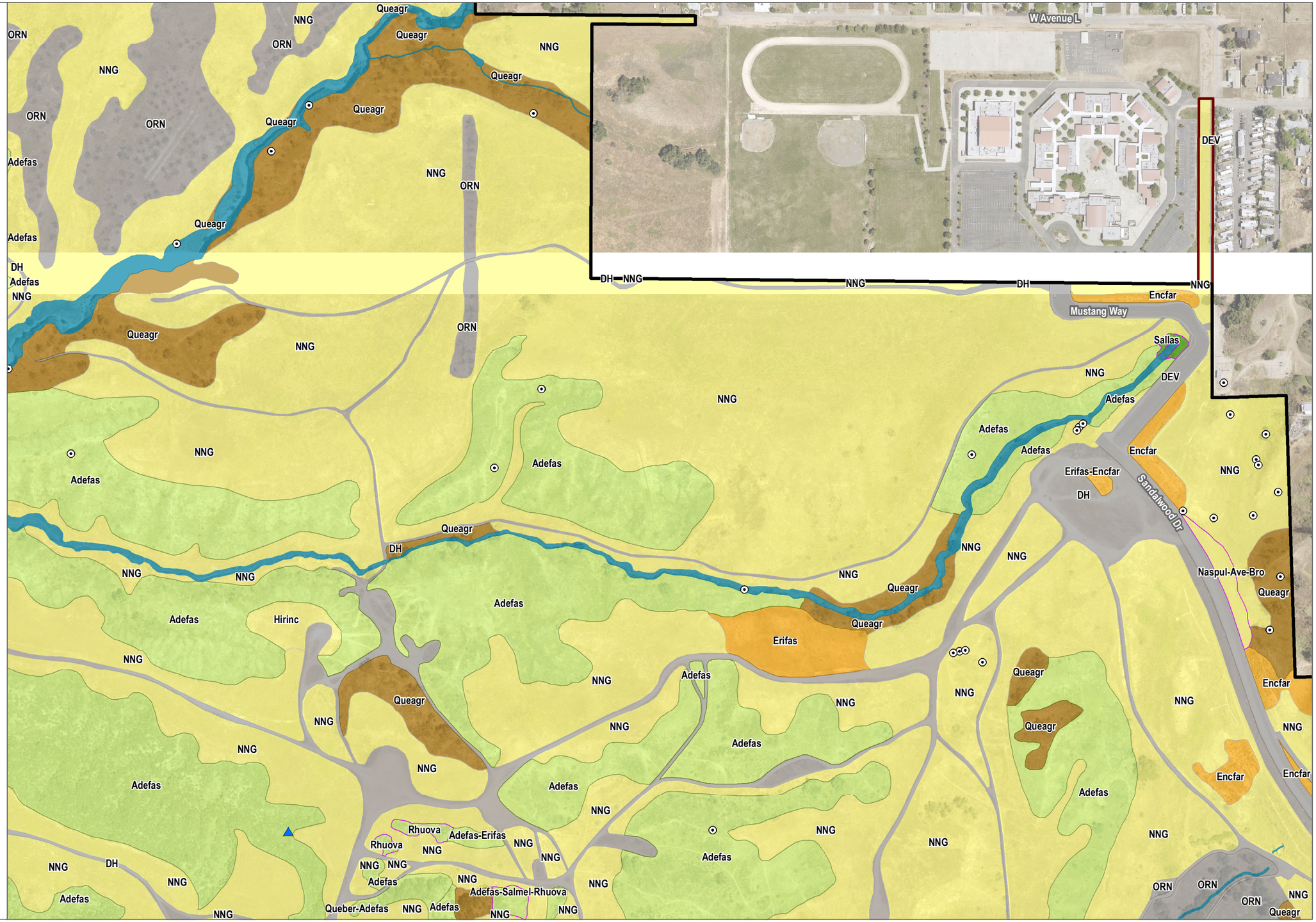
- Sallas - Arroyo willow

Unvegetated

- NWW - Unvegetated wash and river bottom

Disturbed and Developed

- ORN - Ornamental Plantings
- DH - Disturbed Habitat
- DEV - Urban/Developed



SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4G

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Suitable Burrowing Owl Burrows

Special-Status Wildlife

- northern harrier
- Rare/Sensitive Vegetation Communities

- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Adefas-Salmel - Chamise-Sage chaparral
  - Queber-Adefas - Scrub oak chaparral
  - Rhuova - Sugarbush chaparral
- **Grass and Herb Dominated**
  - NNG - Non-Native Grassland
  - Sal - Russianthistle-dyers woad-fivehood bassia fields
- **Scrub**
  - Encfar - Brittle bush scrub
  - Erifas/Encfar - California buckwheat scrub
  - Malfas - Bush mallow scrub
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Riparian**
  - Samnig - Basket bush-river hawthorn-desert olive patches
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat
  - DEV - Urban/Developed

SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4H

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows
- **Grass and Herb Dominated**
  - NNG - Non-Native Grassland
- **Disturbed and Developed**
  - DH - Disturbed Habitat
  - DEV - Urban/Developed

SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

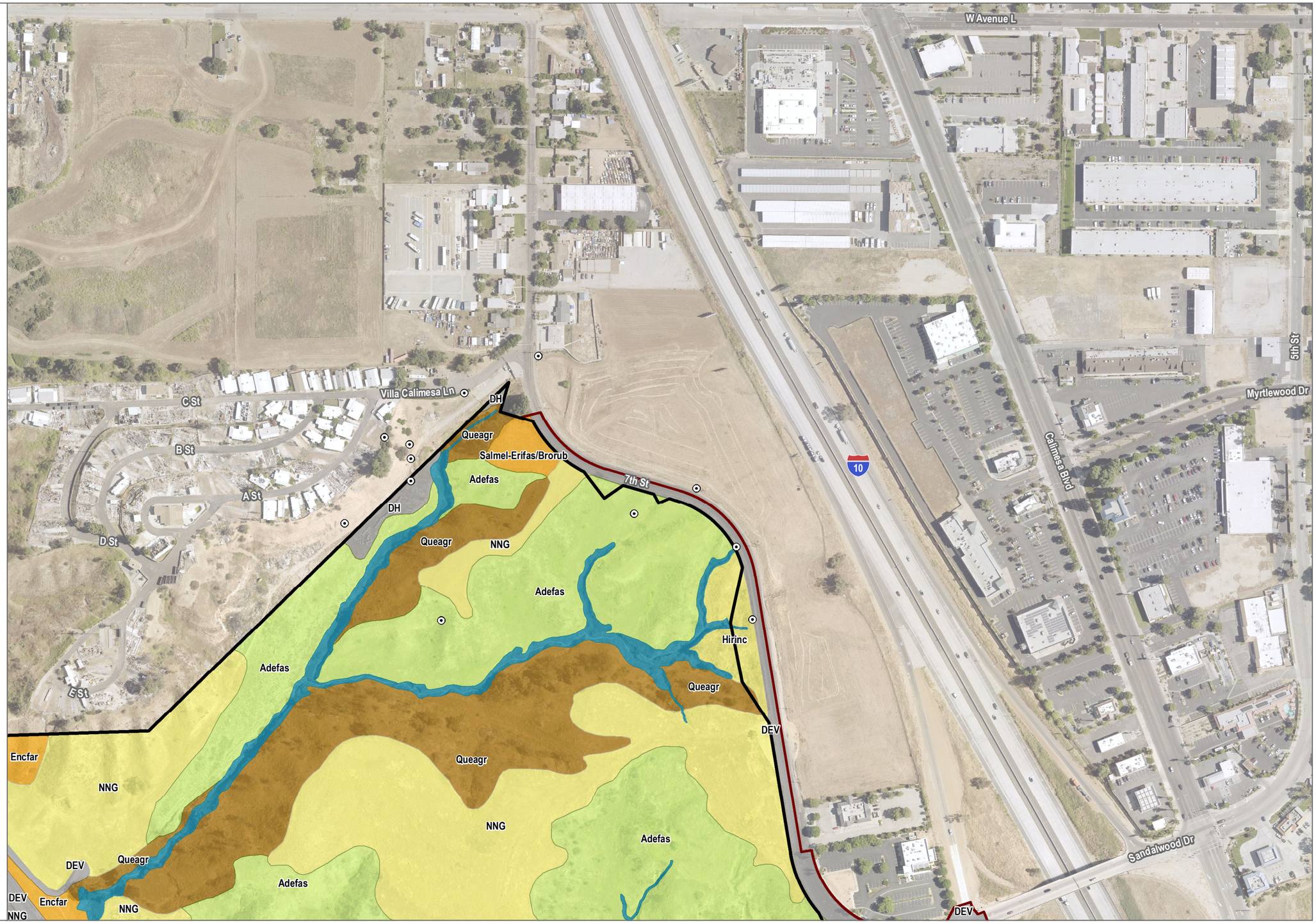
0 150 300 Feet

FIGURE 4I

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows
- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
- **Grass and Herb Dominated**
  - Hirinc - Upland mustards or star-thistle fields
  - NNG - Non-Native Grassland
- **Scrub**
  - Encfar - Brittle bush scrub
  - Salmel/Erifas/BrorubBlack sage scrub
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - DH - Disturbed Habitat
  - DEV - Urban/Developed



SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4J

Biological Resources

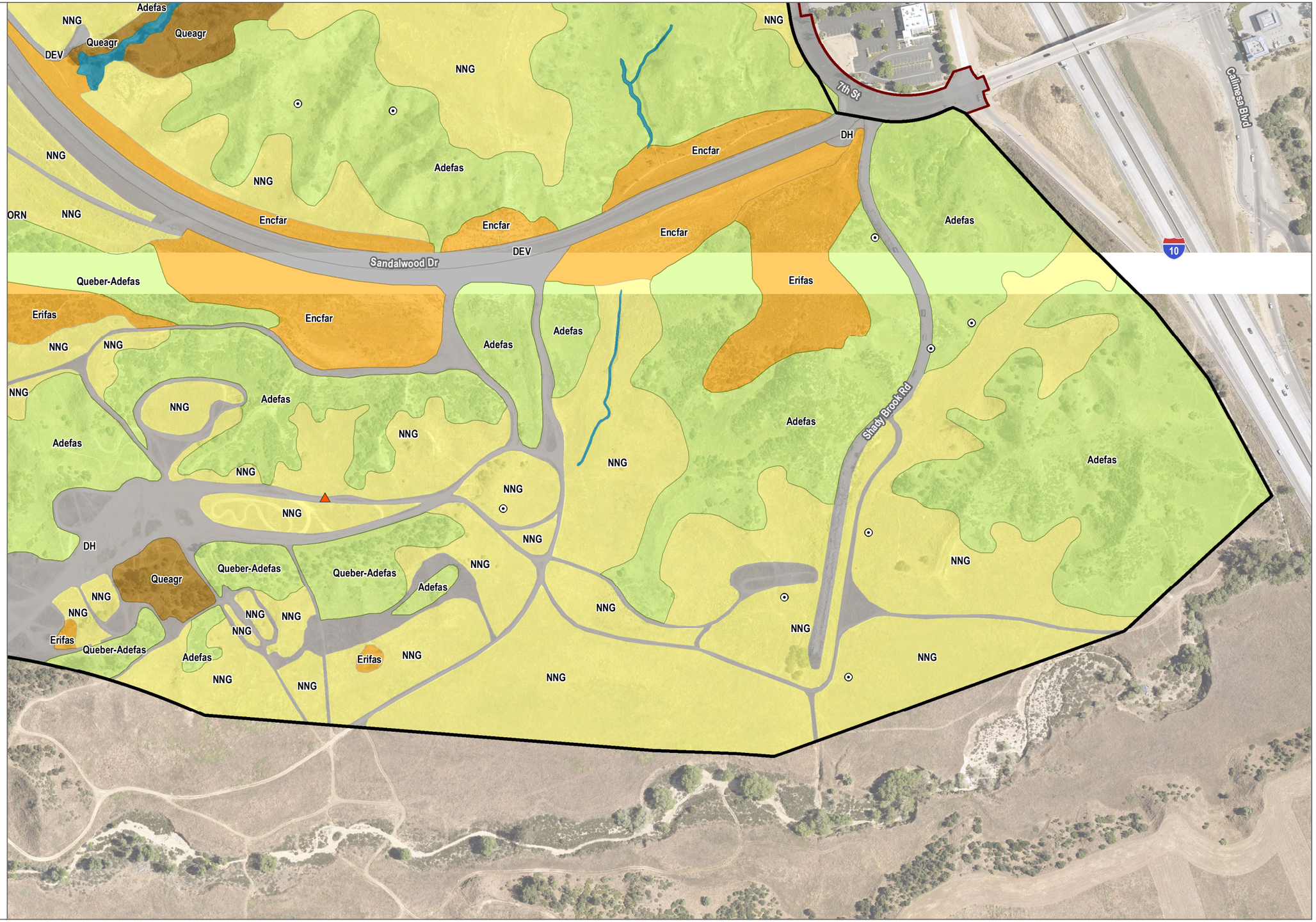
Fire Protection Plan for the Mesa Verde Specific Plan Project

- Project Site
- Off-Site Improvement Area
- Suitable Burrowing Owl Burrows

Special-Status Wildlife

- red diamond rattlesnake

- **Chaparral**
  - Adefas/Ceatom/Erifas/Lotsco/Eri - Chamise chaparral
  - Queber-Adefas - Scrub oak chaparral
- **Grass and Herb Dominated**
  - NNG - Non-Native Grassland
- **Scrub**
  - Encfar - Brittle bush scrub
  - Erifas/Encfar - California buckwheat scrub
- **Woodland**
  - Queagr - Coast live oak woodland and forest
- **Unvegetated**
  - NWW - Unvegetated wash and river bottom
- **Disturbed and Developed**
  - ORN - Ornamental Plantings
  - DH - Disturbed Habitat
  - DEV - Urban/Developed



SOURCE: Hunsaker 2024; Riverside County; NAIP

DUDEK

0 150 300 Feet

FIGURE 4K

Biological Resources

Fire Protection Plan for the Mesa Verde Specific Plan Project

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2.2.4 Fire History

Fire history is an important component of a site-specific FPP. Fire history data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. In turn, this understanding of why fires occur in an area and how they typically spread can then be used for pre-planning and designing defensible communities. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the site, and how a fire may spread.

Fire history represented in the FPP uses the California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (FRAP) database. FRAP summarizes fire perimeter data dating to the late 1800s/early 1900s, but which is incomplete due to the fact that it only includes fires over 10 acres in size and has incomplete perimeter data, especially for the first half of the 20th century (Syphard and Keeley 2016). However, the data does provide a summary of recorded fires and can be used to show whether large fires have occurred in the Project area, which indicates whether they may be possible in the future.

According to available data from the CAL FIRE in the FRAP database, there have been 139 fires that have burned within 5 miles of the site since the beginning of the historical fire data record. Recorded wildfires within 5 miles range from approximately 10 acres to approximately 28,136 acres (Edna Fire) and the average fire size is approximately 1,452 acres. The 2020 El Dorado Fire (approximately 22,504 acres) is the most recent fire to burn near the project site, however, the most recent significant fire was the 1998 Edna Fire (approximately 28,136 acres). There have been eight (8) fires on record that have burned on the site, with the most recent being the 2019 Sandalwood Fire which burned approximately 1,009 acres within City of Calimesa, killing two people and destroying 74 structures in the Villa Calimesa mobile home park.[11] CFD and Riverside County may have data regarding smaller fires (other fires less than 10 acres) that have occurred on-site that have not been included herein.

Based on an analysis of the CAL FIRE FRAP fire history data set, specifically the years in which the fires burned, the average interval between wildfires in the area (includes areas up to roughly 5 miles from the Project site) was calculated to be one year with intervals ranging between zero (multiple fires burned in the same year) and 22 years. Based on this analysis, it is expected that wildfire that could impact the Project may occur, if weather conditions coincide, roughly every year with the realistic possibility of shorter or longer interval occurrences, as observed in the fire history records. Fire history for the general vicinity of the Project site is illustrated in Appendix B, Fire History Map.

2.2.5 Analysis of Wildfire Risk from Adding New Development

Research indicated that humans (i.e., human related activities or human created features, services, or processes) are responsible for the majority of Southern California wildfires (Syphard et al. 2007, 2008; Romero-Calcerrada et al. 2008). Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels without proper prevention measures in place. These ignitions predominantly occur as accidents, but may also be purposeful, such as in the case of arson. Roadways are a particularly high source for wildfire ignitions due to high usage and vehicle caused fires (catalytic converter failure, overheated brakes, dragging chains, tossed cigarettes, and others) (Harris 2019; Dudek 2008). In Southern California, and Riverside County, the population living at, working in, or traveling

[11] https://www.fire.ca.gov/incidents/2019/10/10/sandalwood-fire/

through the wildland urban interface is vast and provides a significant opportunity for ignitions every day. However, it is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95 percent of wildfires are controlled below 10 acres (CAL FIRE 2019; Santa Barbara County Fire Department 2019).

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

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

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

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

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

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

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

2009). At a minimum, managing defensible space can reduce risk across multiple scales by damping fire risk, reducing the impact of fire, and in turn reducing annual fire risk (Braziunas et al., 2021).

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

Success of Ignition Resistant Building Codes in Saving Structures

Master-planned communities built to modern ignition resistant standards provide passive fire protection that is highly successful at minimizing damage and loss of structures. The State Fire Marshal's statistics demonstrate that homes built to California Building Code standards adopted in Chapter 7A effectively reduce fire risks to homes built in the wildland urban interface (WUI) and fire hazard severity zones. Remarkably, when those homes are built as part of a properly planned and mitigated master-planned community, like the Mesa Verde Development, the risk of significant structural loss is extremely low. Despite the headlines in recent years about the loss of homes to California wildfires, it has gone substantially unreported that no master-planned community built after the adoption of California Building Code Chapter 7A has suffered extensive structural losses, as evidenced in the OSFM Property Loss Data.

The evidence demonstrates that California's wildland fire structure losses are from the existing home stock built before modern Chapter 7A standards or poorly planned developments. See Appendix D (State Fire Marshal Housing Data Analysis). Extensive analysis of State Fire Marshal data regarding recent impacts from California's mega-fires and the data shows overwhelmingly that over 98.5% of structural damage or loss occurs with homes built before modern Chapter 7A standards, and even of those new homes that were damaged, most involved isolated new construction surrounded by existing, high-risk homes (e.g., new homes lost in the Camp fire) located in high-risk areas. These are homes commonly built in the WUI that are overgrown by many drought-ridden fuel types (brush, shrubs, trees, etc.) that are ready to burn rapidly. Many have narrow roads, inadequate fire access and evacuation routes, and inadequate water supplies. In stark contrast, new master-planned communities must go through a strenuous environmental review under the California Environmental Quality Act (CEQA) and are typically planned, approved, and implemented with numerous fire-safety features and measures, such as:

- Fire-hardened homes built to the latest Chapter 7A standards.
- Community-wide fuel breaks, fire-resistant landscaping, and green belting.
- Perpetual funding, maintenance and enforcement through an HOA.
- Appropriate and reliable fire access and evacuation routes.
- Adequate water supplies (studied pursuant to SB 610).
- Residential interior fire sprinklers.
- Undergrounded project utilities.
- Community design and siting to minimize fire risks (e.g., slope setbacks).

On average, for the nine worst property-loss fires dating back to 2017, only approximately 1% of the homes and apartments destroyed, damaged, or affected were new dwellings (built after January 1, 2010) even though new dwellings make up roughly 7% of the state's total housing stock.

New homes fared extremely well compared with older neighborhoods during these major fires. Of the 31,000 data points analyzed from the State Fire Marshal, it was extremely rare to see more than two new homes on the same street destroyed or affected by the fires, while it was commonplace for entire neighborhoods of older dwellings to be destroyed. As opposed to custom home production where a single home is constructed separate of others, production-style home development is completed in phases, usually 8-15 homes at a time. This typical production-style construction creates blocks or areas of fire-resistant homes, which are much more effective at withstanding wildfire intrusion and decreasing home-to-home spread. Notably, Dudek is not aware of any master-planned community in California constructed after January 1, 2010 (i.e., a planned community with all new homes and typically including measures such as fuel breaks) suffering significant structural loss even during extreme fire events.

Please refer to Appendix D for details regarding the top 9 largest loss wildfires since 2017 and how well master planned communities and newer California Building Code Chapter 7A compliant structures have performed when challenged by aggressive wildfire. Examples of master planned community fire resiliency include the October 2020 Silverado Fire, the 2008 Freeway Complex Fire, and the 2003 Simi Fire, all provided more detail in Appendix D.

2.2.6 Fire Protection Features' Beneficial Effect on Wildfire Ignition Risk Reduction

Each of the fire protection features provided as part of the code requirements or customized for this Project are based on the FPP's evaluation work to protect the Project site, its structures, and their occupants from wildfires. These features also have a similar positive impact on the potential for wildfire ignitions caused by the project and its inhabitants.

As mentioned previously, the ignition resistant landscapes and structures and the numerous specific requirements would minimize the ability for an on-site fire to spread to off-site fuels, as follows:

1. **Ignition resistant, planned and maintained landscape** – all site landscaping of common areas and fuel modification zones will be subject to strict plant types that are lower ignition plants with those closest to structures requiring irrigation to maintain high plant moistures which equates to difficult ignition. These areas are closest to structures, where ignitions would be expected to be highest, but will be prevented through these ongoing maintenance efforts.

2. **100-Foot-Wide Fuel Modification Zone around perimeter of project** – the 100-foot-wide FMZ includes specifically selected plant species, very low fuel densities (only 50% retention of native plants in outer zone and irrigated inner zones), and ongoing HOA funded and applied maintenance, resulting in a wide buffer between the developed areas and the off-site native fuels.

3. **Annual FMZ inspections** – the Mesa Verde HOA or similar entity will have a contracted, 3rd party, CFD-approved FMZ inspector perform one inspection per year to ensure that FMZs are maintained in a condition that is consistent to the City, County's, and FPP's requirements and would provide a benefit of a wide barrier separating wildland fuels from on-site ignitions.

4. **Ignition resistant structures** – all structures will be built to the Chapter 7A (CBC) ignition resistant requirements that have been developed and codified as a direct result of after fire save and loss assessments. These measures result in structures that are designed, built and maintained to withstand fire and embers associated with wildfires. It must be noted that the FMZs would not result in wildfire directly next to these structures. Homes and buildings can be built in the VHFHSZs and WUI areas when they are part of an overall approach that contemplates wildfire and provides design features that address the related risk. A structure within a VHFHSZ that is built to these specifications can be at lower risk than an older structure in a non-fire hazard severity zone. The ignition resistance of on-site structures would result in a low incidence of structural fires, further minimizing potential for project-related wildfires.

5. **Interior fire sprinklers** – sprinklers within all structures are designed to provide additional time for occupants to escape the home or building. Sprinklers in single-family, multi-family and commercial structures are designed to provide structural protection. The common benefit of fire sprinklers is that they are very successful at assisting responding firefighters by either extinguishing a structural fire or at least, containing the fire to the room of origin and delaying flash over. This benefit also reduces the potential for an open space vegetation ignition by minimizing the possibility for structure fires to grow large and uncontrollable, resulting in embers that are blown into wildland areas. This is not the case with older existing homes in the area that do not include interior sprinklers.

6. **Fire access roads and driveways** – roads/driveways provide access for firefighting apparatus. Project roads and driveways provide code-consistent access throughout the mixed-use development. Better access to wildland areas may result in faster wildfire response and continuation of the fire agencies' successful control of wildfires at small sizes.

7. **Water** – providing firefighting water throughout the Project with fire hydrants accessible by fire engines is a critical component of both structural and vegetation fires. The Project provides firefighting water volume, availability and sustained pressures to the satisfaction of CFD. Water accessibility helps firefighters control structural fires and helps protect structures from and extinguish wildfires.

2.3 Off-Site Wildfire Impacts

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

Common ignition sources in southern California are related to powerlines and vehicles (Keeley & Syphard, 2018). Powerlines-based ignitions are a major concern with respect to off-site wildfire impacts. However, this risk can be mitigated by burying powerlines, as they would be for this project. Burying powerlines significantly eliminates a potential ignition source within the Project site and benefits the larger vicinity. The remaining highest likelihood of vegetation ignitions in the Project area would be related to existing roads used by Project residents and employees. However, the Project provides roadside fuel modification along all roads it creates. These efforts reduce or minimize the ability for a vehicle related spark, catalytic converter failure, or other ignition source to ignite and spread fire from the roadsides into unmaintained fuels. The on-site roadways would comply with all fire department access requirements and be adjacent to fuel modification. Therefore, even if ignition were to occur on the Project interior roadways it is highly unlikely it would spread beyond the Project site and due to the level of hardscape and the adjacent fuel modifications areas, would result in patchy and slow fire spread and reduced fire intensity.

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

2.3.1 Vegetation Management

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

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

This will keep the FMZs and landscaped areas in a highly fire resistive condition free of accumulated flammable debris and plants.

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

2.3.2 Firefighter Response

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

2.3.3 Ignition Resistant/Noncombustible Construction

The WUI fire problem is structures lacking ignition resistant features (i.e., ember resistant vents, interior sprinklers); therefore, the best mitigation is to reduce the likelihood of building ignition occurring (Zhou, 2013). Structural characteristics play a large role in whether a building burns, which is important in WUI environments as structures also serve as fuel (Gorte, 2011). The benefit of structure-based mitigation is that it not only lowers the on-site risk but also lowers the risk of wildfire across a landscape (Mockrin et al., 2020). In WUI areas, this is because structures are also fuels that can spread a fire into open space. With the incorporation of ignition-resistant construction, the likelihood of structural ignition occurring within the Project area is minimized. The Project will provide new code compliant, ignition resistive structures, which lowers the threat from on-site fires impacting off-site areas as the structures themselves are very unlikely to act as fuel. While the Project includes vent coverings to prevent ember penetration the Project buildings will also include NFPA 13 Interior Automatic Fire Sprinkler Systems for occupancy type in every building. This is crucial in preventing off-site impacts as embers can also be generated by a structure fire and can be blown over the fuel modification into native fuels. Automatic sprinklers can isolate a fire to the area of origin, limit its ability to spread to the rest of the building, and even extinguish a fire before the responding firefighters arrive, thus damping the likelihood of ember production. The installation of interior fire sprinklers also reduce impacts on fire response capacity as the automatic sprinklers will allow firefighters to focus on reducing additional ignitions beyond the point of origin.

Structure design, such as this Project's design, is crucial in protecting an area against wind-driven fires. The Project provides features that not only prevent fire intrusion but prevent structure fires from escaping into off-site areas. This allows the Project to not only protect the immediate area but the surrounding environment.

2.3.4 Shelter-in-Place Capability

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

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

This Fire Protection Plan provides significant evaluation and conclusions regarding the shelter-in-place capability of the Project's buildings. Among other things, the Project has been designed to include ignition-resistant structures with the use of ignition resistant construction materials, effective defensible space and fuel management zones, ember protection, and other redundant structure, infrastructure, building code, and water supply and flow requirements established as containing adequate protective features to act as temporary shelters during wildfires. All the on-site structures could be utilized for temporary refuge during a wildfire. In addition, there may be protected open-air areas that would be enhanced to serve as temporary sheltering sites as a contingency plan if evacuation is considered undesirable. These sites would be designated with input from CFD and may include green spaces, lee-side of buildings, or other protected areas.

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

The decision on whether to evacuate or shelter-in-place is carefully considered with the timing and nature of the incident. Sheltering-in-place is the preferred method of protection for people that are not directly impacted or in the direct path of a hazard. This will reduce congestion and transportation demand on the major transportation routes for those that have been directed to evacuate by police or fire personnel. Like with most new developments that incorporate ignition resistant construction, wide fuel modification zones, ember protection, and fire defensibility throughout, responding fire and law enforcement personnel will be able to direct persons to temporarily refuge on-site in designated buildings in the rare situation where shelter-in-place is determined to be safer than evacuating.

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

The Project buildings will be constructed of ignition resistant construction. Because of the ignition resistant construction, fuel modification zone setbacks and the type of lower fire intensity vegetative fuels in the vicinity of the site, sheltering in place is considered to be a safe option if a fast-moving wildfire precludes complete evacuation of the Project site. The primary concern is anticipated to be with smoke and air quality rather than exposure to flames and heated air. Measures to safely refuge persons within the buildings and minimize smoke and air quality

issues would be enacted in this scenario. For example, when wildfire ignites, it is common for HVAC systems to be turned off.

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

Even though current Building and Fire Codes require these measures, at one time, many of them were used as mitigation measures for buildings in fire hazard areas, because they were known to reduce structure vulnerability to wildfire. These measures were adopted into the 2007 California Building Code and have been retained and enhanced in code updates since then, including within the 2022 Fire and Building code updates. The following Project features are required for new development in fire hazard areas and would form the basis of the system to provide adequate access by emergency responders and provide the protection necessary to minimize structural ignitions:

- Application of the latest adopted ignition-resistant building codes.
- Exterior wall coverings are to be 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 (NFPA 13, 13D or 13R).
- Boxed or no eaves or soffits.
- The use of paper-faced insulation or combustible installation in attics or other ventilated areas is not prohibited.
- The use of plastic, vinyl (with the exception of vinyl windows with metal reinforcement and welded corners), or light wood on the exterior is not prohibited.
- Any vinyl frames to have welded corners and metal reinforcement in the interlock area to maintain integrity of the frame certified to ANSI/AAMA/NWWDA 101/I.S 2 97 requirements.
- Skylights to be tempered glass (as applicable).
- Rain gutters and downspouts to be non-combustible. They would be designed to prevent the accumulation of leaf litter or debris, which can ignite roof edges.
- Doors to be of approved noncombustible construction.
- There would be no combustible awnings, canopies, or similar combustible overhangs.
- No combustible fences to be allowed within 5 feet of structures.
- All chimneys and other vents on heating appliances using solid or liquid fuel, including outdoor fireplaces and permanent barbeques and grills, to have spark arrestors that comply with the City and County Fire Code. The code requires that openings would not exceed 1/4-inch. Arrestors would be visible from the ground.
- Modern infrastructure, access roads, and water delivery system.
- Maintained FMZs.

Notably, interior fire sprinklers, which would be provided in all structures (required by code since 2010), have an extremely high reliability track record (NFPA 2021) of controlling fire in 96% of reported fires, and statistics indicate that fires in structures with sprinklers resulted in 82% lower property damage and 68% lower loss of life (Hall 2013).

NFPA 13 fire sprinklers are designed for structure protection and life safety. For wildland fire defense, should embers succeed in entering a structure, sprinklers provide an additional layer of life safety and structure protection.

Sheltering-In-Place as an Active Emergency Option

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

2.3.5 Wildfire Risk Awareness Education

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

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

The Firewise USA program administered by NFPA is a certification program for communities to gain recognition for the fire-wise design and maintenance of their community. Firewise USA began in 2019 with seven sites that were challenged to improve the fire resilience of their communities through a focused approach to active wildfire risk reduction. This is done through a collaborative framework created to empower neighbors to get organized and take action to reduce wildfire risk at a local level. The program has grown to include over 1.5 million residents living in Firewise USA communities (Firewise USA, 2024). The insurance industry, due to Department of Insurance Regulation #REG-2020-00015, is required to recognize the Firewise certification and consider it when it comes to

determining if a community is insurable; cuts to insurance premiums have been made based on this certification. Given the established framework of Firewise USA, its direct mention in regulatory language, and its existing adoption by multiple insurance companies, it can be reasonably anticipated that more companies will require the same certification from customers that attempt to pursue discounted policies.

There are several requirements to become a Firewise USA community and multiple living documents must be prepared. Firewise USA communities must have a minimum of 8 dwelling units and a maximum of 2,500 (Firewise USA, 2024). In order to be recognized as a Firewise USA community, the following requirements shall be followed by the Project's HOA[12]:

1. **Form a board or committee:** Create a board or committee of volunteers to represent the community, made up of residents and partners such as a representative of the local fire department would first need to be formed. A resident leader will need to be identified who will be the program point of contact. The board or committee is responsible for defining the boundaries of the site and determines the number of individual single-family dwelling units within the community or site. As mentioned above, in order to be recognized as a Firewise site, the community must have a minimum of 8 dwelling units and a maximum of 2,500. (Firewise USA, 2024).

2. **Create a Firewise USA portal account:** Create a Firewise USA account and submit an application to your state Firewise USA liaison. (Firewise USA, 2024).

3. **Obtain a wildfire risk assessment:** The board or committee will collaborate with their local wildfire expert or a 3rd-party consultant such as Dudek to complete a community wildfire risk assessment (CWRA). The assessment should be a community-wide view that identifies areas of successful wildfire risk reduction and where improvements could be made. Emphasis should be on the general conditions of homes and related home ignition zones. The CWRA is a living document and would need to be updated at least every five years. (Firewise USA, 2024).

4. **Develop an action plan:** The board or committee will use the CWRA to create a three-year action plan, broken down by year, that identifies and prioritizes actions to reduce ignition to homes. These can include community-wide investments along with suggested homeowner actions and education activities that participates will strive to complete annually, or over a period of multiple years. The action place document is required to be updated at least every three years. As circumstances change (e.g. completing activities, experiencing a fire or natural disaster, new construction in community, etc.), the action plan may need to be updated more frequently. (Firewise USA, 2024).

5. **Host an educational event:** Host at least one event per year to educate the community about wildfire risk reduction. (Firewise USA, 2024).

6. **Meet the minimum investment:** Every year, neighbors will need to complete educational and risk reduction actions identified in the plan which go towards your site's annual reporting efforts. At a minimum, each site is required to annually invest the equivalent of one (1) volunteer hour per dwelling unit in wildfire risk reduction actions. If your site identifies 100 homes within its boundary, then 100 hours of work or the

[12] How to become a Firewise USA site. https://www.nfpa.org/education-and-research/wildfire/firewise-usa/become-a-firewise-usa-site

monetary equivalent, based on the independent sector value of volunteer time, need to be completed for that year. (Firewise USA, 2024).

7. **Submit an annual renewal:** Maintain your Firewise USA status. (Firewise USA, 2024).

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

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3 Anticipated Fire Behavior

3.1 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of the fire that would be expected adjacent to the development site given characteristic features such as topography, vegetation, and weather. Dudek utilized BehavePlus software package version 6 (Andrews, Bevins, and Seli 2008) to analyze potential fire behavior[13].

3.2 Fire Behavior Modeling Analysis

An analysis was conducted to evaluate fire behavior variables and to objectively predict flame lengths, intensities, and spread rates for four modeling scenarios, including two summer, onshore weather conditions (northwest and west/southwest of the site) and two extreme fall, offshore weather conditions (northeast and south/southeast of the site). These fire scenarios incorporated observed fuel types representing the dominant vegetation representative within and adjacent to the development site, in addition to slope gradients, wind, and fuel moisture values for both the 50th percentile weather (summer, on-shore winds) and the 97th percentile weather (fall, off-shore winds). Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent to the site.

To support the fire behavior modeling efforts conducted for the Project's Fuel Modification Plan (see Figure 10), a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and were classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the site and proposed fuel modification zones (FMZ) are used for determining flame lengths and fire spread. Vegetation types, which were derived from the field assessment and the Project's Vegetation Community Maps, were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-Project fire behavior changes. Fuel models were selected from Standard Fire Behavior Fuel Models: a Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005). Fuel models were also assigned to the fuel FMZs to illustrate post-Project fire behavior changes. Based on the anticipated existing and post-Project vegetation conditions, five different fuel models were used in the fire behavior modeling effort presented herein. Fuel model attributes are summarized in Table 3.

[13] A discussion of fire behavior modeling is presented in Appendix C, Fire Behavior Modeling.

Table 3. Fuel Models Used for Fire Behavior Modeling

Fuel Model	Description	Location of Fuel Models	Fuel Bed Depth (Feet)
Existing Conditions			
Gr2	Low-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<1.0 ft.
Gr4	Moderate-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<3.0 ft.
Gs1	Low-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<2.0 ft.
Gs2	Moderate-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<3.0 ft.
Post-Development Conditions			
FM8	Compact Litter	Fuel Modification Zones A and B: irrigated landscape throughout the Project site	<1.0 ft.
Gs1	Low-load, dry climate grasses-shrub	Fuel Modification Zone C: Thinned landscape throughout the Project site	<2.0 ft.
NB	Non-burnable	Roadway and parking lot areas throughout the development.	0 ft.

A total of four modeling scenarios were completed for the development area. These sites were selected based on the probability of a wildfire approaching from these directions during a Santa Ana wind-driven fire event (fire scenarios 1 and 2) and an on-shore weather pattern (fire scenarios 3 and 4). Fuel modification includes establishment of irrigated and thinned zones in the rear yards of each lot and around the perimeter of the development, as well as along both sides of the site access roads as well as interior landscape requirements.

Table 4 summarizes the weather and wind input variables used in the BehavePlus modeling process.

Table 4. Fuel Moisture and Wind Inputs

Model Variable	Summer Weather Condition (50th Percentile)	Peak Fall Weather Condition (97th Percentile)
Fuel Models	Gr2, Gr4, Gs1, and Gs2	Gr2, Gr4, Gs1, and Gs2
1 hr. Moisture	4%	1%
10 hr. Moisture	5%	2%
100 hr. Moisture	9%	5%
Live Herbaceous Moisture	37%	30%
Live Woody Moisture	73%	60%
20-foot Wind Speed (mph)	15 mph (sustained winds)	18 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	210 and 300	45 and 135
Wind adjustment factor	0.4	0.4
Slope (uphill)	6% to 8%	5% to 12%

3.3 Fire Behavior Modeling Results

The results presented in Tables 5 and 6 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis; rather, the models provide a worst-case wildfire behavior condition as part of a conservative approach. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location would be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

The results of fire behavior modeling analysis for pre- and post-Project conditions are presented in Tables 5 and 6, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 8, BehavePlus Fire Behavior Analysis Map.

Fire Scenario locations and descriptions:

- Scenario 1. Fire flaming front approaching from the northeast toward the northern portion of the project with sustained 18 mph east/northeastern winds and up to 50 mph gusts.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.
- Scenario 2. Fire flaming front approaching from the south/southeast toward the south and east sides of the development with 18 mph east/northeastern winds and up to 50 mph gusts.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.
- Scenario 3. Fire flaming front approaching from the west/southwest towards the south and west sides of the development with sustained winds of 15 mph on-shore winds from the west.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.
- Scenario 4. Fire flaming front approaching from the northwest towards the northwest side of the development with sustained winds of 15 mph on-shore winds from the west/northwest.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.

- Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.

The results presented in Tables 5 and 6 depict values based on inputs to the BehavePlus software reflecting a "moment in time" and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis, but the models provide a worst-case wildfire behavior condition as part of a conservative approach. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location would be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

3.3.1 Existing Conditions

Based on the BehavePlus analysis result presented below and in Tables 5 and 6, wildfire behavior through the low-to- moderate load non-maintained grass/grass-shrub dominated fuels throughout and adjacent to the development footprint being fanned by 15 mph sustained winds, from the west and pushed by on-shore ocean breezes typically exhibit less severe fire behavior due to lower wind speeds and higher humidity. Under typical onshore weather conditions, a surface vegetation fire could have flame lengths between approximately 5 feet and 12 feet in height and spread rates between 0.5 and 2.0 mph. Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 0.2 to 0.4 miles.

A worst-case fire under gusty Santa Ana winds and low fuel moistures adjacent to the Project site is expected to be primarily of moderate to high intensity through the non-maintained surface grass/grass-shrub dominated fuels throughout and adjacent to the development site. Worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 1) is anticipated to be a wind-driven fire from the east/southeast during the fall. Under such conditions, expected surface flame length are expected to reach approximately 39 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 16,026 BTU/feet/second with spread rates up to 16 mph and could have a spotting distance up to 2.2 miles away.

Table 5: RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 12% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds w/ 50 mph gusts – (NE of the site)				
Low-load grasses (Gr2)	10.6 (18.0)[3]	952 (3,037)	1.9 (6.2)	0.4 (1.3)
Moderate-load grasses (Gr4)	19.7 (38.7)[3]	3,709 (16,026)	3.9 (16.8)	0.7 (2.2)
Low-load grass-shrub (Gs1)	7.2 (14.0)[3]	420 (1,763)	0.7 (3.0)	0.3 (1.1)
Moderate-load grass-shrub (Gs2)	10.5 (20.5)[3]	940 (4,048)	0.9 (4.2)	0.4 (1.4)
Scenario 2: 5% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds with 50 mph gusts – (S/SE of the site)				
Low-load grasses (Gr2)	10.5 (18.0)[3]	942 (3,037)	1.9 (6.2)	0.4 (1.3)
Moderate-load grasses (Gr4)	19.6 (38.6)[3]	3,670 (15,987)	3.8 (16.7)	0.7 (2.2)
Low-load grass-shrub (Gs1)	7.2 (14.0)[3]	416 (1,763)	0.7 (3.0)	0.3 (1.1)

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Moderate-load grass-shrub (Gs2)	10.4 (20.5)[3]	930 (4,038)	1.0 (4.2)	0.4 (1.4)
Scenario 3: 8% slope; Summer, on-shore winds (50th percentile), 15 mph sustained – (W/SW of the site)				
Low-load grasses (Gr2)	6.5’	327	0.9	0.3
Moderate-load grasses (Gr4)	12.1’	1,274	1.8	0.4
Low-load grass-shrub (Gs1)	4.7’	164	0.4	0.2
Moderate-load grass-shrub (Gs2)	6.9’	373	0.5	0.3
Scenario 4: 6% slope; Summer on–shore winds (50th percentile), 15 mph sustained winds – (NW of the site)				
Low-load grasses (Gr2)	6.5’	330	0.9	0.3
Moderate-load grasses (Gr4)	12.1’	1,285	1.8	0.4
Low-load grass-shrub (Gs1)	4.7’	165	0.4	0.2
Moderate-load grass-shrub (Gs2)	6.9’	376	0.5	0.3

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

3.3.2 Post-Development Conditions

As presented in Table 6, Fire Behavior Modeling Results for Post-Project Conditions, Dudek conducted modeling of the Project site for post-Project fuel conditions for the Project. The FMZs include fire friendly and maintained landscaping on the periphery of the Project. For modeling the post-Project conditions, fuel model assignments were re-classified for the landscaping as listed in Table 3. Fuel model assignments for all other areas remained the same as those classified for the existing condition.

A worst-case fire under gusty Santa Ana winds and low fuel moistures (Scenario 1) is expected to be moving between 0.2 mph and 3.0 mph. Flame length values were modeled between 3.0 feet and 14 feet; spotting is projected to occur between 0.4 and 1.1 miles from the flaming front. For on-shore wind conditions, the worst-case fire (Scenario 3) is expected to be moving between 0 and 0.4 mph with flame lengths between 1.4 feet and 4.7 feet.

Table 6: RAWS BehavePlus Fire Behavior Model Results – Post Project Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 12% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds w/ 50 mph gusts – (NE of the site)				
Fuel modification zones A and B (FM8)	2.1 (3.0)[3]	27 (63)	0.1 (0.2)	0.1 (0.4)
Fuel modification zone C (Gs1)	7.2 (14.0)[3]	420 (1,763)	0.7 (3.0)	0.3 (1.1)
Non-burnable	N/A	N/A	N/A	N/A
Scenario 2: 5% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds with 50 mph gusts – (S/SE of the site)				
Fuel modification zones A and B (FM8)	2.0 (3.0)[3]	27 (63)	0.1 (0.2)	0.1 (0.4)
Fuel modification zone C (Gs1)	7.2 (14.0)[3]	416 (1,763)	0.7 (3.0)	0.3 (1.1)

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Non-burnable	N/A	N/A	N/A	N/A
Scenario 3: 8% slope; Summer, on-shore winds (50th percentile), 15 mph sustained – (W/SW of the site)				
Fuel modification zones A and B (FM8)	1.4’	12	0.0	0.1
Fuel modification zone C (Gs1)	4.7’	164	0.4	0.2
Non-burnable	N/A	N/A	N/A	N/A
Scenario 4: 6% slope; Summer on–shore winds (50th percentile), 15 mph sustained winds – (NW of the site)				
Fuel modification zones A and B (FM8)	1.4’	12	0.0	0.1
Fuel modification zone C (Gs1)	4.7’	165	0.4	0.2
Non-burnable	N/A	N/A	N/A	N/A

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

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

Surface Fire:

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

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

Table 7. Fire Suppression Interpretation

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

3.4 Project Area Fire Risk Assessment

Wildland fires are a common natural hazard in most of southern California with a long and extensive history. Southern California landscapes include a diverse range of plant communities, including vast tracts of non-native grasslands intermixed with sparse scrub and chaparral vegetation, like those found on and adjacent to the development site. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from forest to grasslands, become highly flammable each fall and 2) the climate of southern California has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with high winds (Santa Ana) occurring during autumn after a six-month drought period each year. Based on this research, the anticipated growing population expanding into WUI areas, and the regions' fire history, it can be anticipated that periodic wildfires may start on, burn onto, or spot into the site. The most common type of fire anticipated in the vicinity of the development area is a wind-driven fire from the north/northeast and/or east, moving through the natural vegetation found on the adjacent lands.

With the conversion of the landscape to ignition-resistant development, wildfires may still encroach upon and drop embers on the site but would not be expected to burn through the development site or produce sustainable spot fires due to the lack of available fuels. Studies indicate that even with older developments that lacked the fire protections provided in the Project, wildfires declined steadily over time (Syphard, et. al., 2007 and 2013) and further, the acreage burned remained relatively constant, even though the number of ignitions temporarily increased. This is due to the conversion of landscapes to ignition resistant, maintained areas, more humans monitoring areas resulting in early fire detection and discouragement of arson, and fast response from the fire suppression resources that are located within these developing areas.

Therefore, it will be important that the latest fire protection technologies, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced. The Project, once developed, would not facilitate wildfire spread and would reduce projected flame lengths to levels that would be

manageable by firefighting resources for protecting the site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire site landscape. The Project will implement the latest fire protection measures, including fuel modification along the perimeter edges of the development. In addition, the Project's FMZs (minimum 100-foot-wide FMZ widths throughout the development) would provide between 6 and 10 times clearance than the longest calculated flame length conditions for portions of the proposed developed area that abut chamise chaparral and sage scrub plant communities (reference Table 6).

Given the climatic, vegetative, topographic characteristics, and local fire history of the area, the Project Site, once developed, is determined to be subject to periodic wildfires that may start nearby, burn towards, or spot into the development. The potential for off-site wildfire encroaching on, or showering embers on the site is considered low, but the risk of ignition from such encroachments or ember showers is considered low based on the type of ignition resistant landscapes and construction and fire protection features that will be provided for the structures.

While it is true that humans are the cause of most fires in California, there is no data available that links increases in wildfires with the development of ignition-resistant communities. The Project will include a robust fire protection system, as detailed in the Project's FPP. This same robust fire protection system provides protections from on-site fire spreading to off-site vegetation. Accidental fires within the landscape or structures within the development will have limited ability to spread. The landscape throughout the site and on its perimeter will be highly maintained and much of it irrigated, which further reduces its ignition potential. Structures will be highly ignition resistant on the exterior and the interiors will be protected with automatic sprinkler systems, which have a very high success rate for confining fires or extinguishing them. The Project will be a fire-adapted community with a strong resident outreach program that raises fire awareness among its residents.

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Scenario Run #4

Summer OnShore Fire (Pre-Development)
Slope: 6%
Fuel Model: Gr2, Gr4, Gs1, and Gs2
Wind: 15 mph sustained winds
Maximum Flame Length: 12.1 feet
Fireline Intensity: 1,285 Btu/ft/sec.
Spread Rate: 1.8 mph
Spot distance: 0.4 mi

4

Scenario Run #1

Extreme Fall Off-Shore Fire (Pre Development)
Slope: 12%
Fuel Model: Gr2, Gr4, Gs1, and Gs2
Wind: 18 mph sustained winds
Maximum Flame Length: 19.7 feet
Fireline Intensity: 3,709 Btu/ft/sec.
Spread Rate: 3.9 mph
Spot distance: 0.7 mi

Wind: 50 mph wind gusts
Maximum Flame Length: 38.7 feet
Fireline Intensity: 16,026 Btu/ft/sec.
Spread Rate: 16.8 mph
Spot Distance: 2.2 mi

1

Scenario Run #3

Summer OnShore Fire (Pre-Development)
Slope: 8%
Fuel Model: Gr2, Gr4, Gs1, and Gs2
Wind: 15 mph sustained winds
Maximum Flame Length: 12.1 feet
Fireline Intensity: 1,274 Btu/ft/sec.
Spread Rate: 1.8 mph
Spot distance: 0.4 mi

3

Scenario Run #2

Extreme Fall Off-Shore Fire (Pre Development)
Slope: 5%
Fuel Model: Gr2, Gr4, Gs1, and Gs2
Wind: 18 mph sustained winds
Maximum Flame Length: 19.6 feet
Fireline Intensity: 3,670 Btu/ft/sec.
Spread Rate: 3.8 mph
Spot distance: 0.7 mi

Wind: 50 mph wind gusts
Maximum Flame Length: 38.6 feet
Fireline Intensity: 15,987 Btu/ft/sec.
Spread Rate: 16.7 mph
Spot Distance: 2.2 mi

2

Project Boundary

Fuel Model	Description	Location of Fuel Models	Fuel Bed Depth (Feet)
Existing Conditions			
Gr2	Low-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<1.0 ft.
Gr4	Moderate-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<3.0 ft.
Gs1	Low-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<2.0 ft.
Gs2	Moderate-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<3.0 ft.
Post-Development Conditions			
FM8	Compact Litter	Fuel Modification Zones A and B: irrigated landscape throughout the Project site	<1.0 ft.
Gs1	Low-load, dry climate grasses-shrub	Fuel Modification Zone C: Thinned landscape throughout the Project site	<2.0 ft.
NB	Non-burnable	Roadway and parking lot areas throughout the development.	0 ft.

SOURCE: AERIAL-GOOGLE EARTH IMAGERY SERVICE

DUDEK

0 250 500 1,000 Feet

FIGURE 5

BehavePlus Analysis Map

Fire Protection Plan for the Mesa Verde Specific Plan Development Project

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4 Emergency Response Service

The following sections analyze the project in terms of current CFD Fire Service capabilities and resources to provide Fire Protection and Emergency Services. The analysis that follows examines the ability of the existing nearby CFD fire stations to adequately serve the proposed project site. Response times were evaluated using project build-out conditions. It was assumed that phased construction would include access roads to the newly constructed structures and that the shortest access route to those structures would be utilized.

4.1 Emergency Response Fire Facilities

The Project site is located within CFD response area. Table 8 presents a summary of the location, equipment, staffing levels, maximum travel distance, and travel time for the closest existing fire stations responding to the Project, specifically to include Calimesa Fire Station 1. Travel distances are derived from Google Road data while travel times are calculated applying the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance). The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time.

Table 8. Closest Existing Fire Stations Summary

Station No.	Location	Equipment	Staffing**	Maximum Travel Distance***	Travel Time***
Calimesa Fire Station 1[14] (RCFD 21) *	906 Park Ave, Calimesa, CA 92320	Engine	4	1.4 miles	3.03
Yucaipa Fire Station 1[15]	1416 Bryant Street, Yucaipa, CA 92399	Engine	3	5.4 miles	10.23
RCFD 22	10055 Avenida Mira Vila, Cherry Valley, CA 92339	Engine	3	6.3 miles	11.36

* Cal FIRE RCFD 21 from 1990 - 2017
** Staffing levels per shift
*** Assumes travel distance and time to the entry point within the Project site.

Calimesa Fire Station 1, staffed 24/7 with career firefighters, would provide initial response. CFD Station 1 is located east of the Project site, at 906 Park Ave, Calimesa, CA. CFD Station 1 is staffed with one captain, one engineer, and two firefighters per 24-hour shift and is equipped with one engine. A private ambulance also responds providing one paramedic and one EMT. CFD Station 1 will be capable of responding within 3 minutes to the proposed southern entrance of the Mesa Verde Specific Plan Development site. It should be noted that as part of this Project, Planning Area 56 is designated Calimesa Public Works (CPW), which is a 5.3-acre site intended for the use of the City's Public Works Department and would include offices, equipment storage, and other uses as determined by the Public Works Department. A new City Fire Station is also envisioned within Planning Area 56.

[14] https://www.cityofcalimesa.net/160/Department-Overview
[15] Yucaipa Fire Department 2019 Annual Report

Figure 3*, Project Land Use Plan*, shows the location of Planning Area 56 and the envisioned location of a new CFD Station location.

Secondary response would be provided from City of Yucaipa Fire Station 1 (San Bernardino County), which is located north of the Project site at 11416 Bryant Street, Yucaipa, CA, and can respond within 10 minutes to the southern entrance of the Project site. Yucaipa Fire Station 1 staffs three on-duty firefighters, 24-hours per day and houses an Engine.

Within the area's emergency services system, fire and emergency medical services are also provided by other Riverside County and San Bernardino County Fire Stations. Generally, each agency is responsible for structural fire protection and wildland fire protection within their area of responsibility. However, mutual aid agreements enable non-lead fire agencies to respond to fire emergencies outside their district boundaries. In the Project area, fire agencies cooperate under a statewide master mutual aid agreement for wildland fires. There are also mutual aid agreements in place with neighboring fire agencies and typically include interdependencies that exist among the region's fire protection agencies for structural and medical responses but are primarily associated with the peripheral "edges" of each agency's boundary. See Figure 6 for locations of closest existing fire stations to the Project Site.

The City of Calimesa Fire Department was established on January 1, 2018, relinquishing CAL Fire/Riverside County Fire Department (RCFD) of their contractual agreement. As such, the data provided is a result of the study conducted while Calimesa contracted with RCFD (Fire Station 21).

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

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

Land Classification	Population Density	Fire Staffing Characteristics	Code 3 Medical Emergency First Due Unit - Response Time	Code 2 Medical Emergency First Due Unit - Response Time
URBAN	>1,000 persons per square mile	Land use includes residential, commercial and industrial complexes.	4:00 minutes, 90% of the time	8:00 minutes, 90% of the time
SUBURBAN	500 TO 1,000 persons per square mile	Land use includes residential, light commercial, and light industrial.	6:00 minutes, 90% of the time	10:00 minutes, 90% of the time
RURAL	100 to 500 per square mile	Residential and agricultural land uses.	8:00 minutes, 90% of the time	12:00 minutes, 90% of the time
OUTLYING	<100 per square mile	Residential and open space land uses.	15:00 minutes, 90% of the time	20:00 minutes, 90% of the time

Source: Riverside County Fire Department FY 17-18 (updated in 22-23) Service Alternatives per conversation with Fire Safety Specialist Steven Gonzalez, February 26, 2024.

A majority of the area surrounding the Project site is designated medium density residential with a gross density of 2.4 dwellings units per acre[16]. Further, the Project proposes commercial mixed use and 2 elementary schools; therefore, the Project area would be classified as" Rural" with a 12-minute first-in fire engine response time, as defined in Table 9 above. As previously mentioned, response to the Project site from the closest existing Fire Station (CFD Fire Station 1) would achieve a 3.03-minute travel time to the southern entrance of the Mesa Verde Specific Plan and the Yucaipa Fire Station has a response time of 10.23 minutes, meeting the benchmark standard. Therefore, the Project's calculated response time would achieve faster times than the requirement for "Rural" areas.

4.2 Estimated Calls and Demand for Service

Determining the potential impact associated with the Project's estimated population increase is required in order to compare how many additional calls may be realized and determine what effects they may have on the available response resources. The estimated incident call volume of the Project is based on a conservatively calculated estimate from the maximum potential number of additional persons that would be expected on site. Emergency call volumes related to typical projects, such as new residential developments, can be reliably estimated based on the historical per-capita call volume from a particular fire jurisdiction.

The following estimated annual emergency call volume generated by the Project (Residential) is based upon per capita data for 2017 from RCFD 21 calls within City of Calimesa[17].

- Total population[18] served 10,026 (April 1, 2020).
- Total annual calls: 1,277, per capita call generation: 0.127 (127 calls per 1,000 persons).
- Total annual fire calls (Commercial, Residential, Multi-Family, Vehicle, Wildland, Other; 1.4% of total calls): 19, per capita call generation: 0.001
- Total annual Emergency Medical Services (80% of total calls): 1,022, per capita call generation: 0.101
- Total other calls (Rescue, Traffic Collisions, Hazardous Materials, Public Service, etc.; 18.6% of total calls): 236, per capita call generation: 0.023

Using the data above, the estimated annual emergency call volume for the Project site was calculated. To provide this conceptual estimate, Dudek made assumptions regarding residential and mixed-use populations within Mesa Verde Specific Plan Project. The residential population is based on a conservative total[19] of 9,125 occupants for all 3,650 residential units. The on-site population for each building and areas of use within the building will vary based on occupancy. Based on this information, the total maximum estimated total population of the Project site, is projected to be 9,125 persons. Based on this population estimate, the calculated call volumes by type of call are provided in Table 10.

16 Mesa Verde Specific Plan November 2017 - https://www.cityofcalimesa.net/ArchiveCenter/ViewFile/Item/93
17 2017 Riverside County Fire Department Annual Report.
18 https://www.census.gov/quickfacts/calimesacitycalifornia
19 Based on the national average of American household of 2.5 occupants in 2022

Table 10. Calculated Call Volume (Conceptual Based on 9,125 Persons)

Type of Call	Per Capita Call Generation Factor	Number of Estimated Annual Calls
Total Other Calls	.023	210
Total Fires	.001	9
Total EMS Calls	.101	922
Total Calls	.125	1,159

As mentioned, the new residential and mixed-use development will increase the call volume at a rate of a conservatively calculated (the actual number of calls may be lower than this estimate) up to 1,159 calls per year (3.2 calls per day), specific to the Project Site. Calimesa Fire Station 1 total emergency responses in 2017 totaled 1277 calls per year (3.5 calls per day and approximately 24 calls per week). The level of service demand for the Project raises overall call volume (almost doubles the call volume) but is not anticipated to impact the existing fire stations to a point that they cannot meet the demand. For perspective, five calls per day are typical in an urban or suburban area. A busy fire station company would be one with 10 to 15 or more calls per day. When Mesa Verde Specific Plan Project site is built out, Calimesa Fire Station 1 could potentially respond to 7 calls per day and approximately 46.5 calls per week for the entire City of Calimesa, although the number will likely be lower than that based on the conservative nature of the population, the phasing plan, and calls per capita data used in this estimate. The Project will generate funding for the fire department resources through taxes and fire fees. The Calimesa Fire Department will have final determination regarding the potential impacts to their service capabilities and how best to utilize the funding to optimize their response resources.

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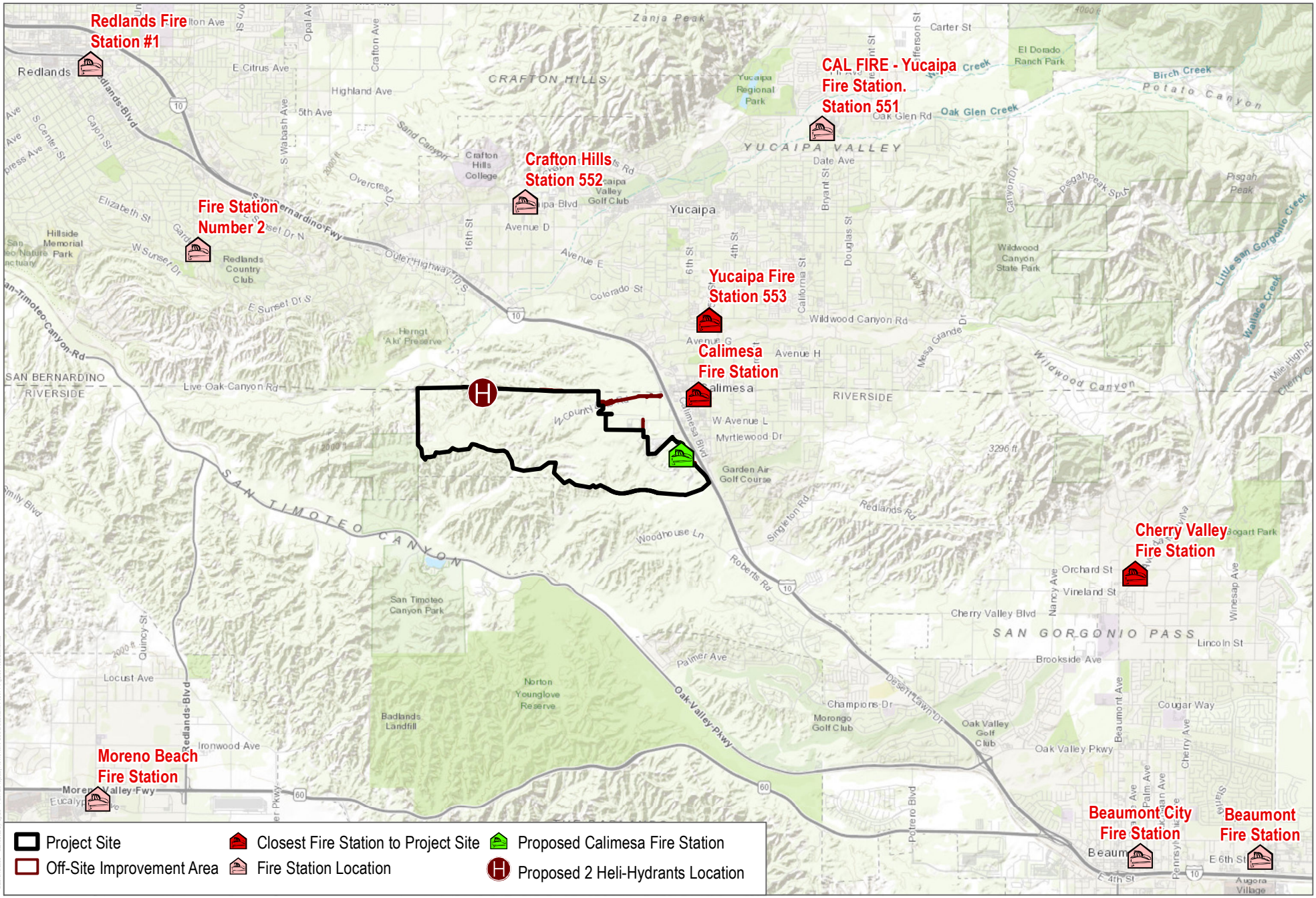

SOURCE: CalFIRE; Hunsaker 2024; County of San Bernardino; County of Riverside; Open Street Map; NAIP 202

FIGURE 6

Fire Stations to Project Site

Fire Protection Plan for the Mesa Verde Specific Plan Project

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5 Fire Safety Requirements – Building Ignition Resistance, Infrastructure, And Defensible Space

This FPP demonstrates that Mesa Verde Specific Plan Area 2 Amendment 2 Project will comply with applicable portions of Calimesa Municipal Code, including Title 15, Chapter 15.05 – Adoption of the 2022 Edition of the CBC, (Part 2 of Title 24 of the California Code of Regulations, including Chapter 7A and local City amendments, and Chapter 15.10 Adoption of the 2022 Edition of the CFC, including Chapter 49 and local City amendments. The Project will also be consistent with applicable sections of the 2021 edition of the International Fire Code as adopted by the CFD, which governs the building, infrastructure, and defensible space requirements detailed in this FPP. The Project also complies with the 2022 California Residential Code (CRC), Section 237 as adopted by the County. The Project would also be subject to the provisions of section 4291 of the Public Resources Code (PRC) regarding brush clearance standards around structures, and the CFD Weed Abatement and Defensible Space guidelines. The Project will meet applicable codes or will provide alternative materials and/or methods, if warranted. While these standards will provide a high level of protection to structures within the development, there are no guarantees that compliance with these standards will prevent damage or destruction of structures by fire in all cases. The following summaries highlight important fire protection features. Prior to bringing combustible materials onto the site, utilities shall be in place, fire hydrants operational, an approved all-weather roadway, or an approved road surface alternative in place, and interim defensible space zones established and approved. A response map update, including roads and fire hydrant locations, in a format compatible with current CFD mapping shall be provided to the Calimesa Fire Department.

5.1 Fire Apparatus Access

5.1.1 Access Roads

Project Site access, including road widths and connectivity, will comply with the requirements of Chapter 5, Section 503 – Fire Apparatus Access Road, including sub-section 503.2.1 (as amended by the City of Calimesa) and Appendix D – Fire Apparatus Access Roads and will include:

- All roads (87.5 acres) in the Mesa Verde Specific Plan will comply with access road standards of not less than 24 feet (amended section of 503.2.1), unobstructed width and can support an imposed load of at least 75,000 pounds with aggregate cement or asphalt paving materials.
- Interior circulation streets and parking lot roadways that are considered roadways for traffic flow through the Project Site will meet fire department access requirements when serving the proposed structures.
- Private or public streets that provide fire apparatus access to buildings three stories or more in height shall be improved to 30 feet unobstructed width.
- Private and public streets for each phase shall meet all Project approved fire code requirements, paving, and fuel management prior to combustible materials being brought to the Project site.
- Vertical clearance of vegetation (lowest-hanging tree limbs), along roadways will be maintained at clearances of 13 feet, 6 inches to allow fire apparatus passage.

- Cul-de-sacs and fire apparatus turnarounds will meet 2022 CFC standards and the City of Calimesa municipal code.
- Any roads that have traffic lights shall have approved traffic pre-emption devices (Opticom) compatible with devices on the Fire Apparatus.
- 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.
- Roadway design features (e.g., speed bumps, humps, speed control dips, planters, and 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.
- Access roads shall be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction.
- Developer will provide information illustrating the new roads, in a format acceptable to the CFD for updating of Fire Department response maps.

5.1.2 Maximum Dead-End Road (cul-de-sac) Length

Maximum dead-end road lengths shall be in accordance with the City of Calimesa Municipal Codes which have fully adopted the 2022 CFC, except for the amended sections listed in Title 15, Chapter 15.10. Section 503.2.1 has been amended completely and states that a fire apparatus access road shall have an unobstructed width of not less than 24 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6.

Additionally, each planning area varies in the number of ingress/egress roads or streets. Dead end streets no longer than 350 feet shall have approved provisions for fire apparatus turnaround or cul-de-sac. Cul-de-sac streets may exceed 350 feet, but not 600 feet in length with provisions for appropriate mitigations to the approval of CFD.

5.1.3 Gates

There are no gates proposes for the proposed Project, however, gates on private roads and/or private driveways are permitted, but subject to Fire Code requirements and standards, including:

- Gates will be equipped with conforming sensors for detecting emergency vehicle “Opticom” strobe lights from any direction of approach, if required.
- All automatic gates will be equipped with a Knox[20], emergency key-operated switch overriding all command functions and opening the gate(s).
- Gate activation devices will be equipped with a battery backup or manual mechanical disconnect in case of power failure.
- Further, gates will be:
    - Minimum 20 feet wide of clearance for one-way traffic when fully open at entrance.
    - Minimum of two feet wider than road width at exit.
    - Constructed from non-combustible or exterior fire-rated treated wood materials.
    - Inclusive of provisions for manual operation from both sides, if power fails. Gates will have the capability of manual activation from the development side or a vehicle (including a vehicle detection loop).

[20] https://www.knoxbox.com/Products/Gate-Key-Switches-and-Padlocks

5.1.4 Driveways

Any structure that is 150 feet or more from a common street in the development shall have a paved fire apparatus access roads meeting the following specifications:

- Grades 15% or less with surfacing and sub-base consistent with the 2022 edition of the CFC.

5.1.5 Grade

The Project complies with the City of Calimesa and Riverside County grade requirements. Fire apparatus access roads shall not exceed 15 percent in grade.

5.1.6 Surface

All fire apparatus access and vehicle roadways shall be asphalt or concrete and designed and constructed in accordance with County Public Works standards and be designed to accommodate a minimum of a 75,000-pound fire apparatus load.

5.1.7 Vertical Clearance

All on-site fire apparatus access roads shall have an unobstructed width of not less than 24 feet and an unobstructed vertical clearance clear to the sky to allow aerial ladder truck operation. The fire access road shall have an unobstructed vertical clearance of 13 feet 6 inches (lowest-hanging tree limbs), along roadways to allow fire apparatus passage. Any applicable tree-trimming permit from the appropriate agency is required.

5.1.8 Premise Identification

Identification of roads and structures will comply with the 2022 edition of the CFC, as follows:

- All residential structures shall be identified by street address. Numbers shall be 4 inches in height, 1/2 - inch stroke, and located 6 to 8 feet above grade. Addresses on multi-residential buildings shall be 6 inches high with a 1/2-inch stroke. Numbers will contrast with the background; numbers shall be displayed on the structure.

- All commercial/industrial structures required to be identified by street address numbers at the structure. Numbers to be minimum 8 inches high with 1-inch stroke, visible from the street. Numbers will contrast with background and shall be electrically illuminated during the hours of darkness where building setbacks exceed 100 feet from the street or would otherwise be obstructed; numbers shall be displayed at the property entrance. Numbers will contrast with background.

- Multiple structures located off common driveways or roadways will include posting addresses on structures and the entrance to individual driveway/roads or at the entrance to the common driveway/ road for faster emergency response.

- Proposed private and public streets within the development will be named, with the proper signage installed at intersections to satisfaction of the Department of Public Works.

- Streets will have street names posted on non-combustible street signposts. Letters/numbers will be per the 2022 CFC standards.
    - Temporary street signs shall be installed on all street corners within Mesa Verde Specific Plan Project prior to the placing of combustible materials on the Project site. Permanent signs shall be installed prior to occupancy of buildings.

Premise identification will be installed, street signs and building numbers, prior to the occupancy of structures.

5.1.9 Ongoing Infrastructure Maintenance

The Mesa Verde Specific Plan Area 2 Amendment 2 Project HOA and/or Property Owner/Property Management Company shall be responsible for long term funding and maintenance of internal private roads, fire protection systems (including fire sprinklers), and fuel modification areas.

5.1.10 Pre-Construction Requirements

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

5.2 Ignition Resistant Construction and Fire Protection

All new structures within the Mesa Verde Specific Plan Area 2 Amendment 2 Project site will be constructed to the current fire code standards. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the 2022 CBC (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. Appendix E provides a summary of the requirements for ignition resistant construction.

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

There are three primary concerns for structure ignition: 1) radiant and/or convective heat, 2) burning embers, and 3) direct flame contact (NFPA 1144 2008, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the Wildland Urban Interface (WUI) built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through Chapter 7A exterior fire ratings for walls, windows and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided the project are required by the CFD but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior fire sprinklers for extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. 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:

1. The Chapter 7A Materials and Construction Methods for Exterior Wildfire Exposure (CBC) chapter details the ignition resistant requirements for the following key components of building safely in wildland urban interface and fire hazard severity zones:

    a. Roofing Assemblies (covering, valleys and gutters)
    b. Vents and Openings
    c. Exterior wall covering
    d. Open Roof Eaves
    e. Closed Roof Eaves and Soffits
    f. Exterior Porch Ceilings
    g. Floor projections and underfloor protection
    h. Underfloor appendices
    i. Windows, Skylights and Doors
    j. Decking
    k. Accessory structures

2. New class-A fire rated roof and associated assembly. With the proposed class-A fire rated roof, areas where there will be attic or void spaces requiring ventilation to the outside environment, the attic spaces will require either ember-resistant roof vents or a minimum 1/16-inch mesh (smaller sizes restrict air flow) and shall not exceed 1/8-inch mesh for side ventilation (recommend BrandGuard, O'Hagin or similar vents). All vents used for this project will be approved by CFD. **Structures along the perimeter of the development shall not have any vents on the side of the structures that face the fuel modification zones and/or off-site vegetation areas. All vents used for this project will be approved by CFD.**

3. Per Chapter 7A of the CBC, multi- pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2.

4. The proposed project structures would be constructed of ignition resistant[21] construction materials and include the installation of National Fire Protection Association (NFPA) 13D automatic interior fire sprinkler systems within all one- and two-family dwellings, NFPA 13R interior fire sprinkler systems within each multi-family unit, and NFPA 13 for all other structures, based on the latest adopted Building and Fire Code requirements for each residential dwelling and occupancy type.

5. Modern infrastructure, access roads, and water delivery system.

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

5.3 Infrastructure and Fire Protection Systems Requirements

The following infrastructure components would be implemented in order to comply with the City of Calimesa and Riverside County requirements, the 2022 CFC, CFD's Fire Code Standards, and nationally accepted fire protection standards, as well as additional requirements to assist in providing reasonable on-site fire protection.

5.3.1 Water Supply

Water service for Mesa Verde Specific Plan Project site will be provided by Yucaipa Valley Water District (YVWD). All water storage and hydrant locations, mains, and water pressures would be designed to fully comply with 2022 CFC and all structures are required to have NFPA 13, NFPA 13R, or NFPA 13D property protection internal fire sprinklers. The Project will be consistent with County requirements for fire flow and fire hydrant requirements within a VHFHSZ. All water storage and hydrant locations, mains, and water pressures would be designed to fully comply with 2022 Fire Code Fire Flow Requirements. As detailed in the California Fire Code Section 8.32.050 and California Fire Code Section 903.2, all structures within the development are required to have an NFPA 13 consistent automatic fire sprinkler systems based on the latest adopted Building and Fire Codes for occupancy types.

5.3.2 Fire Hydrants

Fire Hydrants shall be located along fire access roadways and adjacent to each structure, as determined by the CFD and current fire code requirements to meet operational needs. Fire Hydrants will be consistent with applicable Design Standards. More specifically, one fire hydrant shall be located at each street intersection and spaced no more than 500 feet apart in any direction, with no portion of any lot frontage more than 250 feet from the hydrant. The minimum fire flow shall be between 1,750 gallons per minute (GPM) and 2,500 GPM for 2 hours duration at 20 pounds per square inch (PSI). Additionally, a fire hydrant shall be placed along perimeter streets at each intersection and spaced 1,000 feet apart.

5.3.3 Installation of Heli-Hydrants

The Project includes the installation of two Heli-hydrants within Planning Area 57 in the north/northwestern edge of the Project site. As described by the Yorba Linda Water District, who in 2019 made the first permanent "Heli-Hydrant" operational, the installation of new Heli-Hydrants allows first responders to save critical time and effectively fight fires by offering a strategically located, quick-fill, pilot-operated water source that can fill in a short amount of time. The permanent water containment feature can be filled via connected hydrants and are used as a source of water for helicopters to access without landing. The remote operation of the Heli-Hydrants allows for the use of helicopters to provide greater safety of ground firefighters in areas they cannot reach. The Project will install two Heli-hydrants to ensure that water supply is always available for two active helicopters during a wildfire event.

Prior to installation of the proposed Heli-Hydrants, a site evaluation jointly completed by the contractor, the City's Water Department, the contracted Fire Engineer/Heli-Hydrants Installer, and the CFD is necessary to determine the proper location of the Heli-Hydrants. Proper site preparation and Heli-Hydrant operating system specifications shall be provided by the contracted Fire Engineer to the CFD for approval. The project owner and CFD will coordinate regarding the system specifications. Please refer to Appendix G – Basic Specification for Heli-Hydrant Model HHYL#2-

15x8NR and Appendix H–Heli-Hydrant Water Tank Installation Specification Sheet used for the Yorba Linda Water District Heli-Hydrant.

5.3.4 Automatic Fire Sprinkler Systems

As part of this Project, each individual single-family residential structure unit will include the installation of its own NFPA 13D automatic interior fire sprinkler system, each multi-family residential unit shall include the installation of its own NFPA 13R automatic interior fire sprinkler system, and all Business Park/Industrial, Commercial and other occupancy types require the installation of NFPA 13 automatic interior fire sprinkler system, per CRC Section R313, meeting Item 1 of CRC Section R302.2.2. CRC Section R313.1 states that an automatic residential interior fire sprinkler system shall be installed in single-family and multi-family residential structures. The automatic residential fire sprinkler systems for shall be designed and installed in accordance with CRC Section R313.3 or NFPA 13D (Section R313.1.1).

- CRC Section R313.3 outlines the design and installation of the residential automatic sprinkler systems in accordance with NFPA 13D or Section R313.3, which shall be considered equivalent to NFPA 13D. Partial residential sprinkler systems shall be permitted to be installed only in buildings not required to be equipped with a residential sprinkler system. Section R313.3 shall apply to stand-alone and multi-purpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multi-purpose automatic sprinkler system shall supply domestic water to both fire sprinklers and plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the water distribution system.

- Fire sprinkler plans for each individual townhouse unit will be submitted and reviewed by CFD for compliance with the applicable fire and life safety regulations, codes, and ordinances as well as the CFD Fire Prevention Standards for fire protection systems.

Actual system design is subject to final building design and the occupancy types in the structure. Fire sprinkler plans for each structure will be submitted and reviewed by CFD for compliance with the applicable fire and life safety regulations, codes, and ordinances. Fire sprinkler plans for each structure will be submitted and reviewed by CFD for compliance with the applicable fire and life safety regulations, codes, and City of Calimesa ordinances for fire protection systems.

5.3.5 Residential Hazard Detectors

All residences will be equipped with residential smoke detectors and carbon monoxide detectors and comply with current CBC, CFC, and California Residential Code standards.

5.3.6 Ban on Wood-Burning Fireplaces

The Project's plans and specifications shall prohibit wood-burning fireplaces as required by South Coast Air Quality Management District (SCAQMD) Rule 445 in single-family and multi-family residences throughout the entire development site. Natural gas fireplaces shall be limited to a total of 13,954. These requirements shall be posted on the community intranet and shall be clearly described and distributed to home buyers through their home purchase contracts and CC&Rs (Mitigation Measure MM 11-3).

5.3 Defensible Space and Vegetation Management

5.3.1 Defensible Space and Fuel Modification Zone (FMZ) Requirements

WUI fire protection requires a systems approach, which includes the components of infrastructure and water, structural safeguards (addressed in the FPP), and adequate defensible space setbacks. This section provides defensible space details for the Mesa Verde Specific Plan Area 2 Amendment 2 Project.

An important component of a fire protection system for this Project is the provision for ignition-resistant landscapes. A fuel modification zone (FMZ) is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought-tolerant, fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. A typical landscape/fuel modification installation requires a 100-foot-wide fuel modification zone from each structure extending outwards towards undeveloped areas. Based on the Project's site and grading plans, the entire Project site achieves 100 feet of FMZ through the combination of on-site provided FMZs and off-site equivalent FMZs. The Project's Conceptual Fuel Modification Plan (Figure 7) conceptually illustrates the 100-foot-wide FMZ Plan proposed for the Project site which consists of three zones; a 5-foot-wide Ember-Resistant Zone A, a 45-foot fully irrigated Zone B landscaped area with CFD approved plant species and a minimum 50-foot-wide thinning reduced fuel Zone C. The Ember-Resistant Zone extends from the exterior wall surface of the building to 5-feet on a horizontal plane. Within this zone, all combustible material shall be removed. Landscape within Zone B FMZ area of the Development Footprint will minimally meet Zone B standards and will include areas that will be maintained by the Project's HOA and/or Property Management Company, as well as by the private property owners, as detailed below. The project will also include a minimum 20-foot wide roadside FMZ for portions of the Project's roadways that are adjacent to naturally vegetated areas.

Cohen (1995) performed structure ignition fire research studies that suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid Structure Ignition Assessment Modeling results indicate that a 20-foot-high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas, a 70-foot-high flame requires about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). For this fire study example, bare wood was used, which is more combustible unlike the ignition and ember resistant construction material designs to be implemented for the structures within this development. For the Project, assuming 45-foot flame lengths, 100-foot-wide fuel modification zones are justifiable for limited areas.

Based on the modeled extreme weather flame lengths for the Project site once developed and FMZs are in place, wildfire flame lengths are projected to be approximately between 3.0 to 14.0 feet high in areas of Development Footprint-adjacent non-native grassland areas intermixed with sparse scrub and chaparral fuels. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining "defensible space" distances for providing firefighters with room to work and minimizing structure ignition. For the Project's current configuration, the FMZ widths between the naturally vegetated open space areas and the property lot lines achieves

the code minimum 100 feet of on-site fuel modification for the entirety of the Project site, approximately five (5) to 10 times the modeled flame lengths based on the fuel type represented adjacent to the Development Footprint. The FMZs will be constructed from the structure outwards towards undeveloped areas.

Although FMZs are very important for setting back structures from adjacent unmaintained fuels, the highest concern is considered to be from firebrands or embers as a principal ignition factor. To that end, the Project site, based on its location and ember potential, is required to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the CFD and City's Fire and Building Codes (e.g., Chapter 7A).

5.3.1.1 City of Calimesa/Cal Fire Defensible Space and Fuel Modification Zone Standards

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

As mentioned above a typical landscape/fuel modification installation requires a 100-foot-wide fuel modification zone consisting of a 50-foot-wide irrigated Zone B (including 5-foot-wide ember resistant Zone A) and a 50-foot-wide thinning Zone C measured from the rear of the structures or side/rear lot boundary extending outwards towards undeveloped areas. The 100-foot-wide FMZ, when properly maintained, will effectively minimize the potential for structure ignition from direct flame impingement or radiant heat within the development. As proposed, the 100-foot FMZ Plan proposed for the Project site which consists of three zones; a 50-foot fully irrigated Zone B (including a 5-foot Ember-Resistant Zone A) landscaped area with CFD approved plant species and a minimum 50-foot-wide thinning reduced fuel Zone C. Assembly Bill 3074, passed into law in 2020, requires a third zone for defensible space. This law requires the Board of Forestry and Fire Protection to develop the regulation for a new ember-resistant zone (Zone A) within 0 to 5 feet of the home by January 1, 2023. The intensity of wildfire fuel management varies within the 100-foot perimeter of the home, with more intense fuels' reduction occurring closer to your home. A Fuel Modification Plan shall be reviewed and approved by a CFD Fire Safety Specialist per Title 15, Chapter 15.10, Section 4906.1, for consistency with defensible space and fire safety guidelines. The Project's Conceptual Fuel Modification Plan (Figure 7) conceptually illustrates the 100-foot-wide FMZ Plan proposed for the Project site.

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

In the northern portion of the Project, the fuel modification zone will be provided by an equivalent land use (solar array) being constructed by YVWD in 2024. Should the solar project not be completed as planned, the Project would acquire a fuel modification zone easement from the YVWD to provide thinning to achieve 100 feet of FMZ from the Project's nearest structures or alternative methods of fire protection will be provided to that portion of the development.

5.3.1.2 Project-Specific Fuel Modification Zone Treatments

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

The Ember-Resistant Zone is applicable site-wide and is measured from the exterior wall of the structure outward to 5-feet (horizontal 0-5 feet) and falls within the irrigated Zone B FMZ. The ember-resistant zone is designed to keep fire or embers from igniting materials that can spread the fire to your home.

The Ember-Resistant Zone includes the following key components:

- The use of hardscaping like gravel, pavers, concrete, and other non-combustible mulch materials. No combustible bark or mulch.
- Remove all dead and dying weeds, grass, plants, shrubs, trees, branches, and vegetative debris (leaves, needles, cones, bark, etc.); check the roofs gutters, decks, porches, and stairways.
- Remove all branches within 10 feet of any chimney or stovepipe outlet.
- Limit plants in this area to low growing, nonwoody, properly watered and maintained plants.
- Relocate firewood and lumber to be a minimum 30 feet or more from the structure.
- Vegetation limited to no more than 6" to 18" in height.
- Vegetation shall be irrigated.

Zone B: Irrigated Zone – Fully irrigated zone extending from structure outward to 50 feet

Zone B extends from the end of Zone A to 50 feet (5-50 feet) from buildings, structures, decks, or to your property line, whichever is closer. Zone B includes the following key components:

- Irrigated by the automatic or manual system to maintain healthy vegetation and fire resistance.
- Remove all dead plants, grass, and weeds.
- Remove dead or dry leaves and pine needles from yard, roof, and rain gutters.
- Remove branches that hang over your roof and keep dead branches 10 feet away from chimneys.
- Trim trees regularly to keep branches a minimum of 10 feet from other trees.
- Relocate wood pines to be a minimum 30 feet or more from the structure.
- Remove or prune flammable plants and shrubs near windows.
- Remove vegetation and items that could catch fire from around and under decks, balconies, and stairs.
- Create separation between trees, shrubs, and items that could catch fire such as patio furniture, wood piles, and swing sets.

- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers (not exceeding 4 inches in height), and spaced shrubs.
- Plants in Zones A and B shall be inherently highly fire-resistant and spaced approximately, Plants shall be on the approved fuel modification plant list.
- Trees are not recommended for Zone B unless they are dwarf varieties or mature trees of small stature.
- Prohibited plant species (Appendix F) shall not be within 30 feet or more of the structures.
- Vines and climbing plants shall not be allowed on any structure.

Zone C: Reduce Fuel Zone – Thinning Zone extending from the outer edge of Zone B out up to 150 feet from structure

Zone C extends from Zone B up to 100 feet (50-150 feet) outward from the buildings, structures, decks, or to the property line, whichever is closer. Zone C includes the following key components:

- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers (not exceeding 4 inches in height, except as approved by the CFD), and spaced shrubs.
- Create horizontal space between shrubs and trees. Horizontal spacing depends on the slope of the land and the heigh of the shrubs or trees. Generally, shrubs should be spaced 2x's the height of a shrubs and trees should be separated 10 feet apart.
- Create vertical spacing between grass, shrubs and trees. Vertical spacing includes removing all branches at least 6 feet from the ground and/or at least maintaining at least 3x the height of a shrubs separation from the lowest tree branch. Lack of vertical space can allow a fire to move from the ground to the brush to the treetops like a ladder, leading to more intense fire closer to the home.
- Remove all fallen leaves, needles, twigs, bark, cones, and small branches (they may be permitted to a depth of 3-inches).
- All exposed wood piles must have a minimum of 10 feet clearance, down to bare mineral soil, in all directions.
- Irrigation systems are not required if the zone entirely consists of native plants.
- Annual grasses and weeds shall not exceed a height of 6-inches.

5.3.1.3 Sitewide Landscape Management

Roadside-Adjacent/Fire Access Road Defensible Space Zone

The roadside-adjacent defensible space zone extends a minimum of 20 feet from the edge of any public or private roadway that may be used as access for fire-fighting apparatus or resources that are adjacent to naturally vegetation open-space areas. Clear and remove flammable growth for a minimum of 20 feet on each side of the access roads. Additional clearance beyond 20 feet may be required upon inspection. Required on all areas of Project.

- Required clearance extends a minimum of 20 feet from the edge of any public or private roadway that are adjacent to naturally-vegetated open space areas, as well as an unobstructed vertical clearance of 13-feet 6-inches.
- Landscaping and native plants shall be appropriately spaced and maintained.
- Roadside fuel modification for the Project consists of maintaining ornamental landscapes, including trees, clear of dead and dying plant materials. Roadside fuel modification shall be maintained by the Project's HOA and/or Property Management Company.

Special Fuel Management Issues

On the Project site, tree planting in the fuel modification zones and along roadways is acceptable, as long as they meet the following restrictions as described below:

- For streetscape plantings, trees should be planted 10 feet from the edge of the curb to the center of the tree trunk. Care should be given to the type of tree selected, that it will not encroach into the roadway, or produce a closed canopy effect.
- Crowns of trees located within defensible space shall maintain a minimum horizontal clearance of 15 feet for a single tree. Mature trees shall be pruned to remove limbs one-third the height of six feet, whichever is less, above the ground surface adjacent to the trees.
- Deadwood and litter shall be regularly removed from trees.
- Ornamental trees shall be limited to groupings of 2–3 trees with canopies for each grouping separated horizontally as described in Table 11 below.

Table 11. Distance Between Tree Canopies by Percent Slope

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

1 Determined from canopy dimensions as described in Sunset Western Garden Book (Current Edition)
2 2020 CFC Section 4907.

Specific Landscaping Requirements

The following requirements are provided for the HOA/Property Management-maintained fuel modification zones. All landscaping shall be maintained by the HOA and/or Property Management Company.

Plants used in the fuel modification areas or landscapes will include drought-tolerant, fire-resistive trees, shrubs, and groundcovers. The planting list and spacing will be reviewed and approved by CFD, included on submitted landscape plans. The plantings will be consistent with the Riverside County/RCFD Suggested Plant Reference Guide. The suggested plant reference guide intends to provide examples of plants that are less prone to ignite or

spread flames to other vegetation and combustible structures during a wildfire. Additional Plants can be added to the landscape plant material palette with approval from CFD.

Pre-Construction Requirements

- Perimeter fuel modification areas must be implemented and approved by the CFD before combustible materials are brought on site. Fuel modification zone areas will be mowed and maintained throughout construction phase and landscape plantings will be provided in conjunction with standard Project landscape timing.

- Existing flammable vegetation shall be reduced by 50% on vacant lots upon commencement of construction.

Dead fuel, ladder fuel (fuel which can spread fire from the ground to trees), and downed fuel shall be removed, and trees/shrubs shall be properly limbed, pruned, and spaced per the plan.

Environmentally Sensitive Areas/Open Space

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

Prohibited Plants

Certain plants are considered prohibited in the landscape due to characteristics that make them highly flammable. These characteristics can be physical (structure promotes ignition or combustible) or chemical (volatile chemicals increase flammability or combustion characteristics). The plants included in the Prohibited Plant List (refer to Appendix F) are unacceptable from a fire safety standpoint and shall not be planted or allowed to establish opportunistically within the FMZs or landscape areas.

5.3.1.4 FMZ Vegetation Management Maintenance

Vegetation management, i.e., assessment of fuel modification zone condition and removal of dead and dying and undesirable species; as well as thinning as necessary to maintain specified plant spacing and fuel densities, shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined during the interim period where FMZ is maintained on- or off-site. The individual homeowners shall be responsible for all fuel modification vegetation management on their lots in compliance with the plan and the CFD requirements. The Project's HOA and/or Property Management Company shall be responsible for all fuel modification vegetation management for all common areas of the Project site, including roadsides clearance and fuel modification zones. The Project's HOA and/or Property Management Company will assure private homeowner lots comply with the plan initially and on an ongoing basis. Chapter 7A requirements for ongoing maintenance of fire-resistive building materials and fire sprinkler systems will be included in the CC&R's and Deed encumbrances for each lot. Additionally, the Project's HOA and/or Property Management Company shall be responsible for ensuring long-term

funding and ongoing compliance with all provisions of the FPP, including vegetation planting, fuel modification on the perimeter, and maintenance requirements on all common areas and roadsides.

Maintenance of FMZ's and Defensible Space is an important component for the long-term fire safety of the Project. On-going/as-needed fuel modification zone maintenance during the interim period while the Mesa Verde Specific Plan Project is built out and adjacent parcels are developed, which may be one or more years, will include necessary measures for consistency with the FPP, including:

- Regular Maintenance of dedicated Open Space.
- Removal or thinning of undesirable combustible vegetation and replacement of dead or dying landscaping.
- Maintaining ground cover at a height not to exceed 18 inches. Annual grasses and weeds shall be maintained at a height not to exceed three inches.
- Removing accumulated plant litter and dead wood. Debris and trimmings produced by thinning and pruning should be removed from the Project site or chipped and evenly dispersed in the same area to a maximum depth of four inches.
- Maintaining manual and automatic irrigation systems for operational integrity and programming. Effectiveness should be regularly evaluated to avoid over or under-watering.
- Complying with these FPP requirements on a year-round basis. Annual inspections are conducted following the natural drying of grasses and fine fuels, between the months of May and June, depending on precipitation during the winter and spring months.

Project's HOA and/or Property Management Company:

- Required to maintain the access roads, including a minimum of 20 feet clearance on each side of the road(s) within the Development Footprint adjacent to open space areas.
- Required to annually maintain the FMZs (or as needed).
- Required to maintain all common areas, including trees planted along internal roadways and in other areas throughout Project.

Resident/Homeowner:

- Maintenance of vegetation on individual property lots.
- Adjoining home homeowners are responsible for offsite brush clearance.

5.3.2 Construction Phase Vegetation Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for the Project area shall be performed pursuant to the FPP and FAHJ on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible materials will not be brought on-site without prior fire department approval.

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

- 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.

5.3.3 Pre-Construction Requirements

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

As an additional consultant recommendation, prior to bringing lumber or combustible materials onto the Project site, improvements within the active development area shall be in place, including utilities, operable fire hydrants, an approved, temporary roadway surface, and fuel modification zones established.

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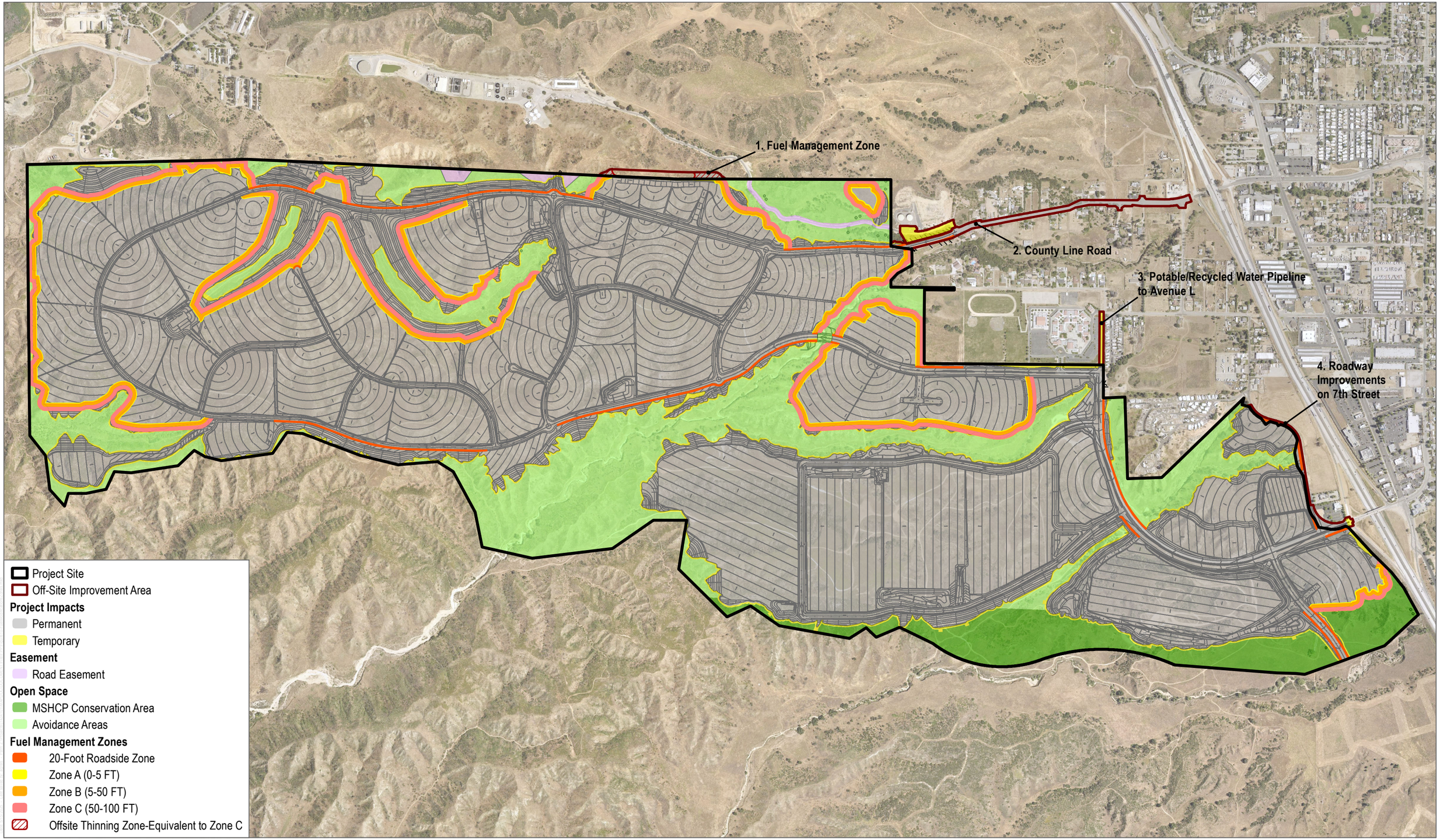

SOURCE: Hunsaker 2024; Riverside County 2023; Open Street Map

DUDEK

0 1,000 2,000 Feet

FIGURE 7

Fuel Modification Zones

Fire Protection Plan for the Mesa Verde Specific Plan Project

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6 Wildfire Education Program

Early evacuation for any type of wildfire emergency at the Project site is the preferred method of providing for resident safety, consistent with the CFD's current approach within Riverside County. As such, the residents and owners within Mesa Verde Specific Plan Project will be provided a proactive educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go" stance on evacuation and how to prepare for wildfire.[22] CFD has adopted NFPA's Firewise USA curriculum as resources for the community.[23] The wildfire education program will be facilitated by the HOA, property manager, business owners, or similar entity and will disclose the potential wildfire risk and the requirements of the FPP. The educational program will also include information regarding the necessary landscape maintenance and structural-based fire protection features. Having ongoing education included in the Project creates a heightened level of wildfire risk awareness and fire protection measures. This benefits both the Project and the surrounding areas as people would be more aware of the wildfire risk and potential impacts. Further, it decreases the likelihood the Project residents, employees, and other users would cause an uncontrolled ignition and they would be aware of what steps to take if they observe an ignition. As such the impact on off-site areas would be further lowered by reducing the probability of ignition.

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

The Firewise USA program administered by NFPA is a certification program for communities to gain recognition for the fire-wise design and maintenance of their community. Firewise USA began in 2019 with seven sites that were challenged to improve the fire resilience of their communities through a focused approach to active wildfire risk reduction. This is done through a collaborative framework created to empower neighbors to get organized and take action to reduce wildfire risk at a local level. The program has grown to include over 1.5 million residents living in Firewise USA communities (Firewise USA, 2024). The insurance industry, due to Department of Insurance Regulation #REG-2020-00015, is required to recognize the Firewise certification and consider it when it comes to determining if a community is insurable; cuts to insurance premiums have been made based on this certification. Given the established framework of Firewise USA, its direct mention in regulatory language, and its existing adoption by multiple insurance companies, it can be reasonably anticipated that more companies will require the same certification from customers that attempt to pursue discounted policies.

There are several requirements to become a Firewise USA community and multiple living documents must be prepared. Firewise USA communities must have a minimum of 8 dwelling units and a maximum of 2,500 (Firewise USA, 2024). In order to be recognized as a Firewise USA community, the following requirements shall be followed by the Project's HOA:

[22] 2023 Mesa Verde Wildfire Emergency Evacuation/Shelter-In-Place Plan
[23] https://yubafiresafe.org/home-preparedness/

1. **Form a board or committee:** Create a board or committee of volunteers to represent the community, made up of residents and partners such as a representative of the local fire department would first need to be formed. A resident leader will need to be identified who will be the program point of contact. The board or committee is responsible for defining the boundaries of the site and determines the number of individual single-family dwelling units within the community or site. As mentioned above, in order to be recognized as a Firewise site, the community must have a minimum of 8 dwelling units and a maximum of 2,500. (Firewise USA, 2024).

2. **Create a Firewise USA portal account:** Create a Firewise USA account and submit an application to your state Firewise USA liaison. (Firewise USA, 2024).

3. **Obtain a wildfire risk assessment:** The board or committee will collaborate with their local wildfire expert or a 3rd-party consultant such as Dudek to complete a community wildfire risk assessment (CWRA). The assessment should be a community-wide view that identifies areas of successful wildfire risk reduction and where improvements could be made. Emphasis should be on the general conditions of homes and related home ignition zones. The CWRA is a living document and would need to be updated at least every five years. (Firewise USA, 2024).

4. **Develop an action plan:** The board or committee will use the CWRA to create a three-year action plan, broken down by year, that identifies and prioritizes actions to reduce ignition to homes. These can include community-wide investments along with suggested homeowner actions and education activities that participates will strive to complete annually, or over a period of multiple years. The action place document is required to be updated at least every three years. As circumstances change (e.g. completing activities, experiencing a fire or natural disaster, new construction in community, etc.), the action plan may need to be updated more frequently. (Firewise USA, 2024).

5. **Host an educational event:** Host at least one event per year to educate the community about wildfire risk reduction. (Firewise USA, 2024).

6. **Meet the minimum investment:** Every year, neighbors will need to complete educational and risk reduction actions identified in the plan which go towards your site's annual reporting efforts. At a minimum, each site is required to annually invest the equivalent of one (1) volunteer hour per dwelling unit in wildfire risk reduction actions. If your site identifies 100 homes within its boundary, then 100 hours of work or the monetary equivalent, based on the independent sector value of volunteer time, need to be completed for that year. (Firewise USA, 2024).

7. **Submit an annual renewal:** Maintain your Firewise USA status. (Firewise USA, 2024).

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

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7 Conclusion

The requirements and recommendations set forth in this FPP document how the Project conforms with required fire and building codes. The recommendations provided in the FPP have also been designed specifically for the proposed construction of structures within areas designated as VHFHSZ. When properly implemented on an ongoing basis, the fire protection strategies proposed in this FPP should significantly reduce the potential fire threat to vegetation on the community and its structures, as well as assist CFD in responding to emergencies within the Project site. The fire protection system provided for the Mesa Verde Specific Plan Area 2 Amendment 2 Project site includes a redundant layering of code-compliant, fire-resistant construction materials and methods that have been shown through post-fire damage assessments to perform extremely well against wildfire and ember storm conditions. The Project will include the necessary defensible space and setbacks, along with ignition resistant construction of one of the most restrictive fire and building codes in the country. The use of these methods and materials along with ongoing maintenance will result in a community that will be highly defensible with minimal firefighting resource demands. It is Dudek's professional opinion that this Project, like any project built to the most recent fire safety code requirements, will not be vulnerable to fire losses experienced by older, less ignition resistant projects. It is necessary to understand that projects occurring within fire hazard severity zones and wildland urban interface areas with higher potential fire hazards represent lower overall fire safety risk when the buildings and community are built to ignition resistant levels required by CFD and Riverside County. Conversely, older communities that do not include the ignition resistant strategies may occur in a location that represents lower potential fire hazards outside of a fire hazard severity zone or wildland urban interface, but may actually be at higher overall fire risk due to the vulnerabilities inherent in their construction.

Modern infrastructure would be provided, and all structures are required to include interior, automatic fire sprinklers consistent with the City's and County's regulatory standards. It also provides guidance for vegetation maintenance for the proposed FMZs and landscaped areas on the Project site. The requirements and recommendations provided in this FPP have been designed specifically for the Mesa Verde Specific Plan Project. This analysis and its fire protection justifications are supported by fire science research, results from previous wildfire incidents, and fire agencies that have approved these concepts.

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

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

It is recommended that the homeowners, employees, or other occupants who may reside within the Project site adopt a conservative approach to fire safety. The approach must include maintaining the landscape and structural

components according to the appropriate standards and embracing a “Ready, Set, Go” stance on evacuation and shelter-in-place NFPA’s Firewise USA curriculum for the community. The Project is not to be considered a shelter-in-place development. However, the fire agencies and/or law enforcement officials may, during an emergency, as they would for any new development providing the layers of fire protection as this project, determine that it is safer to temporarily refuge residents, employees or visitors on-site. When an evacuation is ordered, it will occur according to pre-established evacuation decision points or as soon as notice to evacuate is received, which may vary depending on many environmental and other factors. It is important for anyone living at the WUI to educate themselves on practices that will improve safety.

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

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Appendix A

Representative Project Photograph Log

MESA VERDE SPECIFIC PLAN
DEVELOPMENT PROJECT
APPENDIX A
PHOTO LOG

Picture 1: Photograph taken looking north up Sunset Ave. towards the southwest portion of the project site, standing near the intersection of Sunset Ave. and W. Wilson St.

Picture 2: Photograph taken looking south down Sunset Ave. standing near the center of the property along the western property boundary. Note the low- to moderate-load grass/grass-shrub vegetation along the western property boundary.

Picture 3: Photograph taken looking north/northwest at the grass/grass-shrub vegetation located west of the project site on the west side of Sunset Avce.

Picture 4: Photograph taken looking south standing along the western property boundary towards the southwestern portion of the project site. Note the low-load grasses throughout the property.

Picture 5: Photograph taken looking southwest standing along the western property boundary towards the south/southeastern portion of the project site. Note the low-load grasses that have been grazed by cows.

Picture 6: Photograph taken looking east across the project site standing along the western property boundary towards the eastern portion of the project site. Note the low-load grasses throughout that have been grazed by cows.

Picture 7: Photograph taken looking northeast across the project site standing along the western side of the property towards the northeastern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 8: Photograph taken looking north across the project site standing along the western side of the property towards the northern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 9: Photograph taken looking south at one of the canyons in the southeast portion of the project site standing in the southeastern portion of the property. Note the moderate-load grass-shrub dominated vegetation.

Picture 10: Photograph taken looking west across the project site standing in the southeastern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 11: Photograph taken looking north/northwest across the project site the southeastern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 12: Photograph taken looking southwest across the project site standing in the southeastern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 13: Photograph taken looking north along the eastern side of the project site standing in the southeastern portion of the property. Note the low-load grasses throughout that have been grazed by cows.

Picture 14: Photograph taken looking southeast at one of the canyons in the southeast portion of the project site standing in the southeastern portion of the property. Note the moderate-load grass-shrub dominated vegetation.

Picture 15: Photograph taken looking north across the project site standing in the center of the eastern portion of the project site. Note the low-load grasses throughout that have been grazed by cows.

Picture 16: Photograph taken looking northeast at the naturally vegetated hills east of the project site standing in the center of the eastern portion of the project site. Note the low-load grasses throughout that have been grazed by cows.

Picture 17: Photograph taken looking southeast at the naturally vegetated hills east of the project site standing in the center of the eastern portion of the project site.

Picture 18: Photograph taken looking south across the western property boundary standing along Sunset Ave. in the northwest portion of the project site. Note the low-load grasses throughout that have been grazed by cows.

Picture 19: Photograph taken looking north up Sunset Ave. and across the northern portion of the project site. Note the low-load grasses throughout that have been grazed by cows.

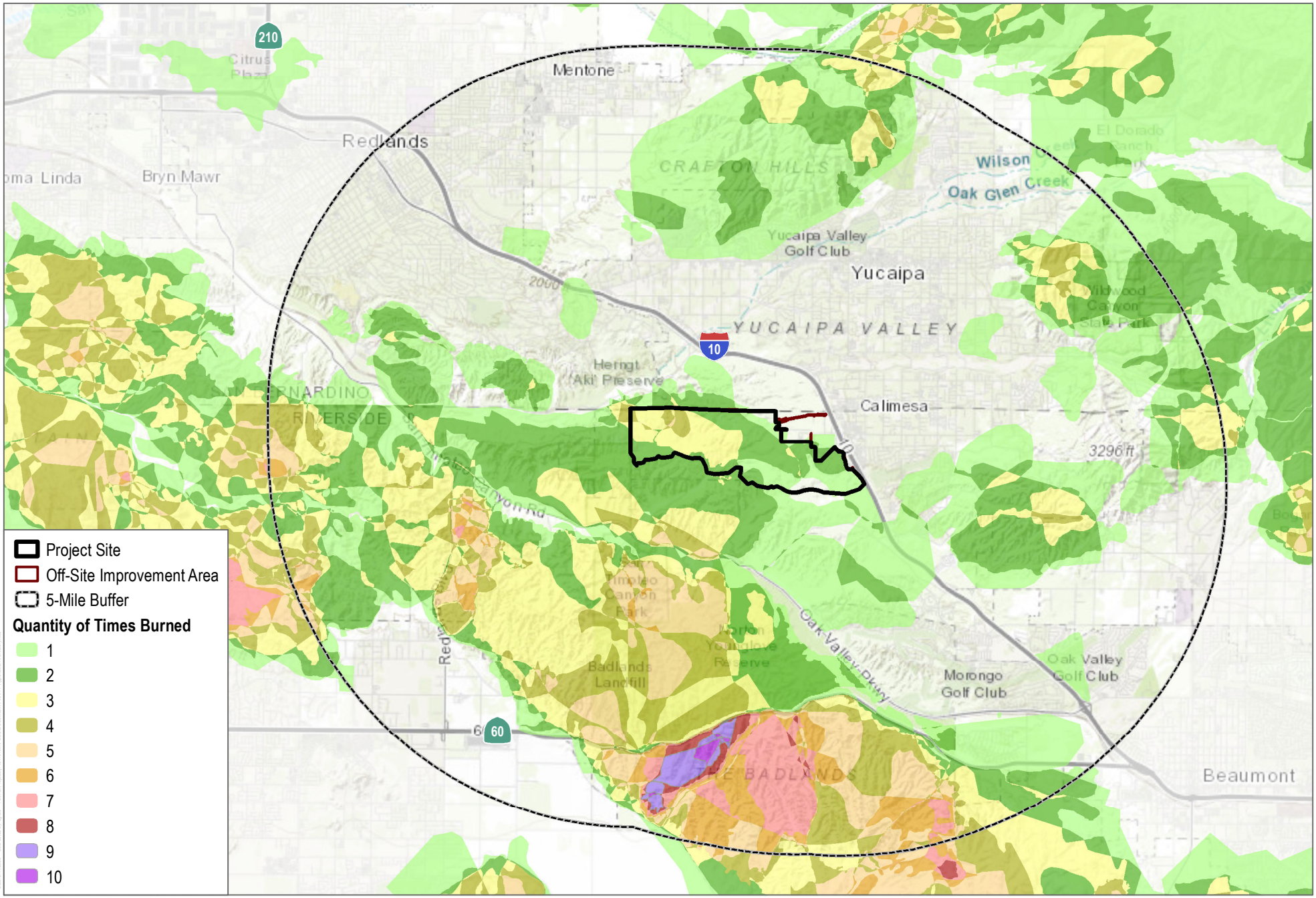
Picture 20: Photograph taken looking southeast of the vegetation along the eastern side of Bluff St. northeast of the project site.

Picture 21: Photograph taken looking north up Bluff St. in the northeastern portion of the project site.

Picture 22: Photograph taken looking south down Bluff St. and the eastern side of the development site. Note the low-load grasses throughout that have been grazed by cows.

Appendix B

Project Vicinity Fire History Map



SOURCE: CalFIRE; Hunsaker 2024; County of San Bernardino; County of Riverside; Open Street Map; NAIP 202

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APPENDIX B

Fire History

Fire Protection Plan for the Mesa Verde Specific Plan Project

Appendix C

BehavePlus Fire Behavior Analysis Summary

FIRE BEHAVIOR MODELING SUMMARY
MESA VERDE SPECIFIC PLAN DEVELOPMENT PROJECT, CALIMESA, CALIFORNIA

1 BehavePlus Fire Behavior Modeling History

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used as the industry standard for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus 6.0, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

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

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

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

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

The seven fuel characteristics help define the 13 standard fire behavior fuel models[1] and the five custom fuel models developed for Southern California[2]. According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

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

In addition, the aforementioned fuel characteristics were utilized in the recent development of 40 new fire behavior fuel models[3] developed for use in BehavePlus modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- Grass Models GR1 through GR9
- Grass-shrub Models GS1 through GS4
- Shrub Models SH1 through SH9

1 Anderson, Hal E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT.

2 Weise, D.R. and J. Regelbrugge. 1997. Recent chaparral fuel modeling efforts. Prescribed Fire and Effects Research Unit, Riverside Fire Laboratory, Pacific Southwest Research Station. 5p.

3 Scott, Joe H. and Robert E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

- Timber-understory Models TU1 through TU5
- Timber litter Models TL1 through TL9
- Slash blowdown Models SB1 through SB4

BehavePlus software was used in the development of the Mesa Verde Specific Plan Development Project (Proposed Project) Fire Protection Plan (FPP) in order to evaluate potential fire behavior for the development site. Existing site conditions (both on and adjacent to the project site) were evaluated, and local weather data was incorporated into the BehavePlus modeling runs.

2 Fuel Models

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the proposed development site in the City of Calimesa, Riverside County, California. As is customary for this type of analysis, four scenarios were evaluated, including two summer, onshore weather condition (northwest and west/southwest of the site) and two extreme fall, offshore weather condition (northeast and south/southeast of the site). The Project site is currently vacant and undeveloped land, with the exception of a portion of Sandalwood Drive, and is intersected by incised drainages and numerous dirt roads. The majority of the study area burned in 2017 and 2019 during the Palmer and Sandalwood Fires, respectively. Furthermore, the Project site is surrounded by a mix of land uses, including open space, residential, commercial, and industrial areas. The Project site is bordered to the north by undeveloped hillsides, a wastewater treatment facility, and rural development, with its northern boundary aligning with the boundary between Riverside and San Bernardino counties. To the east lies residential, school, and urban uses in the City, while the areas to the south and west comprise mainly of undeveloped hillsides with some rural development, including roadways. The following provides an overview of the surrounding land uses.

With that said, fuels and terrain within and adjacent to the development area could produce flying embers that may affect the project, but defenses will be built into the structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels directly adjacent to and within fuel modification zones that could have the potential to affect the project's structures from a radiant and convective heat perspective as well as from direct flame impingement, however, the buildings will be surrounded by irrigated landscape and hardscape areas. BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the Proposed Project site. In addition, data sources are cited and any assumptions made during the modeling process are described.

2.1 Vegetation (Fuels)

To support the fire behavior modeling efforts conducted for the Project's Fuel Modification Plan (see Figure 10), a Dudek Fire Protection Planner analyzed the different vegetation types observed on and adjacent to the site and were classified into the aforementioned numeric fuel models. As is customary for this type of analysis, the terrain and fuels directly adjacent to the site and proposed fuel modification zones (FMZ) are used for determining flame lengths and fire spread. Vegetation types, which were derived from the field assessment and the Project's Vegetation Community Maps (Figures 4a through 4j), were classified into a fuel model. Fuel models are selected by

their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-Project fire behavior changes. Fuel models were selected from Standard Fire Behavior Fuel Models: a Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005). Fuel models were also assigned to the fuel FMZs to illustrate post-Project fire behavior changes. Based on the anticipated existing and post-Project vegetation conditions, five different fuel models were used in the fire behavior modeling effort presented herein. Fuel model attributes are summarized in Tables 1 and 2.

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
Gr2	Low-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<1.0 ft.
Gr4	Moderate-load, Dry climate grasses	Represents the naturally-vegetated grass vegetation within the areas surrounding the project site, as well as throughout the development site.	<3.0 ft.
Gs1	Low-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<2.0 ft.
Gs2	Moderate-load, Dry climate grass-shrubs	Represents the grass-shrub vegetation located adjacent to the development without maintenance.	<3.0 ft.

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
FM8	Compact Litter	Fuel Modification Zones A and B: irrigated landscape throughout the Project site	<1.0 ft.
Gs1	Low-load, dry climate grasses-shrub	Fuel Modification Zone C: Thinned landscape throughout the Project site	<2.0 ft.
NB	Non-burnable	Roadway and parking lot areas throughout the development.	0 ft.

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope in the absence of wind. Terrain that forms a funneling effect, such as chimneys, chutes, or saddles 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 wind The Project site has varied topography including extensive plateaus and flat- bottomed valleys. Elevations are highest in the northeastern parts of the site where the elevations reach above 2,300 feet. Elevations gradually decrease southwesterly to between 2,100 and 2,300 feet. Small portions of the site fall below 2,100 feet elevation resulting in an elevation difference across the site of about 200 feet.

2.3 Weather Analysis

Historical weather data for the Riverside County region was utilized in determining appropriate fire behavior modeling inputs for the Project area. 50th and 97th percentile moisture values were derived from Remote Automated Weather Station (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. Weather data sets from the Beaumont RAWS (ID number 045617)[4] were utilized in the fire modeling runs.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through November 30 for each year between 1985 and 2020 (extent of available data record) for 97th percentile weather conditions and from June 1 through September 30 for each year between 1985 and 2020 for 50th percentile weather conditions.

Following analysis in Fire Family Plus, fuel moisture information was incorporated into the Initial Fuel Moisture file used as an input in BehavePlus. Wind speed data resulting from the Fire Family Plus analysis was also determined. Initial wind direction and wind speed values for the five BehavePlus runs were manually entered during the data input phase. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. Table 3 summarizes the wind and weather input variables used in the Fire BehavePlus modeling efforts.

Table 3: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	Gr2, Gr4, Gs1, and Gs2	Gr2, Gr4, Gs1, and Gs2
1 hr. Moisture	4%	1%
10 hr. Moisture	5%	2%
100 hr. Moisture	9%	5%
Live Herbaceous Moisture	37%	30%
Live Woody Moisture	73%	60%
20-foot Wind Speed (mph)	15 mph (sustained winds)	18 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	210 and 300	45 and 135
Wind adjustment factor	0.4	0.4
Slope (uphill)	6% to 8%	5% to 12%

3 Fire Behavior Modeling Efforts

As mentioned, the BehavePlus fire behavior modeling software package was utilized in evaluating anticipated fire behavior adjacent to the Proposed Project site. Four focused analyses were completed for both the existing project site conditions and the post project conditions, each assuming worst-case fire weather conditions for a fire approaching the project site from the northwest, west/southwest, northeast, and south/southeast. The results of

[4] Banning RAWS Station Latitude and Longitude: 33.964189, -117.006231

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

Fire Scenario Locations and Descriptions:

- Scenario 1. Fire flaming front approaching from the northeast toward the northern portion of the project with sustained 18 mph east/northeastern winds and up to 50 mph gusts.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.

- Scenario 2. Fire flaming front approaching from the south/southeast toward the south and east sides of the development with 18 mph east/northeastern winds and up to 50 mph gusts.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.
- Scenario 3. Fire flaming front approaching from the west/southwest towards the south and west sides of the development with sustained winds of 15 mph on-shore winds from the west.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.
  - Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.
- Scenario 4. Fire flaming front approaching from the northwest towards the northwest side of the development with sustained winds of 15 mph on-shore winds from the west/northwest.
  - Existing conditions:
    - On-site and Offsite: A combination of Low- to moderate-load dry climate grass and grass-shrub vegetation.

- Post-Project conditions: paved roadway, combination of irrigated and thinned FMZs, paved parking areas.

4 Fire Behavior Modeling Results

The results presented in Tables 4 and 5 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

Based on the BehavePlus analysis result presented below and in Tables 4 and 5, wildfire behavior through the low-to- moderate load non-maintained grass/grass-shrub dominated fuels throughout and adjacent to the development footprint being fanned by 15 mph sustained winds, from the west and pushed by on-shore ocean breezes typically exhibit less severe fire behavior due to lower wind speeds and higher humidity. Under typical onshore weather conditions, a surface vegetation fire could have flame lengths between approximately 5 feet and 12 feet in height and spread rates between 0.5 and 2.0 mph. Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 0.2 to 0.4 miles.

A worst-case fire under gusty Santa Ana winds and low fuel moistures adjacent to the Project site is expected to be primarily of moderate to high intensity through the non-maintained surface grass/grass-shrub dominated fuels throughout and adjacent to the development site. Worst-case fire behavior under peak weather conditions (represented by Fall Weather, Scenario 1) is anticipated to be a wind-driven fire from the east/southeast during the fall. Under such conditions, expected surface flame length are expected to reach approximately 39 feet with wind speeds of 50+ mph. Under this scenario, fireline intensities reach 16,026 BTU/feet/second with spread rates up to 16 mph and could have a spotting distance up to 2.2 miles away.

As presented in Table 5, Fire Behavior Modeling Results for Post-Project Conditions, Dudek conducted modeling of the Project site for post-Project fuel conditions for the Project. The FMZs include fire friendly and maintained landscaping on the periphery of the Project. For modeling the post-Project conditions, fuel model assignments were re-classified for the landscaping as listed in Table 2. Fuel model assignments for all other areas remained the same as those classified for the existing condition.

A worst-case fire under gusty Santa Ana winds and low fuel moistures (Scenario 1) is expected to be moving between 0.2 mph and 3.0 mph. Flame length values were modeled between 3.0 feet and 14 feet; spotting is projected to occur between 0.4 and 1.1 miles from the flaming front. For on-shore wind conditions, the worst-case fire (Scenario 3) is expected to be moving between 0 and 0.4 mph with flame lengths between 1.4 feet and 4.7 feet.

Table 4: RAWS BehavePlus Fire Behavior Model Results – Existing Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 12% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds w/ 50 mph gusts – (NE of the site)				
Low-load grasses (Gr2)	10.6 (18.0)[3]	952 (3,037)	1.9 (6.2)	0.4 (1.3)
Moderate-load grasses (Gr4)	19.7 (38.7)[3]	3,709 (16,026)	3.9 (16.8)	0.7 (2.2)
Low-load grass-shrub (Gs1)	7.2 (14.0)[3]	420 (1,763)	0.7 (3.0)	0.3 (1.1)
Moderate-load grass-shrub (Gs2)	10.5 (20.5)[3]	940 (4,048)	0.9 (4.2)	0.4 (1.4)
Scenario 2: 5% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds with 50 mph gusts – (S/SE of the site)				
Low-load grasses (Gr2)	10.5 (18.0)[3]	942 (3,037)	1.9 (6.2)	0.4 (1.3)
Moderate-load grasses (Gr4)	19.6 (38.6)[3]	3,670 (15,987)	3.8 (16.7)	0.7 (2.2)
Low-load grass-shrub (Gs1)	7.2 (14.0)[3]	416 (1,763)	0.7 (3.0)	0.3 (1.1)
Moderate-load grass-shrub (Gs2)	10.4 (20.5)[3]	930 (4,038)	1.0 (4.2)	0.4 (1.4)
Scenario 3: 8% slope; Summer, on-shore winds (50th percentile), 15 mph sustained – (W/SW of the site)				
Low-load grasses (Gr2)	6.5’	327	0.9	0.3
Moderate-load grasses (Gr4)	12.1’	1,274	1.8	0.4
Low-load grass-shrub (Gs1)	4.7’	164	0.4	0.2
Moderate-load grass-shrub (Gs2)	6.9’	373	0.5	0.3
Scenario 4: 6% slope; Summer on–shore winds (50th percentile), 15 mph sustained winds – (NW of the site)				
Low-load grasses (Gr2)	6.5’	330	0.9	0.3
Moderate-load grasses (Gr4)	12.1’	1,285	1.8	0.4
Low-load grass-shrub (Gs1)	4.7’	165	0.4	0.2
Moderate-load grass-shrub (Gs2)	6.9’	376	0.5	0.3

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph

Table 5: RAWS BehavePlus Fire Behavior Model Results – Post Project Conditions

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/second)	Spread Rate[1] (mph[2])	Spotting Distance[1] (miles)
Scenario 1: 12% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds w/ 50 mph gusts – (NE of the site)				
Fuel modification zones A and B (FM8)	2.1 (3.0)[3]	27 (63)	0.1 (0.2)	0.1 (0.4)
Fuel modification zone C (Gs1)	7.2 (14.0)[3]	420 (1,763)	0.7 (3.0)	0.3 (1.1)
Non-burnable	N/A	N/A	N/A	N/A
Scenario 2: 5% slope; Fall, Santa Ana winds (97th percentile), 18 mph sustained winds with 50 mph gusts – (S/SE of the site)				
Fuel modification zones A and B (FM8)	2.0 (3.0)[3]	27 (63)	0.1 (0.2)	0.1 (0.4)
Fuel modification zone C (Gs1)	7.2 (14.0)[3]	416 (1,763)	0.7 (3.0)	0.3 (1.1)
Non-burnable	N/A	N/A	N/A	N/A
Scenario 3: 8% slope; Summer, on-shore winds (50th percentile), 15 mph sustained – (W/SW of the site)				
Fuel modification zones A and B (FM8)	1.4’	12	0.0	0.1
Fuel modification zone C (Gs1)	4.7’	164	0.4	0.2
Non-burnable	N/A	N/A	N/A	N/A
Scenario 4: 6% slope; Summer on–shore winds (50th percentile), 15 mph sustained winds – (NW of the site)				
Fuel modification zones A and B (FM8)	1.4’	12	0.0	0.1
Fuel modification zone C (Gs1)	4.7’	165	0.4	0.2
Non-burnable	N/A	N/A	N/A	N/A

Note:

1. Wind-driven surface fire.
2. MPH=miles per hour.
3. Spotting distance from a wind driven surface fire; it should be noted that the wind mph in parenthesis represent peak gusts of 50 mph.

The following describes the fire behavior variables (Heisch and Andrews 2010) as presented in Tables 4 and 5:

Surface Fire:

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

The information in Table 6 presents an interpretation of the outputs for five fire behavior variables as related to fire suppression efforts. The results of fire behavior modeling efforts are presented in Tables 4 and 5. Identification of modeling run locations is presented graphically in Figure 5 of the FPP.

Table 6: Fire Suppression Interpretation

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

Appendix D

State Fire Marshal's Data for Master Plan Community Wildfire Performance

MEMORANDUM
January 18, 2022

To: Dan Dunmoyer, President and CEO of CBIA
From: Bob Raymer[1]
Subject: Analysis of State Fire Marshal Property Loss Data

This memorandum evaluates Office of the State Fire Marshal data to determine how new homes constructed after January 1, 2010 fared in the ten worst property-loss fires dating back to 2017, compared to homes built prior to 2010.

I. METHODS

The State Fire Marshal maintains an extensive data retrieval service of fire incidents across the state, including those related to fires occurring in the Wildland-Urban Interface (WUI).[2] For the nine worst property-loss fires dating back to 2017, CBIA requested residential data that identified:

- Whether the dwelling was single-family or multifamily;
- damage assessment (destroyed, major damage, affected, no damage);
- valuation of the structure; and
- year the structure was built

The data provided by the State Fire Marshal is attached hereto. Regulatory standards applicable to new construction include:

- The State Fire Marshal's "fire hardening" building standards[3]

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[1] Bob Raymer has degrees in Mechanical Engineering (Bachelor of Science), Engineering Technology/Physics (Bachelor of Science and Environmental Science (Bachelor of Arts). He is a licensed Professional Engineer in the State of California and has been involved in building code development and implementation at the state and national level for 40+ years.

[2] See California Incident Data and Statistics Program, available at https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/california-incident-data-and-statistics-program/.

[3] Cal. Code. Regs Title 24, Part 2, Chapter 7A

- Defensible space mandates[4]
- Cal Fire's Fire Safe Development Standards[5]

We selected January 1, 2010 as a conservative date after which these rules were being consistently implemented in new construction in the WUI in California. The results of our analysis are provided below.

II. SUMMARY OF FINDINGS

On average, for the nine worst property-loss fires dating back to 2017, only approximately 1% of the homes and apartments destroyed, damaged, or affected were new dwellings (built after 1/1/10) even though new dwellings make up roughly 7% of the state's total housing stock.

Between 1/1/10-1/1/2020, roughly 1 million homes and apartments were built out of a total housing stock of 14 million, based on building permit data tracked by the Construction Industry Research Board (CIRB). For all these fires, evidence indicates that substantial, initial residential development took place in the period of 1945-1980, decades before these critical rules were put in place.[6]

New homes fared extremely well compared with older neighborhoods during these major fires. Of the 31,000 data points retrieved from the State Fire Marshal, it was extremely rare to see more than two new homes on the samestreet destroyed or affected by the fires, while it was commonplace for entire neighborhoods of older dwellings to be destroyed. As opposed to custom home production where a single home is done separate of others, production-style home development is done in phases, usually 8-15 homes at a time. This typical production-style construction creates blocks or areas of fire-resistant homes, which are much more effective at withstanding wildfire intrusion and decreasing home-to-home spread. Notably, we are not aware of any master-planned community in California constructed after January 1, 2010 (i.e., a planned community with all new homes and typically including measures such as fuel breaks) suffering significant structural loss even during extreme fire events.

As illustrated below, we analyzed data from the nine worst property loss fires over the past seven years, and there was no case of more than three "new homes" in the same contiguous area being destroyed. There was only one case where three new homes next to each other were destroyed. These findings are in stark contrast to older homes, where it was commonplace for groups of homes to be destroyed at the same time, even entire neighborhoods. In this way, new

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[4] Pub. Res. Code 4291.

[5] Cal. Code Regs. Title 14, Division 1.5, Chapter 7 Fire Protection, Subchapter 2, Articles 1-5 (SRA Fire Safe Regulations).

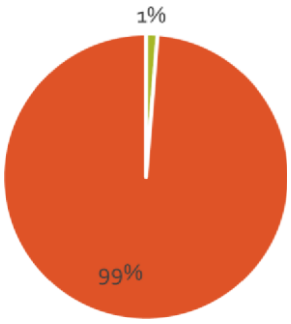
[6] See age-of-dwelling data provided by the State Fire Marshal as described herein.

homes not only are more fire protective individually as compared to older homes, but new homes (particularly aggregations of new homes) help resist the spread of fire within residential areas by decreasing home-to-home spread and ember intrusion-based spread.

III. FIRE SPECIFIC DATA[7]

A. Camp Fire

1. Total Structures Affected or Destroyed: 10,582



- Homes Built After 2010: 136
- Homes Built Before 2010: 10,446

2. Data

Total Homes Destroyed/Major Damage/Affected: 10,582

Built after 1/1/10: 112 destroyed = 0.0106 (3 homes on same street)

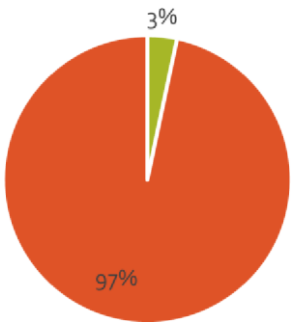
24 affected = 0.0022

136 total = 0.0129 or 1.3%

B. Carr Fire

1. Total Structures Affected or Destroyed: 1,082

[7] Information taken from State Fire Marshal data attached hereto.



- Homes Built After 2010: 36
- Homes Built Before 2010: 1,046

2. Data

Total Homes Destroyed/Major Damage/Affected: 1,082

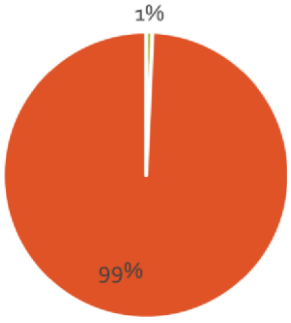
Built after 1/1/10: 24 destroyed = 0.0222 (9 homes on same street)

12 affected = 0.0111

36 total = 0.0333 or 3.3%

C. CZU Lightening Fire

1. Total Structures Affected or Destroyed: 998



- Homes Built After 2010: 7
- Homes Built Before 2010: 992

2. Data

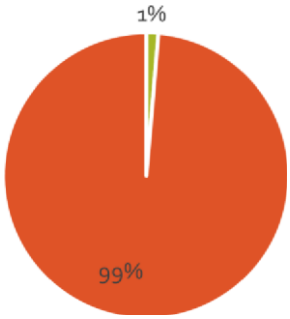
Total Homes Destroyed/Major Damage/Affected: 998

Built after 1/1/10: 5 destroyed **= 0.0050** (no homes on same street)

1 affected = 0.0010
1 inaccessible = 0.0010
7 total **= 0.0070 or 0.7%**

D. Glass Fire

1. Total Structures Affected or Destroyed: 737



- Homes Built After 2010: 10
- Homes Built Before 2010: 727

2. Data

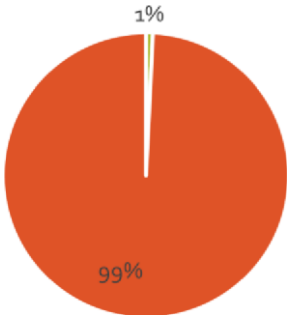
Total Homes Destroyed/Major Damage/Affected: 737

Built after 1/1/10: 4 destroyed = 0.0054 (No homes on same street)

6 affected = 0.0081
10 Total **= 0.0136 or 1.4%**

E. LNU Lightening Fire

1. Total Structures Affected or Destroyed: 1,559



- Homes Built After 2010: 12
- Homes Built Before 2010: 1,547

2. Data

Total Homes Destroyed/Major Damage/Affected: 1,559

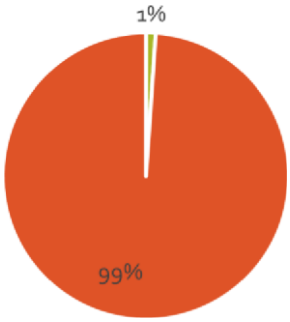
Built after 1/1/10: 5 destroyed = 0.0032 (2 homes on same street)

7 affected = 0.0045

12 Total = 0.0077 or 0.8%

F. North Complex Fire

1. Total Structures Affected or Destroyed: 732



- Homes Built After 2010: 8
- Homes Built Before 2010: 724

2. Data

Total Homes Destroyed/Major Damage/Affected: 732

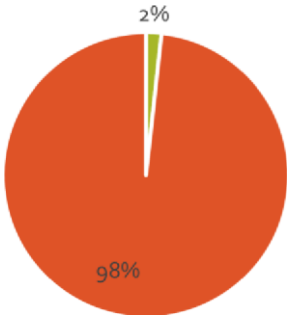
Built after 2010: 7 destroyed = 0.0096 (No homes on same street)

1 affected = 0.0014

8 Total = 0.0109 or 1.1%

G. Nuns Fire

1. Total Structures Affected or Destroyed: 687



- Homes Built After 2010: 12
- Homes Built Before 2010: 675

2. Data

Total Homes Destroyed/Major Damage/Affected: 687

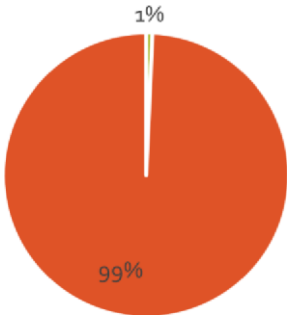
Built after 2010: 10 destroyed = 0.0146 (2 homes on same street)

2 affected = 0.0029

12 Total = 0.0175 or 1.8%

H. Thomas Fire

1. Total Structures Affected or Destroyed: 855



- Homes Built After 2010: 6
- Homes Built Before 2010: 848

2. Data

Total Homes Destroyed/Major Damage/Affected: 855

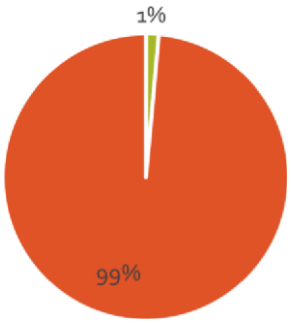
Built after 1/1/10: 5 destroyed = 0.0058 (4 homes on same street)

1 affected = 0.0012

6 Total = 0.0070 or 0.7%

I. Woolsey Fire

1. Total Structures Affected or Destroyed: 1,319



- Homes Built After 2010: 19
- Homes Built Before 2010: 1,300

2. Data

Total Homes Destroyed/Major Damage/Affected: 1,319

Built after 1/1/10:	12 destroyed	= 0.0091	(2 homes on same street)
	7 affected	= 0.0053	
	19 Total	**= 0.0144 or 1.4%**	

Appendix E

Ignition-Resistant Construction Requirements

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

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

approved material that offers equivalent protection. Ventilation louvers and openings may be incorporated as part of access assemblies.

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

Appendix F

RCFD Prohibited Plant List

Botanical Name	Common Name	Comment*
Trees		
Abies species	Fir	F
Agonis juniperina	Juniper Myrtle	F
Casuarina cunninghamiana	River She-Oak	F
Chamaecyparis species (numerous)	False Cypress	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
Lithocarpus densiflorus	Tan Oak	F
Melaleuca species *(M. linariifolia, M. nesophila, M. quinquenervia)*	Melaleuca (Flaxleaf, Pink, Cajeput Tree)	F, I
Picea (numerous)	Spruce	F
Palm species (numerous)	Palm	F, I
Pinus species *(P. brutia, P. canariensis, P. b. eldarica, P. halepensis, P. pinea, P. radiata, numerous others)*	Pine (Calabrian, Canary Island, Mondell, Aleppo, Italian Stone, Monterey)	F
Platycladus orientalis	Oriental arborvitae	F
Pseudotsuga menziesii	Douglas Fir	F
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
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
Arctostaphylos species	Manzanita	F
Arundo donax	Giant Reed	F, I
Artemisia species *(A. abrotanium, A. absinthium, A. californica, A. caucasica, A. dracunculus, A. tridentata, A. pynocephala)*	Sagebrush (Southernwood, Wormwood, California, Silver, True tarragon, Big, Sandhill)	F
Atriplex species (numerous)	Saltbush	F, I
Avena fatua	Wild Oat	F
Baccharis pilularis	Coyote Bush	F
Bambusa species	Bamboo	F, I
Bougainvillea species	Bougainvillea	F, I
Brassica species *(B. campestris, B. nigra, B. rapa)*	Mustard (Field, Black, Yellow)	F, I

Botanical Name	Common Name	Comment*
Bromus rubens	Foxtail, Red brome	F, I
Castanopsis chrysophylla	Giant Chinquapin	F
Cardaria draba	Hoary Cress	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
Eriogonum species *(E. fasciculatum)*	Buckwheat (California)	F
Fremontodendron species	Flannel Bush	F
Heterotheca grandiflora	Telegraph Plant	F
Hordeum leporinum	Wild barley	F, I
Juniperus species	Juniper	F
Lactuca serriola	Prickly Lettuce	I
Larrea tridentata	Creosote bush	F
Lolium multiflorum	Ryegrass	F, I
Lonicera japonica	Japanese Honeysuckle	F
Mimulus aurantiacus	Sticky Monkeyflower	F
Miscanthus species	Eulalie Grass	F
Muhlenbergia species	Deer Grass	F
Nicotiana species *(N. bigelovii, N. glauca)*	Tobacco (Indian, Tree)	F, I
Pennisetum setaceum	Fountain Grass	F, I
Perovskia atroplicifolia	Russian Sage	F
Phoradendron species	Mistletoe	F
Pickeringia montana	Chaparral Pea	F
Rhus (R. diversiloba, R. laurina, R. lentii)	Sumac (Poison oak, Laurel, Pink Flowering)	F
Ricinus communis	Castor Bean	F, I
Rhus Lentii	Pink Flowering Sumac	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

*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 Fuel Modification Zones and elsewhere in this development shall be subject to approval of the Fire Code Official.
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

Basic Specification for Heli-Hydrant Model HHYL#2-15x8NR

Basic Specification for Heli-Hydrant
Model HHYL#2-15x8NR

Site Evaluation and Determination - Completed jointly by contractor, water company, and Whaling Fire.

- Vehicle Access
- Helicopter Access Obstructions Water supply
- Water line size and location
- Head pressure
- Rain drain termination / location
- Over flow termination / location
- Set location of center for Heli-Hydrant
- Cal Fire flyover to determine proper location for the Pilots extraction approach.
- Operations Housing location.
- Mark underground Lines U.S.A.

Site Prep - By Outside Contractor.

- Road access to Site.
- Brush and any trees to be cleared with in a 50 foot Minimum radius of the hydrant. Clear any and all obstructions for Helicopter safety
  Excavation, 20' diameter circle, 3' deep for Heli-Hydrant to be installed in the ground well
- Pea Gravel for pad in side grade band supplied by the tank manufacturer.
- Concrete pad 3' x 4' for Electrical Controller Housing.
  Rebar 737624 #3 Rebar, 16" on center / or / Mesh 42in X 7 ft Nucor
- Trench 18" deep from the controller housing and install 1" underground electrical conduits to the solar panels, the fill valve, house power and SCADA, drain valve. Distance from Heli-Hydrant to Control box min 30 feet, Solar panels same near control box. Lines distance other TBD on site walk.
- Run water 3 inch PVC drain line and overflow to new approved drainage location (rip rap, drainage swell or municipal drain line.
- Run 6" water supply in approved ductal iron or approved piping line from main water supply to Heli-Hydrant CLA-VAL flange.
- Back fill around Heli-Hydrant and compact as needed.
- Resurface or rock around Heli-Hydrant to prevent debris wash from the helicopters to a min 50 foot radius.
- Back fill and compact all trenches.
- Concrete ground vault for the drain valve 16" x 24" with a concrete top.

Heli-Hydrant and Operating System - Provided and installed by Whaling Fire:

- **ONE** (1) 9,779 Gallons (Nominal), 1 – Ring, Open Top, Flat Welded Steel Floor, A.W.W.A. D103, **Factory Powder Coated,** throughout with **5 mil** average dry film thickness using Axalta "Tank Tan," a Thermal Set, NSF 61 Approved, Epoxy Powder Coating on Tank Interior and Underside of Floor & **5 mil** average dry film thickness using Axalta "Superior Sand," a Thermal Set **TGIC Polyester Powder Coating** on Tank Exterior, **15'- 4 5/8" Diameter x 8' (Nominal) High, Bolted Steel Storage Tank,** with the following appurtenances:
- (10 Gauge Shell, - side walls)
- 1 - 6" High x 12 gauge, Galvanized Grade Band (Pre-shipped & furnish)
- 1 – 6" 150# Flanged Elbow w/ Riser & Internal Elbow & Box (Inlet)
- 1 - Specific Air gap above the overflow of the tank

- 1 – 3” Diameter x 10” Deep Floor Sump (Drain)
- 1 – Heli-Hydrant Float Valve Well (12” x 12” x 24” H)
- 1 - Float controller and 3/8” stainless steel tubing to the Cla-valve
  1 – 12” Diameter Overflow Flange w/ 12” Wide x 20” High Cover. Engineered with Water district
- Overflow Side Skirt 4’-6” Wide x 5 1⁄4” High
  1 – Powder Coated Steel Cabinet
- 1 – Set of Approved Tank Drawings Lot –
- 1 - Set Nut Covers (External – Shell)
- 1 - Wind Sock, 20” tall, Solar powered, Lighted **(Exhibit 3)**
- Set of 10 led Bullet lights.
- 1 - CLA VAL **(Exhibit 4)** 1 - 3 inch drain val **(Exhibit 1)**
- VHF Receiver
- VHF Antenna
- Set of Deep cycle Batteries.
- Electrical cabinet 72”H x 36”W X 20”D with the full Patented operating system Power input for both 110 & 24 Volt and SCADA connection. Outputs for 24 volt valve control and lights Rack and set of Solar panels**. (Exhibit 5)**

Exhibits

(Exhibit 1) Valve Control

- Housing: Anticorrosive polyamide (lid & body) Main external shaft: Anticorrosive polyamide External.
- screws: stainless steel.
- Gears: Steel and polyamide.
- Visual position indicator: Polyamide.
- Dome: Polycarbonate.
- Adjustable internal cams: Polyamide.

(Exhibit 3) Lighted Wind sock

- Our hinged windsock pole approx. 20 feet tall and incorporates a hinged base for convenient windsock maintenance. Constructed of welded steel and primed in a 2 part epoxy primer for long life, then top coated with a two part urethane finish.
- Self-contained solar lighted windsock comes complete. No need to run power to the location. This unit charges during the day and stays on at night, to give you a visible speed and wind direction indication anytime. Powered by solar panels and lit by long life LED lights.

(Exhibit 4) CLA-VAL Model129-01 with Heli-Hydrant modifications

(Exhibit 5) Operating system.

- Electrical cabinet 72”H x 36”W X 20”D
- 2- 12 volt deep cycle batteries ran in series to create 24 volt output for back up of the house power.
- VHF receiver and system triggering
- Solar power and charging system for the battery backup.
- Beacon light on top the housing for operation indicator for the pilots.
- Lighting controls for the HH-tank led lights.

- All valve controllers for the Supply CLA-VAL and drain valve.

- Led indicator lights on the outside of the housing for House power and 24 volt power.
- Interior Led indicator lights for open or closed Drain valve, water fill valve, and lights.

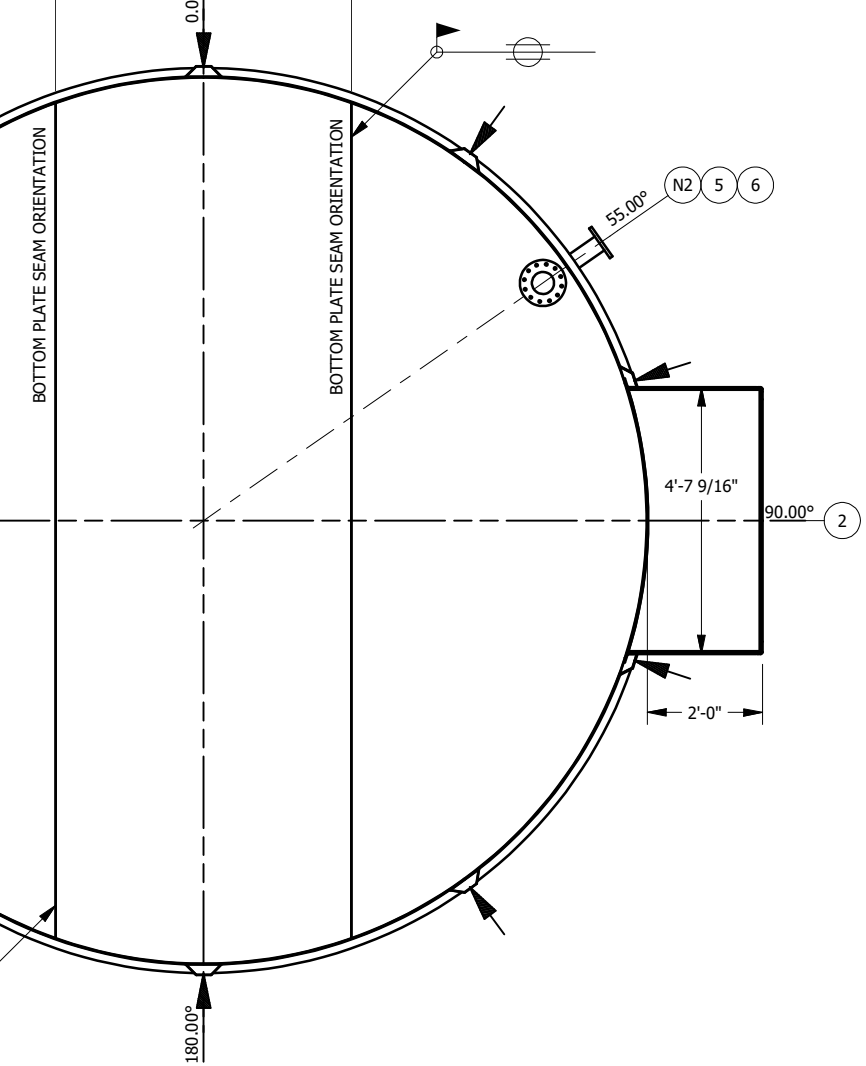
SCADA The PLC is an Eaton ELC series
Ethernet connection / Custom design to meet any agencies connections.
IO input output to control the both water valves and signaling, interior tank lights.
The Enclosure is 60X36X20 with 12" Feet on it making it 72"H x 36"W X 20"D
The PLC is by EATON
1) Eaton ELC2-PV28NNP (CPU with 16 Inputs and 12 Outputs)
1) Eaton ELC-COENETM (Ethernet Communication Module)

Additional items per your agencies needs

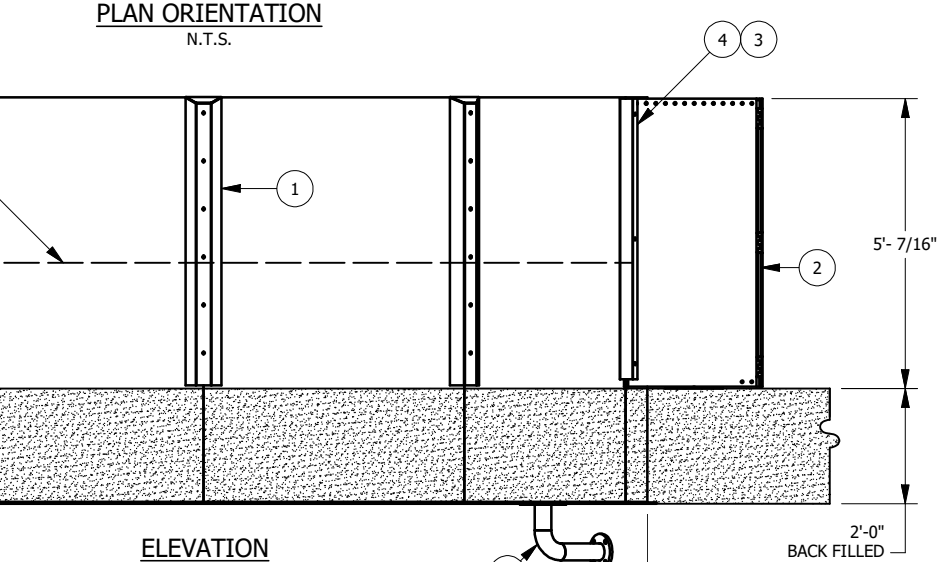
Flow meters
Motion monitors
and other additional items per your request.

Appendix H

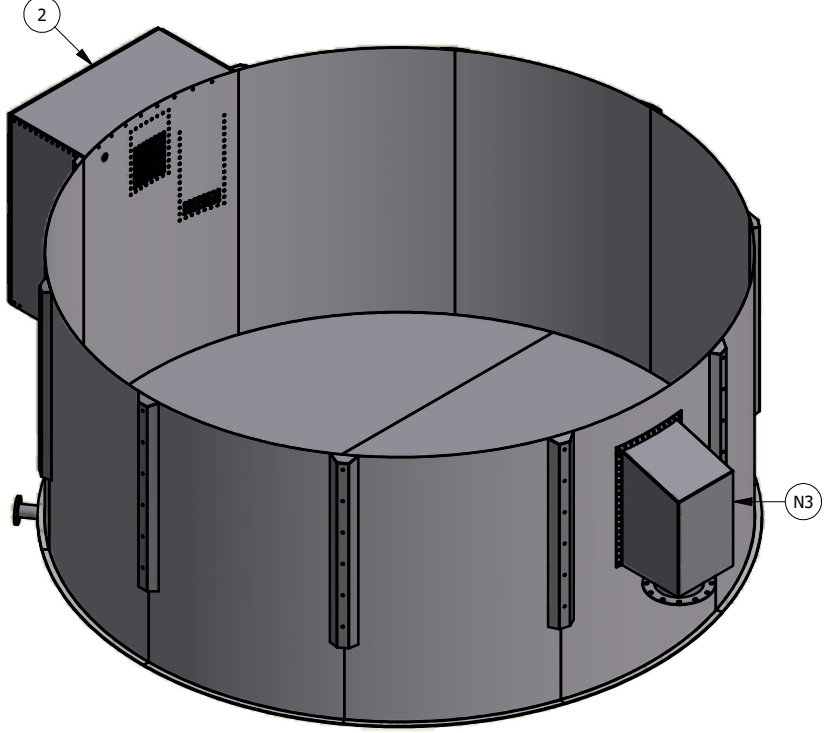
Heli-Hydrant Water Tank Installation Specification Sheet used for the Yorba Linda Water District Heli-Hydrant

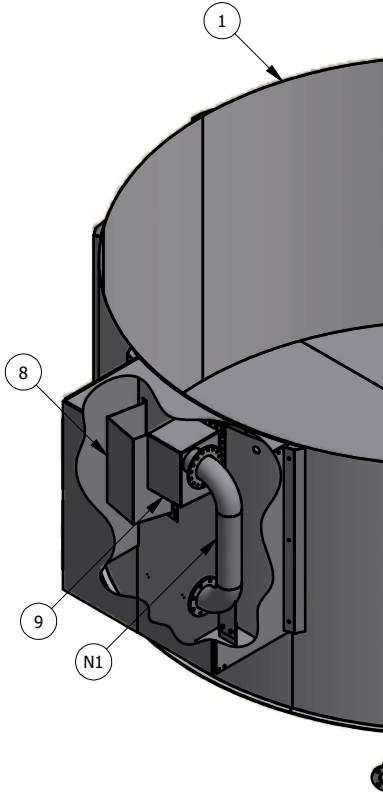


PLAN ORIENTATION
N.T.S.



ELEVATION





COATING SCHEDULE:

1. EXTERIOR COATING OF TANK & ACCESSORIES TO BE FUSION BONDED BAKED-ON POWDER POLYESTER 3 MILS. D.F.T. COLOR: "AXALTA OR EQUAL" SUPERIOR SAND #PFT-609-S6 ***w/PRIMER @ 2 MILS D.F.T. FOR A TOTAL OF 5 MILS D.F.T. (SAME COLOR AS INTERIOR)***

2. INTERIOR COATING OF TANK & ACCESSORIES TO BE FUSION BONDED BAKED-ON POWDER EPOXY 5 MILS. MIN. D.F.T. (N.S.F. 61 APPROVED) COLOR: "AXALTA OR EQUAL" TANK TAN #EFT-602-P7, UNLESS OTHERWISE NOTED.

GENERAL NOTES:

1. TANK TO BE FABRICATED IN ACCORDANCE W/ A.W.W.A. D103-19 & FACTORY-COATED IN ACCORDANCE W/ A.W.W.A D103-19 SECT. 12.6.

2. ALL BOLTS & NUTS UNLESS OTHERWISE NOTED SHALL BE GALV.
-BOLTS TO BE GRADE 5. **BOLTS & NUTS INSIDE TANK TO BE ENCAPSULATED W/ STRUCTURAL BOLTS & NUTS TO BE (GALV.)**

3. TANK BOTTOM TO BE VACUUM TESTED PRIOR TO WATER TEST.

4. ONE DEGREE OF ARC TAKEN ON SHELL O.D. = 1 5/8"

5. ALL HOLES TO BE Ø9/16" BEFORE GALVANIZING OR COATING, Ø17/32" FINISHED w/TOLERANCE ON BOLT HOLE SPACING TO BE ±1/32" BETWEEN ANY TWO HOLES MEASURED IN THE FLAT BEFORE FORMING.

6. ALL TANK OPENINGS TO BE SHOP LOCATED.

7. DUE TO POWDER COATING ALL PIPE WILL BE FLANGED @ APPROX. 10 FEET SECTIONS (SEE ELEVATIONS).

8. PIPING FLEXIBILITY MEETING THE REQUIREMENTS OF AWWA D103-19 SECTION 14.5 SHALL BE PROVIDED (BY OTHERS).

ITEM	PART NUMBER	D
N3	9054-645-002	O-FLOW PIPE, WLDMT., 8"Ø STD. W
N2	9047-846-002	INLET RISER WLDMT, 3"Ø STD. WT.
N1	9047-899-001	INLET RISER ASSY, 6"Ø STD.WT. PI
9	9047-898-002	INLET BOX WLDMT., 3/16" REPAD &
8	9015-022-002	FLOAT BOX WLDMT., 3/16" THK., 12
6	9986-192-199	4" FLG, NYLON MESH, 9 5/8" O.D. w
5	9999-047-299	FLANGE, 4 5/8" I.D., 9 5/8" O.D., 3/
4	9045-986-002	SIDE BOLT COVER WLDMT, LH., 2 1
3	9045-987-002	SIDE BOLT COVER WLDMT, LH., 2 1
2	9004-155-002	ENCLOSURE ASSY, 24" x 55 9/16" x
1	1507-001-002	15'-4 5/8" DIA x 7'-0 1/4" HIGH BOL (ENCAP)(NO TOP CHIME)(FPC)

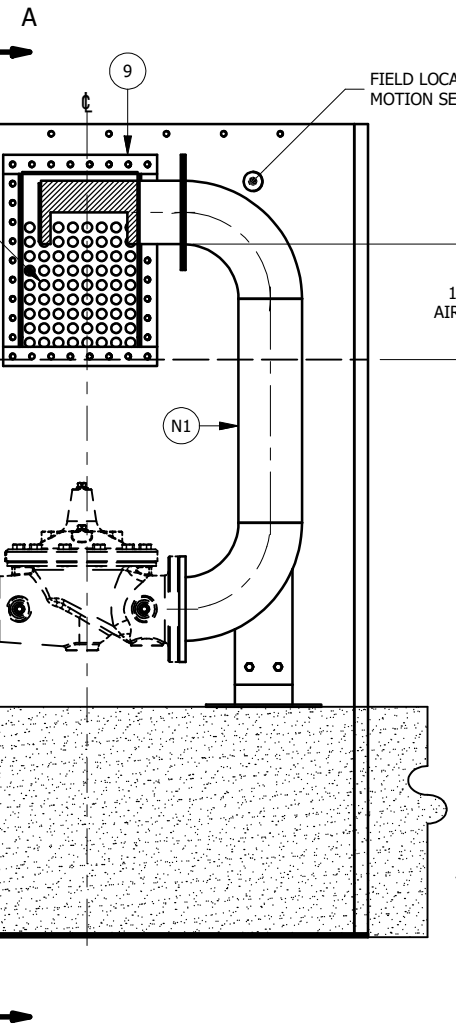
BILL OF

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE INCHES. TOLERANCES ARE:
FRACTIONS: DECIMALS: ANGLES:
MATERIAL:

CUSTOMER:

APPROVALS	DATE
DRAWN BY: Ronnie E.	1/26/2021

TITLE



RISER DETAIL
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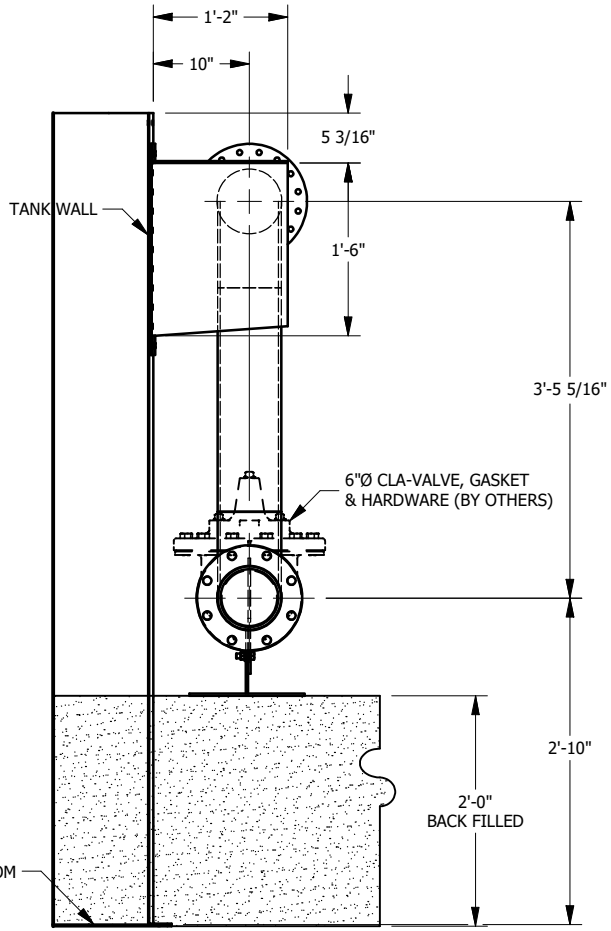
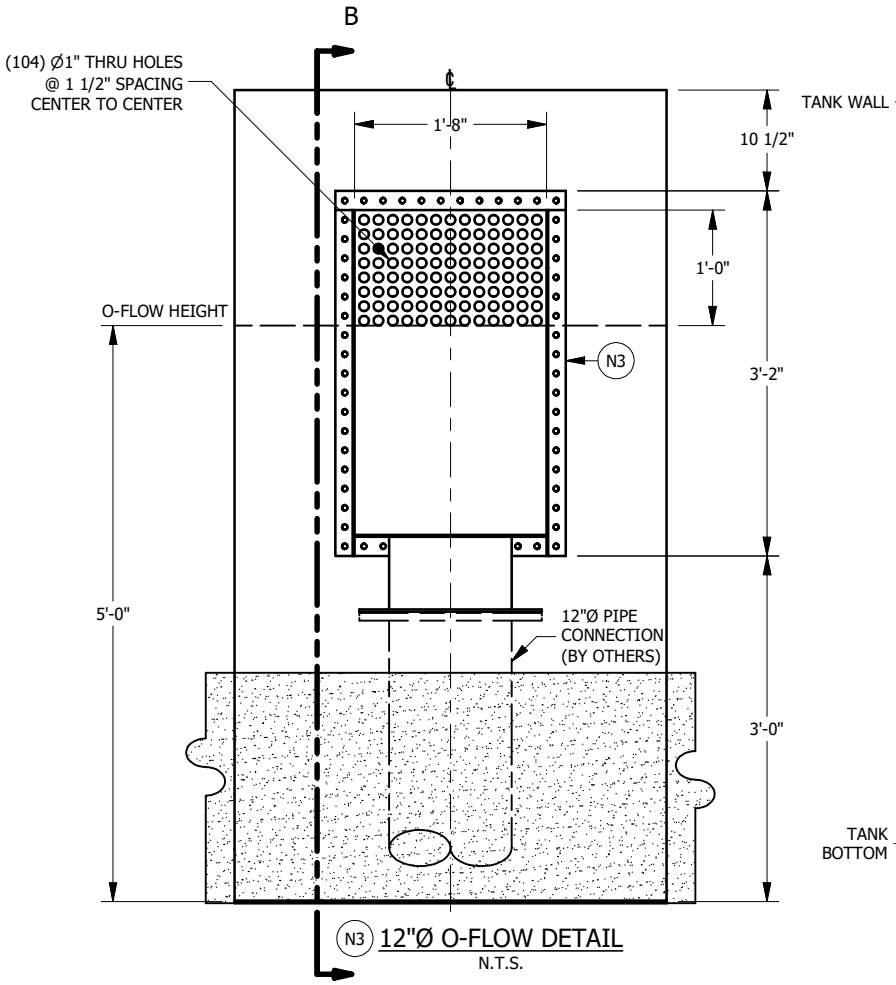
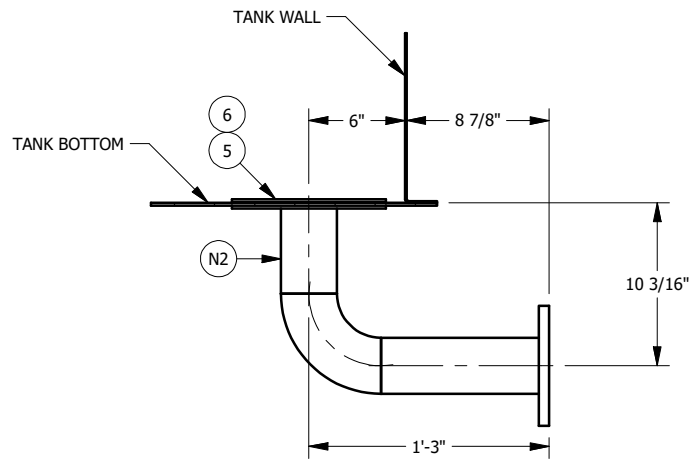


SECTON A-A
N.T.S.



N3 12"Ø O-FLOW DETAIL
N.T.S.



N2 3"Ø SUMP DETAIL
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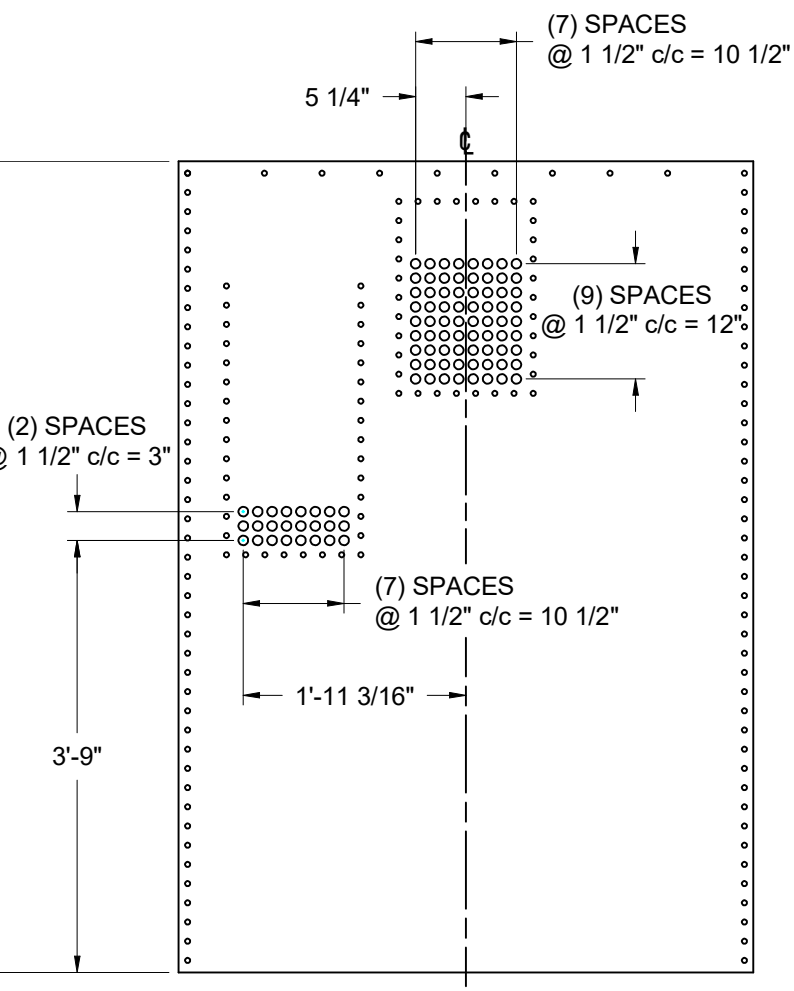
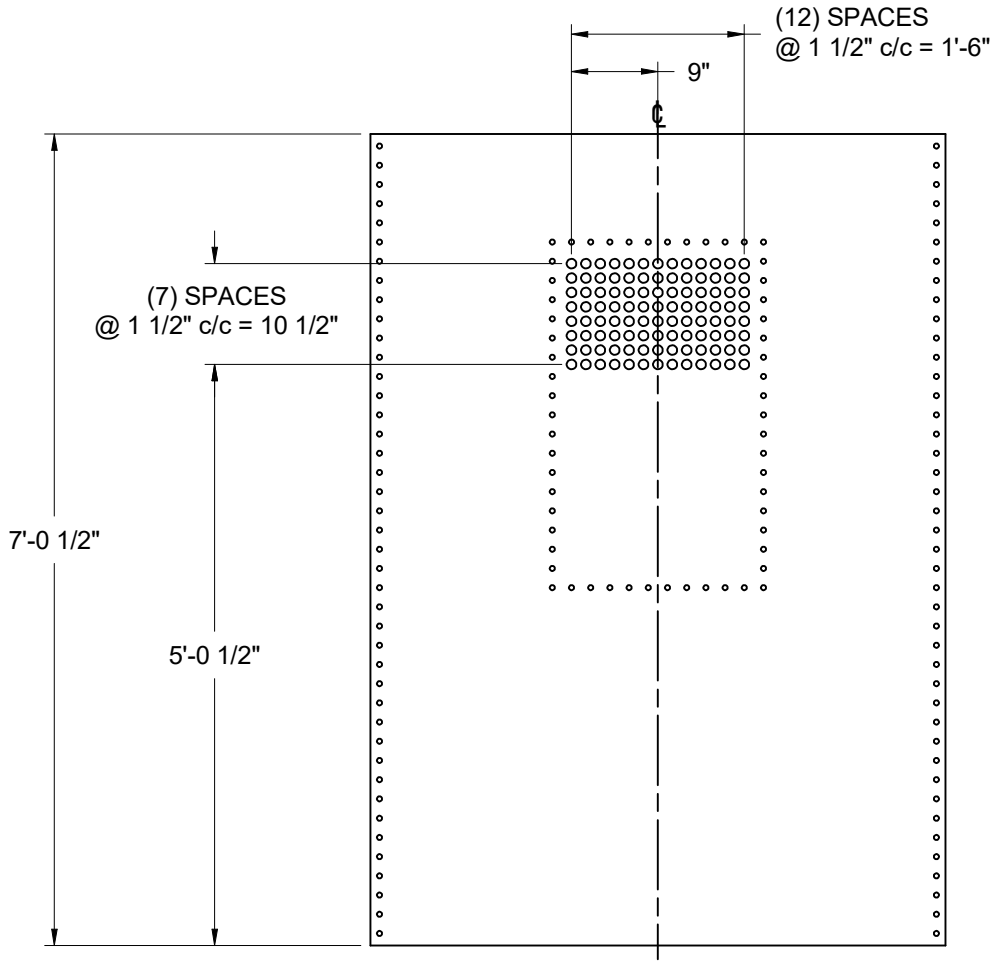


6"Ø INLET, FLOAT
& MOTION SENSOR CUTOUT

12 Ga.
1 REQ'D
N.T.S.



O-FLOW CUTOUT

12 Ga.
1 REQ'D
N.T.S.