Fire Protection Plan

Ocean Kamp Residential Project

DECEMBER 2025

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Table of Contents

SECTION **PAGE NO.**

Acronyms and Abbreviations v

Executive Summary vii

1 Introduction 1
- 1.1 Intent 2
- 1.2 Applicable Codes/Existing Regulations 2
- 1.3 Project Summary 3
  - 1.3.1 Location 3
  - 1.3.2 Existing Land Use 3
  - 1.3.3 Project Description 4

2 Project Site Risk Analysis 11
- 2.1 Field Assessment 11
- 2.2 Project Site Characteristics and Fire Environment 11
  - 2.2.1 Topography 12
  - 2.2.2 Climate 12
  - 2.2.3 Vegetation 13
  - 2.2.4 Fire History 14
  - 2.2.5 Fire Hazard Severity Zone Rating 14
- 2.3 Analysis of Wildfire Risk from Adding New Development 15
- 2.4 Off-site Wildfire Impacts 18
  - 2.4.1 Vegetation Management 19
  - 2.4.2 Firefighter Response 20
  - 2.4.3 Ignition Resistant/Noncombustible Construction 20
  - 2.4.4 Wildfire Risk Awareness Education 22
  - 2.4.5 Summary 22

3 Anticipated Fire Behavior 23
- 3.1 Fire Behavior Modeling 23
- 3.2 Fire Behavior Modeling Analysis 23
- 3.3 Fire Behavior Modeling Results Summary 26
- 3.4 Project Area Fire Risk Assessment 29

4 Emergency Response and Service 33
- 4.1 Emergency Response 33
- 4.2 Emergency Response Travel Time Coverage 37
- 4.3 Estimated Calls and Demand for Service from the Project 39

5 Fire Safety Requirements-Infrastructure, Building Ignition Resistance, and Defensible Space 41
5.1 Roads 41
5.1.1 Primary/Fire Access 41
5.1.2 Road Width and Circulation 42
5.1.3 Maximum Dead-End Road (cul-de-sac) Length 42
5.1.4 Gates 42
5.1.5 Driveways 43
5.1.6 Premises Identification 43
5.1.7 Ongoing Infrastructure Maintenance 44
5.1.8 Pre-Construction Requirements 44
5.2 Ignition Resistant Construction 44
5.3 Fire Protection Systems 45
5.3.1 Water Supply 45
5.3.2 Hydrants 45
5.3.3 Fire Sprinklers 45
5.4 Fuel Modification 46
5.4.1 Fuel Modification Zone Requirements 46
5.4.2 Vegetation Management and Fire Hazard Abatement 48
5.4.3 Undesirable Plants and Trees 48
5.4.4 Construction Phase Vegetation Management 48
5.4.5 Annual Fuel Modification Zone Compliance Inspection 48
5.5 Project Fuel Modification Zone Measurements 51
6 Wildfire Education Program 53
6.1 Recognition for Fire Safety and Maintaining Fire Insurance 53
7 Alternative Means and Methods for Fire Access Compliance 55
7.1 AM&M for Road Widths 55
7.2 AM&M for Fire Access Road Setbacks 55
7.3 AM&M for Remoteness of Secondary Access for North Parcel 56
8 Conclusion 57
9 List of Preparers 61
10 References (including references from Appendices) 63

TABLES

1 Fuel Models Used for Fire Behavior Modeling 23
2 BehavePlus Fine Dead Fuel Moisture Calculation. 24
3 Wind and Weather Input Variables 25
4 RAWS BehavePlus Fire Behavior Model Results – Existing Conditions 28
5 RAWS BehavePlus Fire Behavior Model Results – Post Proposed Project Conditions 29

6 Oceanside Fire Department Closest Responding Stations Summary 37
7 Project Emergency Response Analysis using Speed Limit Formula 38
8 Project Emergency Response Analysis using ISO Formula 38
9 Call Volume Associate with the Project 39

EXHIBITS

1 Example of lower density development 16
2 Example of moderate density development. 17
3 Example higher density development. 17

FIGURES

1 Project Location 5
2 CAL FIRE Fire Hazard Severity Zone Map 7
3 Project Site Plan 9
4 BehavePlus Analysis Map 31
5 Closest Responding Fire Stations Map 35
6 Fuel Modification Plan 49

APPENDICES

A Ocean Kamp Residential Representative Photo Log
B Fire History Map
C BehavePlus Fire Behavior Analysis
D Ignition-Resistant Construction Requirements
E Undesirable Plant List
F Fire Safe San Diego County Recommended Plant List

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Acronyms and Abbreviations

Acronym and Abbreviation	Definition
AMR	American Medical Response
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
CDI	California Department of Insurance
CFC	California Fire Code
CRC	California Residential Code
FAHJ	Fire Authority Having Jurisdiction
FHSZ	Fire Hazard Severity Zone
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program
FS	Fire Station
IBC	International Building Code
ICEMA	Inland Counties Emergency Medical Agency
IFC	International Fire Code
IRC	International Residential Code
LRA	Local Responsibility Area
MPH	miles per hour
NFPA	National Fire Protection Association
OFD	Oceanside Fire Department
PRC	Public Resources Code
Project	Ocean Kamp Residential Project
SRA	State Responsibility Area
WUI	Wildland Urban Interface

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Executive Summary

This Fire Protection Plan (FPP) has been prepared for the Ocean Kamp Residential Project (Project) that proposes a single- and multi-family residential development in the northern portion of the City of Oceanside, within the County of San Diego, California. The Project proposes to construct 571 residential units, consisting of a mix of townhomes, duplexes, apartments, and single-family dwelling units, an approximately 30,000 square foot recreation area with an approximately 720 square foot restroom building, detention basins, , and parking stalls on a total of 25.6 acres across two separate parcels. This FPP provides measures for fire protection that meet the applicable portions of Oceanside Fire Department (OFD) standards and further evaluates and identifies the potential fire risk associated with the Project's land uses. The FPP also 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 OFD along with project-specific measures based on the site, its intended use, and its fire environment.

This document provides analysis of the site's fire environment and its potential impact on the Project as well as the Project's potential impact on the existing fire protection service. Tasks completed in preparation of this FPP include data review, code review, site fire risk analysis, land use plan review, fire behavior modeling, and site-specific recommendations. Requirements and recommendations herein are based on site-specific fire environment analysis and Project characteristics and incorporate area fire planning documents, site risk analysis, and standard principles of fire protection planning.

As determined during the analysis of this site and its fire environment, the Project, in its current condition, may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire spread. Under extreme conditions, wind-driven wildfires from the north and/or west could cast embers onto the property. Once the Project site is developed, the on-site fire potential will be much lower than its current condition due to conversion of wildland fuels to building footprints, parking areas, managed landscapes, fuel modification areas, improved accessibility for fire personnel, and structures built to the latest ignition and ember resistant fire codes.

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

The proposed Project of 571 residential units, recreation area, detention basins and parking stalls encompasses a total of 25.6 acres is currently zoned as Community Commercial Land Use[1].

[1] TM, T19-00004, CUP, 19-00021, Dev Plan, DP19-00016

The entire site has been designed with fire protection as a key objective. The site improvements are designed to facilitate emergency apparatus and personnel access throughout the site. Driveway and road improvements with fire engine turnouts and turnarounds provide access to within 150 feet of the structures. Water availability and flow duration will be consistent with requirements including fire flow and hydrant distribution required by local and state codes. These features along with the ignition resistance of all structures within a designated FHSZ, NFPA 13D or 13R automatic interior fire sprinkler systems, and the pre-planning, training, and awareness will assist OFD with prevention, protection, and suppression capabilities.

As detailed in this FPP, the Project's fire protection systems will include a redundant layering of protection methods that have been proven to reduce overall fire risk. The fire safety measures included herein, both required and recommended, are performance based and 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 building safety, as well as the safety of those occupying the structure, reduce the fire risk on site, 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 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.

Based on the results of this FPP's analysis and findings, the following FPP implementation measures will be provided as part of the proposed development plan. Based on the analysis conducted herein, the Project meets all fire and building code requirements, or provides equivalencies, and includes appropriate protections for the fire environment in which it is located. These measures are discussed in more detail throughout this FPP.

Implementation Measures:

1. The proposed project buildings will be constructed of ignition resistant[2] construction materials and each residential unit will include the installation of a National Fire Protection Association (NFPA) 13D or 13R automatic interior fire sprinkler system based on the latest adopted Building and Fire Codes for occupancy types.
2. Fuel Modification will be provided around the perimeter of Project site, as required by OFD, will be a minimum of 100 feet wide in all directions through on-site Fuel Modification Zones (FMZ) and Defensible Space or a combination of on-site and off-site FMZ equivalent areas.
3. Paved roads are provided throughout the project site.
4. Landscape plantings will not utilize plants designated as undesirable (Attachment E) that have been found to be highly flammable; landscape plant material must be drought tolerant and fire-resistant plantings recommended by Fire Safe San Diego County (Attachment F)
5. Fire apparatus access roads (i.e., public, and private streets) will be provided throughout the residential development and will vary in width and configuration. Primary access and internal circulation will comply with the requirements of the OFD.
6. Water capacity and delivery will be provided by the City of Oceanside Water Utilities Department for operations and during emergencies requiring extended fire flow.

[2] 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.

7. The Homeowners Association or Property Manager (HOA) will hire a 3rd party, OFD approved, FMZ inspector and landscape plan reviewer to provide annual certification (written report submitted to OFD by May 1) that the HOA maintained properties including all FMZs meet the requirements of this FPP.
8. Should future iterations of the Project's site plan result in buildings that do not achieve a minimum of 100 feet of defensible space through approved on-site and off-site means, then alternative materials and methods may be proposed to provide the functional equivalency of a full 100 feet of defensible space. Alternative materials and methods will be to the satisfaction of the OFD and may include structural hardening enhancements or landscape features, like non-combustible walls.

The following measures shall be established in the Covenants, Conditions and Restrictions (CC&Rs) for the Project and implemented by the Project's HOA.

1. On-going maintenance of all fuel modification zones would occur at least annually or as needed by each individual property owner, the Project's HOA, or another approved entity. Annual maintenance should occur before May 1st of each year and inspected by OFD or an approved third party.
2. The property owner and/or property management company will provide informational brochures at time of occupancy, which will include an outreach and educational role to ensure fire safety measures detailed in this FPP have been implemented and development-wide "Ready, Set, Go!" [3] plans prepared.

Early evacuation for any type of wildfire emergency within the development is the preferred method of providing for occupant and business safety, consistent with the OFD's current approach for evacuation. As such, the Project 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. The concept, includes Pre-planning for emergencies, including wildfire emergencies; 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 during periods of fire weather extremes.

This FPP provides a detailed analysis of the Project, the potential risk from wildfire, and potential impacts on the OFD as well as analysis on meeting or exceeding the requirements of San Diego County. Further, this FPP provides requirements, recommendations, and measures to reduce the risk and potential impacts to acceptable levels, as determined by the OFD. While there is no present requirement to periodically update an FPP, it is recommended that this FPP be updated periodically in order to evaluate for future advancements in fire code and wildfire science as they may benefit the Project.

[3] https://readyforwildfire.org/prepare-for-wildfire/

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1 Introduction

This Fire Protection Plan (FPP) has been prepared for the proposed Ocean Kamp Residential Project (Project) in the City (City) of Oceanside, County of San Diego (County), California. The purpose of this FPP is to evaluate the potential impacts resulting from wildland fire hazards associated with the Project's land uses and identify and verify the proposed implementation measures necessary to adequately mitigate those risks to a level consistent with the City thresholds. Additionally, this plan establishes and memorializes the fire safety requirements and standards of the Fire Authority Having Jurisdiction (FAHJ), which is the Oceanside Fire Department (OFD). Requirements, standards, and recommendations are based on Project-specific design features and incorporate input from the Project applicant, planners, engineers, and architects, as well as the OFD.

As part of the assessment, the FPP has considered the fire risks presented by the Project site including the property location, the site's topography, geology, surrounding combustible vegetation (fuel types), climatic conditions, fire history, and proposed land uses for the Project site and the surrounding area. The plan addresses water supply, access, structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management for the Project site along with addressing potential fire impacts to the surrounding area. This FPP also identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect structures and essential infrastructures within the Project site. The FPP also recommends measures that developers and builders, property owners, and the Property Manager will take to reduce the probability of structural and vegetation ignition.

The Project is located within the boundaries of the OFD and thus the FPP addresses the OFD's response capabilities and response time to the Project area.

The following tasks were performed toward completion of this plan:

- Gather Project site specific climate, terrain, and fuel data
- Collect Project site photographs
- Process and analyze the data using the latest geographic information system (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
- 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

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

1.1 Intent

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

1.2 Applicable Codes/Existing Regulations

When following the requirements and recommendations of this FPP, the proposed Project would comply with all applicable portions of the Oceanside Code of Ordinances, Chapter 11 – Fire Protection, where the OFD adopts by reference as the district's Fire Code, the 2022 California Fire Code as published by the California Building Standards Commission, with errata, including Appendix Chapter 4; Appendices A (with modifications), B, BB, C, CC, D, E, F, G, H, I, K, N, and O; as published by the International Code Council, with the changes, modifications, amendments, additions, deletions, and exceptions prescribed in Section 11.18 of the OFC, and the same are hereby adopted for safeguarding of life, property, and the community from injury; fire; explosion; hazardous materials, substances, devices, conditions, processes, activities, operations, practices, and functions; environmental damage; and economic harm, and providing for the issuance of permits and the collection of fees. The Oceanside Code of Ordinances Chapter 11 is hereafter referred to as the OFD Fire Code or "Fire Code." The proposed Project also complies with the California Code of Regulations Titles 14 and 24 and the 2022 CRC (or then current edition). The proposed Project would also be subject to the provisions of Section 51182 of the California Government Code regarding brush clearance standards around structures, the defensible space, and vegetation management, along with fuel reduction requirements of the City Nuisance Vegetation and Waste Clearance Standards. Property owners within the Project site would be expected to follow the above Standards, for weed and fire hazard abatement.

Section R337 of the CRC addresses reducing ember penetration into homes, a leading cause of structure loss from wildfires (California Building Standards Commission 2019). Thus, code compliance is a critical component of the requirements of this FPP, given that portions of the proposed Project's wildland-urban interface (WUI) location are within a Local Responsibility Area (LRA) statutorily designated as within a Moderate and High Fire Hazard Severity Zones (M/HFHSZ) by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2024). Fire hazard designations are based on topography, vegetation, and weather, among other factors, with more hazardous sites including steep terrain, unmaintained fuels/vegetation, and WUI locations. High and Very High FHSZs are not designated to prohibit development but do require that a higher level of fire protection be provided. Projects situated in FHSZs require fire hazard analysis and application of fire protection measures to create defensible communities within these WUI locations.

As described in this FPP, the proposed Project would meet applicable code requirements for building in these higher fire hazard areas. These codes have been developed through decades of wildfire structure save and loss evaluations to determine the causes of 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 CRC (Section R337, Scope, Purpose, and Application).

When following the recommendations and requirements outlined in this FPP, the proposed Project will be consistent with the OFC. Further, it will be consistent with the California Code of Regulations Titles 14 and 24 and the 2022 California Fire Code (CFC) and 2022 CRC (Section R337), or then current editions. Section R337 of the CRC focuses primarily on preventing ember penetration into homes, a leading cause of structure loss from wildfires; thus, it is a critical component of the requirements of this FPP.

The proposed Project will be consistent with the following codes and regulations:

- **2022 California Residential Code, Section R337, Materials and Construction Methods for Exterior Wildfire Exposure:** Minimum standards for a new building located in a Very High FHSZ or WUI area to resist the intrusion of flame or burning embers projected by a vegetation fire. While currently only required for Very High FHSZs, it is anticipated that applicability will be extended to High FHSZs. The entirety of the Project will comply with this standard.
- **2022 California Fire Code, Chapter 49, Requirements for Wildland-Urban Interface Fire Areas**: Minimum standards to increase the ability of a building to resist the intrusion of flame or burning embers being projected by a vegetation fire.
- **California Government Code, Title 5, Division 1, Part 1, Chapter 6.8, Section 51175-51189:** Classification of lands as within a FHSZ.
- **City of Oceanside Ordinance No. 25-OR0379-1:** an ordinance of the City Council of the City of Oceanside amending Chapter 11 of the Oceanside City Code by the addition of Article II, Section 11.15.1 to formally adopt the state fire marshal fire severity maps pursuant to government code Section 51178 and 51179.

1.3 Project Summary

1.3.1 Location

The Project is located in the City of Oceanside, California. The City of Oceanside is located in northern San Diego County. The Project is bound by the San Luis Rey River to the northwest, single family residential to the east, Highway 76 and Mission Avenue to the south, and Foussat Road and disturbed habitat open space to the west. (Figure 1, Project Location). The approximate 25.6 acre Project footprint is situated on two parcels, north parcel APN 1602805800/1602804800, and east parcel APN 1602905800.

The main entrance to the northern parcel of the Project site will be from a proposed roadway south of the Project site. The main entrance to the eastern parcel of the Project site will be from Mission Avenue. There will be a roadway connecting the two parcels. All Project roadways and access routes may also serve as emergency entrances and exits. Surrounding land uses include suburban neighborhoods, open space, commercial uses, an airport, and recreational uses. The eastern parcel is not within a Fire Hazard Severity Zone (FHSZ), and part of the northern parcel lies within a Moderate and High FHSZ, as statutorily designated by CAL FIRE (Figure 2, CAL FIRE Fire Hazard Severity Zones Map). Plant communities in the Project site consist of developed and disturbed habitats, scrub brush, marsh vegetation and meadow.

1.3.2 Existing Land Use

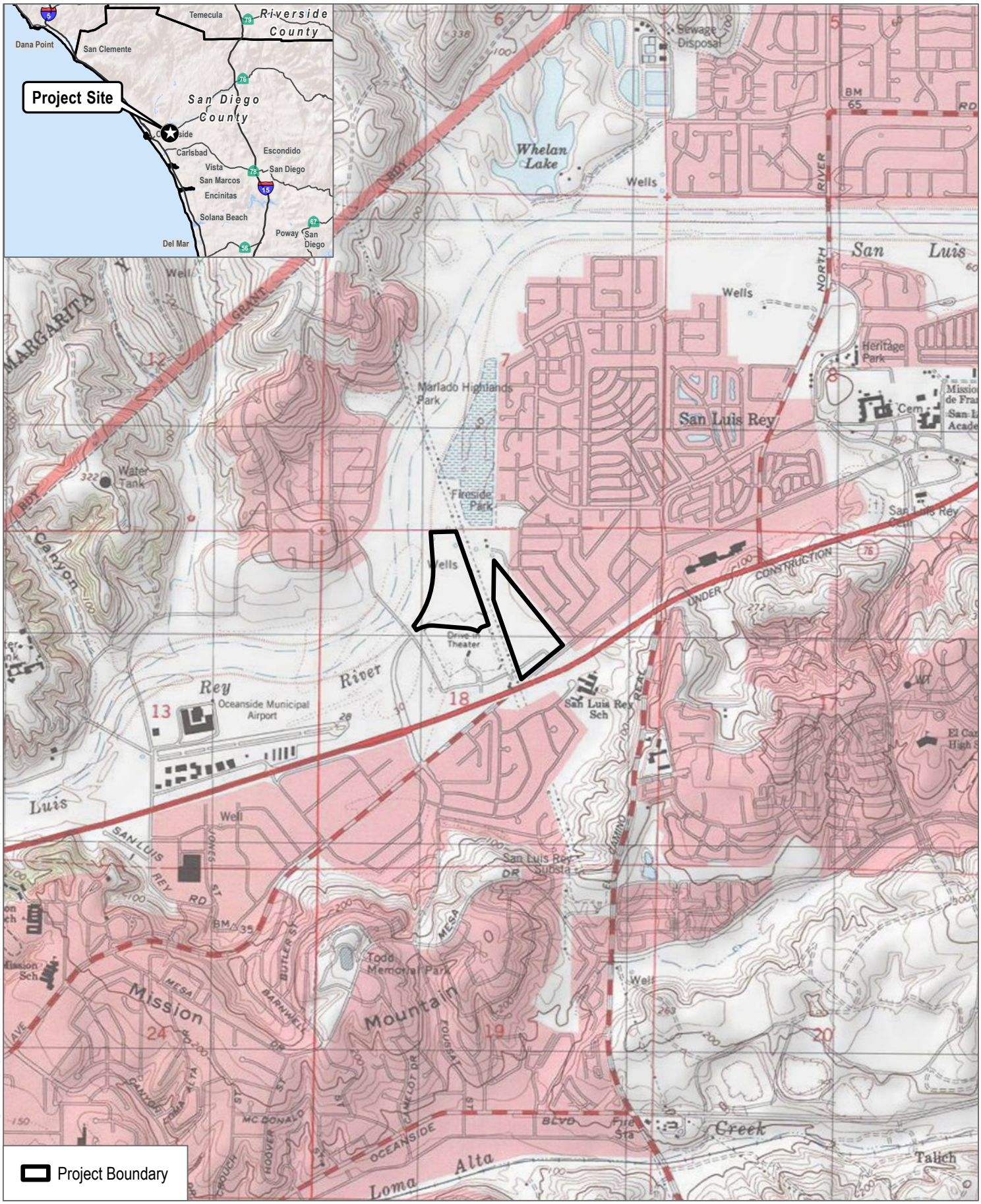
The Project site is positioned in approximately 25.6 acres within the City of Oceanside, south of the San Luis Rey River, north of Mission Avenue, and east of Foussat Road. The Project site and surrounding topography is relatively

flat, with gentle slopes of 1-5% grade. Surrounding land uses include the San Luis Rey River and single family residential to the north, single family residential and municipal uses to the east, open space, residential and commercial to the south, and open space and an airport to the west. A utility corridor with overhead power lines is adjacent to the eastern parcel property boundary.

The site is currently vacant and primarily consists of disturbed habitat, and some shrubland vegetation. The Project site is slightly variable with an approximate 2% grade across the Project site.

1.3.3 Project Description

As identified on the Project's Proposed Site Plan Map (Figure 3, Project Site Plan), the Project proposes the construction of 317 townhomes, 108 duplexes, 86 single family units, and 60 apartments for a total of 571 residential units. There will also be an approximately 30,000 square foot recreational area with an approximate 720 square foot restroom building, approximately 0.2 acre dog park, and detention basins. The Project will total approximately 25.6 acres across two parcels and five neighborhoods. The two neighborhoods in the northern parcel will be The Current (3-story townhomes), and The Tides (2-story townhomes). The three neighborhoods in the southern parcel will be The Break (3-story townhomes), The Shores (3-story duplex), and The Crest (3- story single family detached units).



SOURCE: USGS Topographic Basemap

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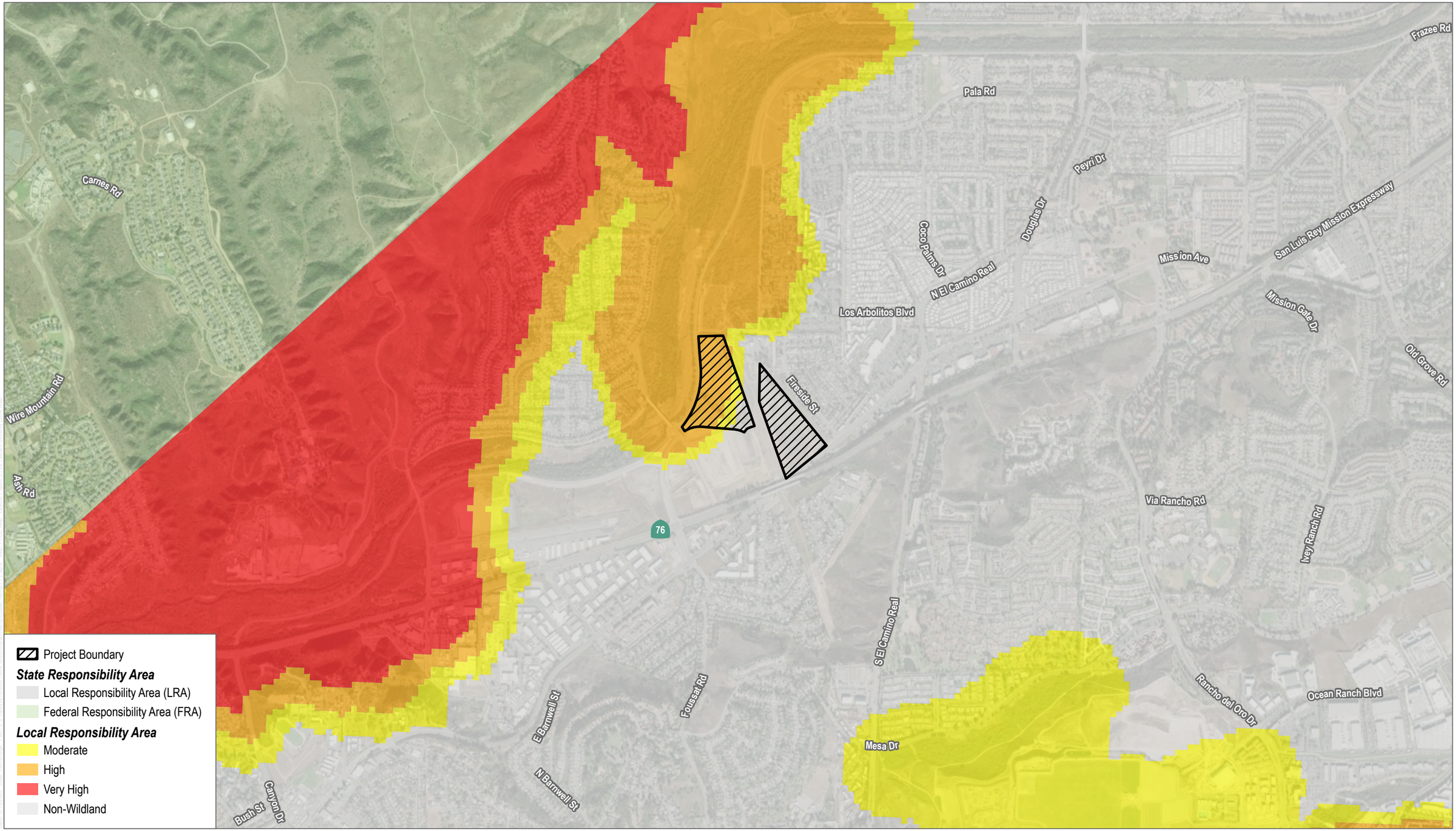
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FIGURE 1

Project Location

Ocean Kamp Project

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SOURCE: Esri Clarity Basemap, OpenStreetMap, CalFIRE 2025

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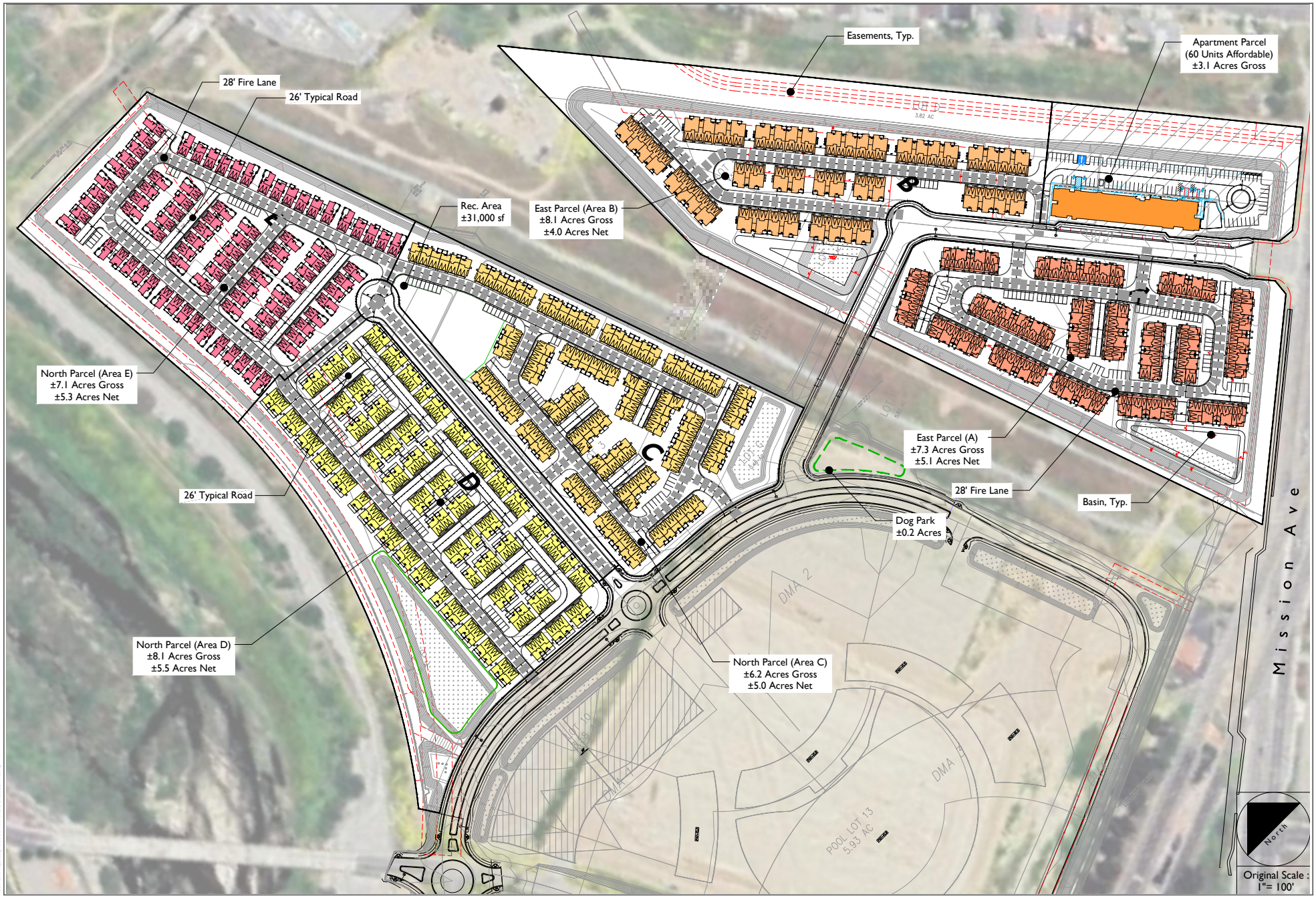
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FIGURE 2

CAL FIRE Fire Hazard Severity Zone Map

Ocean Kamp Project

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SOURCE: Bassenian & Lagoni 2025

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FIGURE 3

Project Site Plan

Ocean Kamp Project

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2 Project Site Risk Analysis

2.1 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 Ocean Kamp Residential Project on July 14, 2025, in order to confirm and acquire Project site information, document existing conditions, and to determine potential actions for addressing the protection of the Project's structures. While on the Project site, Dudek's Fire Protection Planner assessed the area's topography, natural vegetation, and fuel loading, surrounding land use and general susceptibility to wildfire. Among the field tasks that were completed included:

- Vegetation estimates and mapping refinements.
- Fuel load analysis.
- Topographic features documentation.
- Photograph documentation.
- Confirmation and verification of hazard assumptions.
- Off-site, adjacent property fuel and topography conditions.
- Surrounding land use confirmations.
- Necessary fire behavior modeling data collection.
- Ingress and egress documentation.
- Nearby Fire Station reconnaissance.

Study area photographs were collected (refer to Appendix A, *Representative Photo Log*), and fuel conditions were mapped using aerial images. Field observations were utilized to augment existing Project site data in generating the fire behavior models and formulating the 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 fire environment are topography, climate, and vegetation (fuels). The state of each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Structure ignition depends on a variety of factors and can be prevented through a layered system of protective features including fire resistive landscapes directly adjacent to the structure(s), application of known ignition resistive materials and methods, and suitable infrastructure for firefighting purposes. Understanding the existing wildland vegetation and urban fuel conditions on and adjacent to the Project site is necessary to understand the potential for fire within and around the Project site.

The following sections discuss the Project site characteristics, local climate, and fire history within and surrounding the Project site. The Ocean Kamp Residential Project is similar concerning topography, vegetative cover, and proximity to adjacent residential areas, available access, and planned use. The following sections discuss the characteristics of the Project site at a regional scale. The intent of evaluating conditions at this macro-scale is providing a better understanding of the regional fire environment, which is not constrained by property boundary delineations.

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope. Terrain that forms a funneling effect on the landscape can result in especially intense fire behavior. Conversely, flat terrain tends to have insignificant effect on fire spread, resulting in fires that are driven by vegetation and wind. The Project site is positioned in approximately 25.6 acres in the City of Oceanside, south of the San Luis Rey River. Topography in the vicinity of the proposed Project consists primarily of gently sloped terrain. Elevation within the Project site ranges from 30 feet above mean sea level (amsl) to 42 feet amsl.

2.2.2 Climate

The Project site, like much of Southern California, is influenced by prevailing wind patterns. Prevailing winds are winds that blow from a single direction over a specific area of the Earth. The prevailing winds for the Project site are typically from the west averaging about 6.3 mph, but the presence of the Pacific Ocean can cause a diurnal wind pattern known as the land/sea breeze system. In the fall (September through December), wind direction transitions from southwest to northeast, averaging 6.2 mph (Weather Spark 2024). Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds. The terrain close by the Project site includes topography that is subject to periodic extreme fire weather conditions that occur throughout Southern California and San Diego County. The average wind speed in Oceanside experiences mild seasonal variation over the course of the year. The windier part of the year lasts for approximately 7 months, from November to June, with average wind speeds of more than 6.2 mph. The windiest month of the year in Oceanside is February, with an average hourly wind speed of 7.1 mph. The calmer time of year lasts for 5 months, from June to November. (Weather Spark 2024).

Cool winters and dry summers with mild seasonal changes characterize the Southern California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, northeasterly Santa Ana winds. In Oceanside, the summers are hot, arid, and clear and the winters are long, cool, and partly cloudy. Over the course of the year, the temperature typically varies from 45°F to 83°F and is rarely below 40°F or above 90°F. The hot season lasts for approximately 3 months, from July through September, with an average daily temperature of 74°F, with highs reaching 83°F. The hottest month of the year in Oceanside is August, with an average high of 76°F and average low of 64°F. The cool season lasts for 3 months, from December through February, with an average daily high temperature of 67°F. The coldest month of the year in Oceanside is December, with an average low of 45°F and high of 66°F (Weather Spark 2024). The chance of precipitation in Oceanside varies throughout the year, but ranges from 11% in November and April to 21% in February. The wetter season lasts approximately 5 months, from November to April, with a greater than 10% chance precipitation each day. The month with the highest average rainfall is February, with approximately 2.7 inches of rain. The drier season lasts approximately 6 months, from May to October. The month with the fewest wet days Oceanside is July, with an average of 0.0 inches of precipitation (Weather Spark 2024).

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 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.

Typically, the highest fire danger in Southern California coincides with Santa Ana winds. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis near the end of fire season during late summer and early fall. Santa Ana winds are dry, warm, gusty foehn winds that flow from the high desert in the Great Basin (Nevada, western Utah, and eastern California) through the mountain passes and canyons toward the Pacific Ocean. As they converge through the canyons and narrow passes, their velocities increase, gradually dissipating as they spread across wide valley floors. Localized wind patterns are strongly affected by both regional and local topography.

2.2.3 Vegetation

2.2.3.1 Fuels

Vegetation type identification 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 5.1, Fire Behavior Modeling. Vegetation communities that currently occupy the project site include developed and disturbed habitats, southern California coastal scrub, California ruderal grassland and meadow, western north American ruderal wet meadow and marsh, temperate pacific freshwater emergent marsh, warm western temperate urban shrubland, warm western temperate urban herbaceous, warm western temperate developed shrubland, and warm western temperate developed herbaceous (Landfire 2024).

There will be planned open space areas within the residential communities. Within the surrounding area, there are undeveloped areas of open space and native vegetation north and west of the Project site. These areas are within a reasonable proximity whereby wildfire burning through the open space areas could impact the proposed Project—primarily from falling embers.

Following build-out, the fuel modification zones (FMZs) for the Project site will comply with the regulations in OFD Nuisance Vegetation and Waste Clearance Standards, updated in 2023, and CFC Chapter 49.

2.2.3.2 Vegetation Dynamics

The vegetation characteristics described above are used to model fire behavior, discussed in Chapter 5 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, non-native grass-dominated plant communities become seasonally prone to ignition and produce lower intensity, higher spread rate fires. In comparison, sage scrub can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels.

This concept is a key component in the overall establishment and maintenance of the proposed FMZs on the Project site. The FMZs on the Project site will consist of paved areas and irrigated and maintained landscapes, which results in reduced fire ignition, spread rates, and intensity.

2.2.4 Fire History

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

Fire history represented in this FPP uses the Fire and Resource Assessment Program (FRAP) database. FRAP summarizes fire perimeter data dating to the late 1800s; however, the dataset is incomplete because 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 CAL FIRE in the FRAP database,[4] six fires have burned within 5 miles of the Project site since the beginning of the historical fire data record (CAL FIRE 2024). Recorded wildfires within 5 miles range from 87 acres to 15,186 acres (2014 Pulgas Fire), and the average fire size is 2,786 acres. The Pulgas Fire (15,186 acres) is the most recent fire, which occurred in 2014, and is the largest fire that has burned in the Project vicinity. No fires have burned on the Project site. The closest fire to the Project site is the 2014 River Fire, that burned 167 acres approximately 3 miles northeast of the Project site. Fire history for the general vicinity of the Project site is illustrated in Appendix B, *Fire History Map*.

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, which includes areas up to roughly 5 miles from the Project site, was calculated to be 15 years, with intervals ranging between 0 and 41 years. Based on this analysis, it is expected that wildfire that could impact the Project may occur, if weather conditions coincide, roughly every 15 years, with the realistic possibility of shorter or longer interval occurrences, as observed in the fire history records.

2.2.5 Fire Hazard Severity Zone Rating

Fire Hazard Severity Zones depict wildfire hazard based on wildfire intensity and likelihood. The northern portion of the Project site's potential wildfire hazard is mapped by CAL FIRE as primarily high, with some moderate, and the eastern portions of the project has no designation. The recent map updates from CAL FIRE has reclassified the Project site from not within a fire hazard severity zone, to partially designated as high. It is important to emphasize that this designation is in no way intended to prevent development in hazardous fire areas. Uses of Fire Hazard Severity Zone maps, as determined by the Office of the State Fire Marshall, are summarized below.

- Designate areas where California's wildland urban interface building codes apply to new buildings.
- Included into real estate disclosures.

[4] Based on polygon GIS data from CAL FIRE's FRAP, which includes data from CAL FIRE, U.S. Forest Service Region 5, Bureau of Land Management, National Park Service, contract counties, and other agencies. The dataset is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2025.

- Guide planning, prevention, and mitigation activities/requirements that reduce risk.
- Considered by local governments in General Plans
- Fire Hazard Severity Zone maps evaluate "hazard," not "risk". They are like flood zone maps. "Hazard" is based on the physical conditions that create a likelihood that an area will burn over a 30 to 50-year period without considering modifications such as fuel reduction efforts. "Risk" is the potential damage a fire can do to the area under existing conditions, including any modifications such as defensible space, irrigation and sprinklers, and ignition resistant building construction.

FHSZ designations carry certain code requirements, especially for areas mapped as Very High FHSZ, of which the Project has none. For example, Ignition Resistant Construction as required by Chapter 7A of CBC and Section R337 of CRC does not currently apply to the Project as it is not in a Very High FHSZ, however, applicability is expected to expand at the next code update cycle to include structures in a High FHSZ, which the Project does include.

2.3 Analysis of Wildfire Risk from Adding New Development

Humans (i.e., human related activities or human created features, services (i.e., powerlines and electrical equipment), or processes) are responsible for the majority of California wildfires (Syphard et al. 2007, 2008; Romero-Calcerrada et al. 2008). Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels without proper prevention measures in place. These ignitions predominantly occur as accidents, but may also be purposeful, such as in the case of arson. Equipment and powerlines cause a considerable number of fires in San Diego County. After that, 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) (Romero-Calcerrada et al. 2008)). In Southern California, the population living at, working in, or traveling through the WUI 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% of wildfires are controlled below 10 acres (CAL FIRE 2019; Santa Barbara County Fire Department 2019).

Research indicates that the type of clustered, contained development Project like the Ocean Kamp Residential Project, are not associated with increased vegetation ignitions. Syphard and Keeley (2015) summarize all wildfire ignitions included in the CAL FIRE Fire and Resource Assessment Program (FRAP) database dating back over 100 years. They found that equipment-caused fires were by far the most numerous – and these also accounted for most of the area burned – followed closely by the area burned by powerline fires. 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. Ignitions were more likely to occur close to roads and structures, and at intermediate density land uses and structure densities.

As exhibits 1 through 3 illustrate, development density directly influences susceptibility to fire because in higher density developments (like the Project), there is one interface (the Project 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 buildings. The intermix includes development amongst the unmaintained fuels whereas the proposed Project converts all fuels within the footprint and provides a wide, managed fuel modification zone separating buildings 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 development. 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 WUI already exists in the area adjacent to the Project, dominated by older, more fire-vulnerable structures, constructed before stringent fire code requirements were imposed, with varying levels of maintained fuel modification buffers. As discussed in detail throughout this FPP, the Project is an ignition resistant development 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 along roadways). Therefore, the development of the Project would not be expected to materially increase the risk of vegetation ignitions.

Exhibit 1. Example of lower density development where 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

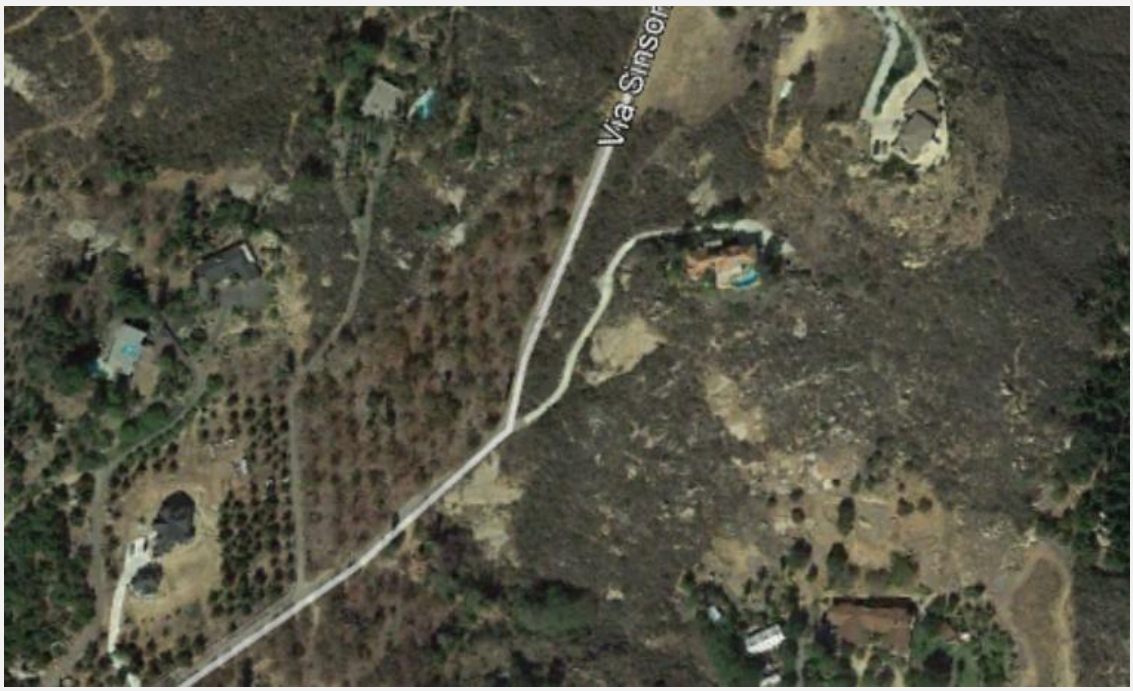


Exhibit 2. Example of moderate density development. Homes are located on larger properties and include varying levels of ignition resistance and landscape/fuel modification provision and maintenance. This type of development results in a higher wildland exposure level for all homes and does not provide 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 higher density development that is 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.



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 Project as the landscapes are managed and maintained to remove exotic fuels that may be established 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 Project, such as the Ocean Kamp Residential Project, also serve to minimize or prevent on-site fires from transitioning into the wildlands. Customized FMZs are crucial as the strategic design and placement of fuel treatments can disrupt or slow fire spread, reduce fire intensity, and facilitate fire suppression within a landscape (Braziunas et al., 2021). This is true regardless of the direction a vegetation fire may be burning – whether toward a community or from within a community. The risk of a structure being destroyed is significantly lower when defensible space is implemented on both shallow and steep properties (Syphard et al., 2014). Even if just half the landscape is treated, the percentage of houses exposed to fire can decrease from 51% to 16% (Braziunas et al., 2021). Moreover, when FMZs are designed properly, they not only protect homes but also the surrounding environment. For example, when the Tahoe Basin experienced the Angora Fire in 2007, fuel treatments had the dual effect of saving homes and increasing forest survival (Safford et al., 2009). In areas where fuel management had been conducted prior to the Angora Fire, home loss was significantly reduced in the adjacent community and 85% of the trees survived, as compared to the 22% that survived in untreated areas (Safford et al., 2009). Fuel management treatments also facilitated the ecological benefit of reduced fire severity, including higher post-fire soil litter cover, higher herbaceous plant cover, higher diversity, and lower levels of invasive beetles (Safford et al., 2009). At a minimum, managing defensible space can reduce risk across multiple scales by damping fire risk, reducing the impact of fire, and in turn reducing annual fire risk (Braziunas et al., 2021).

Further, the requirement that all structures include interior fire sprinklers 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 Project. 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.

2.4 Off-site Wildfire Impacts

It is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95% of wildfires are controlled below 10 acres (CAL FIRE 2019). Studies (Keeley & Syphard 2018; Syphard et al. 2007; Syphard & Keeley 2015) show the ignition resistance and fire safety awareness of the Project and its population influences the likelihood of fire ignitions and the potential for fire to spread off-site into adjacent wildland fuels and negative 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, buildings can withstand wildfire event and prevent fire spread. This prevention benefits the Project and the surrounding areas by reducing the landscape level fire risk. Further, given the Project's multi-scale 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 installing powerlines underground, as they would be on the Project. Undergrounding powerlines significantly reduces 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 Mission Avenue and other roads used by Project occupants, and community members. However, the Project provides roadside fuel modification along all roads it creates. Ongoing maintenance along Mission Avenue, and Foussat Road is expected to occur as part of overall fire reduction efforts not within the control of the Project. These efforts reduce or minimize the ability for a vehicle related spark, catalytic converter failure, or other ignition source to ignite and spread fire from the roadsides into unmaintained fuels. The Project is not expected to significantly increase the already known fire risk associated with roads and in fact the Project- and road-adjacent fuel modification would aid in reducing the preexisting risk. Interior roadways are also not expected to result in significant vehicle ignitions. 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's interior roadways, it is highly unlikely it would spread beyond the Project. If a fire is ignited, the level of hardscape and adjacent fuel modifications areas would result in fire behavior that is patchy with slow fire spread and reduced fire intensity.

Reducing WUI exposure can address the 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 wildfire also play a significant role in protecting wildlands and surrounding areas from Project-related fires.

2.4.1 Vegetation Management

A study in southern Italy found that the ignition potential of an area was significantly influenced by landcover types and human drivers were low or inconsistent (Elia et al., 2019). Urban interfaces with shrubland-dominated vegetation were found to be more fire-prone than those with grasslands or other natural spaces (Elia et al., 2019).

The Project area primarily hosts disturbed habitat, some shrubs and marshland. 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. The intent has since evolved to protect 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 risk of fire 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.

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 not only serve to protect structures from wildfire but function as a buffer for natural areas and surrounding communities. These features will further reduce the potential for wildfire in open space areas and potential impacts on surrounding communities.

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 ensure this maintenance occurs, the Project will conduct regular assessments through a CC&R that requires the HOA to annually review the FMZ. 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.

2.4.2 Firefighter Response

As discussed further in Section 6, the Project is not anticipated to have a negative impact on response capacity. 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 off-site 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, 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.

2.4.3 Ignition Resistant/Noncombustible Construction

The WUI fire challenge is structures lacking ignition resistant features (i.e., ember resistant vents, interior sprinklers); therefore, the best mitigation is to reduce the likelihood of building ignition occurring (Zhou, 2013). Structural characteristics play a significant role in whether a building burns, which is important in WUI environments as structures also serve as fuel (Gorte, 2011). The benefit of structure-based mitigation is that it lowers both the on-site risk and the risk of wildfire across a landscape (Mockrin et al., 2020). In WUI areas, this is because structures 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. Ignition Resistant Construction is presently only required for structures in a Very High FHSZ, of which the Project has none. However, upcoming code updates are expected to increase applicability to structures within a High FHSZ. All Project structures will be code-compliant, ignition-resistant buildings constructed in accordance with Chapter 7A of the CBC or Section R337 of the CRC. This lowers the threat from on-site fires impacting off-site areas as the structures themselves are less likely to function as fuel. While the Project includes

vent coverings to prevent ember penetration, the Project buildings will also include NFPA 13D automatic fire sprinklers for SFDs or 13R automatic fire sprinklers for MFDs 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 point of origin, limit its ability to spread to the rest of the building, and even extinguish a fire before the responding firefighters arrive, thus damping the likelihood of ember production. Residential sprinklers are structure protection level sprinklers that have a high success rate of controlling or suppressing interior structure fires. This also reduces impacts on fire response capacity as the automatic sprinklers will generally contain small fires and prevent flashover.

Structure design, such as the Project's, 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.

Most of the primary components of the Project's layered fire protection system are required by Fire and Building codes, because they have been evaluated in the lab and in real-time wildfires and found to result in saved structures. They are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire.

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

- Non-flammable roofs, which would be Class "A" listed and fire-rated roof assembly, installed per manufacturer's instructions, to approval of the City. Roofs would be made tight with no gaps or openings on ends or in valleys, or elsewhere between roof covering and decking, in order to prevent intrusion of flame and embers. Any openings on ends of roof tiles would be enclosed to prevent intrusion of burning debris. When provided, roof valley flashings would not be less than 0.019 inch (No. 26 gage galvanized sheet) corrosion-resistant metal installed over a minimum 36-inch-wide underlayment consisting of one layer of 72 pound American Society for Testing and Materials (ASTM) 3909 cap sheet running the full length of the valley.
- Exterior wall coverings are to be non-combustible such as stucco;
- 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 13D for SFD and 13R for MFD);
- No eaves or soffits
- No use of paper-faced insulation or combustible installation in attics or other ventilated areas;
- No use of plastic, vinyl (with the exception of vinyl windows with metal reinforcement and welded corners), or light wood on the exterior.
    - Any vinyl frames to have welded corners and metal reinforcement in the interlock area to maintain integrity of the frame certified to ANSI/AAMA/NWWDA 101/I.S 2 97 requirements.
- Rain gutters and downspouts to be non-combustible. They would be designed to prevent the accumulation of leaf litter or debris, which can ignite roof edges.

- Doors to be of approved noncombustible construction or would be solid core wood having stiles and rails not less than 1 3/8 inches thick or have a 20-minute fire rating. Doors to comply with OFD Building Code.
- There would be no combustible awnings, canopies, or similar combustible overhangs.
- Non-combustible fences will be used throughout the Project.
- 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 OFD 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.

2.4.4 Wildfire Risk Awareness Education

As described in Section 8, below, the Project will include 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 occupants. The wildfire education program will be facilitated by the homeowners of the Project and will disclose the potential wildfire risk and the requirements of the FPP. The educational program will also include information regarding the necessary landscape maintenance and structural-based fire protection features. Having ongoing education included in the Project creates a heightened level of wildfire risk awareness and fire protection measures. This benefits both the Project and the surrounding areas as people would be more aware of the wildfire risk and potential impacts. Further, it decreases the likelihood the Project occupants and users would cause an uncontrolled ignition, and they would be aware of what steps to take if they observe an ignition. As such the impact on off-site areas would be further lowered by reducing the probability of ignition.

2.4.5 Summary

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

3 Anticipated Fire Behavior

3.1 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of fire that would be expected next to the Project site given characteristic site features such as topography, vegetation, and weather. Dudek utilized BehavePlus software package (Andrews et al. 2008) to analyze potential fire behavior on and next to the Project site, with assumptions made for the pre- and post-Project slope and fuel conditions. A detailed discussion of the modeling process conducted for this FPP is presented in Appendix C, *BehavePlus Fire Behavior Analysis*. Results are provided below.

3.2 Fire Behavior Modeling Analysis

An analysis using the BehavePlus software package was conducted to evaluate fire behavior variables and to objectively predict flame lengths, intensities, and spread rates for five modeling scenarios. These fire scenarios incorporated observed fuel types representing the dominant on-site and off-site vegetation on vacant land to the north, northeast, and southwest, in addition to slope gradients, and wind and fuel moisture values for both the 50th percentile weather (summer, onshore winds) and the 97th percentile weather (fall, offshore winds). Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or next to the Project site.

Vegetation types, which were derived from available resource materials and confirmed during the field assessment for the Project site, were classified into a fuel model. Fuel models help fire experts realistically estimate fire behavior for a vegetation type. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that surround the proposed development. Fuel models were selected from Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005). Fuel models were also assigned to the perimeter fuel management areas to illustrate post-Project fire behavior changes. Based on the predicted pre- and post-Project vegetation conditions, seven different fuel models were used in the fire behavior modeling effort presented here. Fuel model attributes are summarized in Table 1.

Table 1. Fuel Models Used for Fire Behavior Modeling

Fuel Model Type	Title	Description	Fuel Bed Depth (Feet)
Existing Conditions			
GR2	Low load dry climate grass	Represents the annual grasslands on and off the proposed Project site	1 ft
GS2	Moderate load dry climate grass-shrub	Offsite grass and shrublands to the south of the Project.	1.5 ft
SH2	Moderate load dry climate shrub	Represents the shrublands on and off the proposed project site.	1 ft
SH4	Low load humid climate timber-shrub	Represents the riparian areas surrounding the Project site	3 ft

Table 1. Fuel Models Used for Fire Behavior Modeling

Fuel Model Type	Title	Description	Fuel Bed Depth (Feet)
SH5	High load dry climate shrub	Represents the scrub/shrublands on and off the proposed project site.	4-6 ft
Post-Project			
FM8	Compact Litter	Onsite Zone 1 and 2 fuel modification	0.2 ft.
GR2	Low load dry climate grass	Offsite grassland to the west of the Project site	1 ft
GS2	Moderate load dry climate grass-shrub	Offsite grass and shrublands to the south of the Project.	1.5 ft
SH2	Mod. load dry climate shrub	Represents the offsite vegetation to the southwest of the Project site.	1 ft
SH4	Low load humid climate timber-shrub	Represents the riparian areas surrounding the Project site	3 ft
SH5	High load dry climate shrub	Represents the offsite vegetation to the northeast of the Project site.	4 – 6 ft
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft

Tables 3 and 4 summarize the weather and wind input variables used in the BehavePlus modeling process. Weather and wind inputs for fire behavior modeling conducted in support of this FPP utilized the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use (County of San Diego 2022a). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed 44 years of fire weather data from fire stations and Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

As identified in the County's guidelines, Dudek utilized the Fine Dead Fuel Moisture (FDFM) tool within BehavePlus fire behavior modeling software package to determine fuel moisture. The temperature, relative humidity, and wind speed data for the Coastal weather zone were utilized based on the project's location. Reference fuel moistures were calculated in the FDFM tool and were based on site-specific topographic data inputs. Table 2 summarizes the FDFM inputs and the resulting fine dead fuel moisture values. Table 3 presents the fuel moisture and wind speed inputs for the fire behavior modeling efforts conducted for this analysis.

Table 2. BehavePlus Fine Dead Fuel Moisture Calculation.

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

Table 2. BehavePlus Fine Dead Fuel Moisture Calculation.

Variable	50th Percentile Summer Weather	97th Percentile Peak Weather (Santa Ana)
Slope	0-30%	0-30%
Aspect	West	West
Fuel Shading	Exposed (< 50% shading)	Exposed (< 50% shading)
Fuel Moisture Correction	0%	0%
Fine Dead Fuel Moisture	2%	1%

Table 3. Wind and Weather Input Variables

Model Variable	Summer Weather (50th Percentile) On and Offshore Wind	Peak Weather (97th Percentile) Offshore Wind
Fuel Models	SH4, SH5	GR2, GS2, SH2, SH4, SH5
1 h fuel moisture	2%	1%
10 h fuel moisture	12%	4%
100 h fuel moisture	17%	8%
Live herbaceous moisture	66%	30%
Live woody moisture	132%	59%
20 ft. wind speed	19 mph (sustained winds)	15 mph, 21 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	248	45
Wind adjustment factor	0.4	0.4
Slope	0-1.5%	2-5%

As mentioned, the BehavePlus fire behavior modeling software package was used in evaluating anticipated fire behavior adjacent to the Project site. Five 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 north, east/northeast, southeast, and west. The results of the modeling effort included predicted values for surface fires flame length (feet), rate of spread (mph), fire line intensity (British thermal units/foot/second), and spotting distance (miles). These fire behavior variables are a vital part 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 et al. 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 is 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 downwind and ignite receptive fuel beds. Five 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 five fire scenarios are explained in more detail below:

Fire Scenario Locations and Descriptions:

Pre-Project Conditions On/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning onto the Project site from the south, with average summer onshore winds (19 mph sustained) being fueled onsite as it burns through grass and disturbed habitats.
- **Scenario 2.** Fire flaming front burning south of the Project site with average summer onshore winds (19 mph sustained) being fueled offsite as it burns through grass and shrubs.
- **Scenario 3.** Fire flaming front burning in the riparian area west of the Project site with average summer winds (19 mph) being fueled by riparian vegetation.
- **Scenario 4.** Fire flaming front burning in the riparian area to the north of the Project site with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by riparian vegetation.
- **Scenario 5.** Fire flaming front burning in the open space to the north of the Project with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by grass and shrublands.

Post Project Conditions Onsite/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning onto the Project site from the south, with average summer onshore winds (19 mph sustained) being fueled onsite as it burns through irrigated and managed vegetation.
- **Scenario 2.** Fire flaming front burning south of the Project site with average summer onshore winds (19 mph sustained) being fueled offsite as it burns through grass and shrubs.
- **Scenario 3.** Fire flaming front burning in the riparian area west of the Project site with average summer winds (19 mph) being fueled by riparian vegetation.
- **Scenario 4.** Fire flaming front burning in the riparian area to the north of the Project site with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by riparian vegetation.
- **Scenario 5.** Fire flaming front burning in the open space to the north of the Project with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by grass and shrubs, until it reaches the irrigated vegetation onsite.

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 Fire Behavior Modeling Results Summary

The proposed Project site maintains similar slope and vegetation types on and directly offsite. The slope and vegetation varies further away from the Project site, with the riparian area near the Project site, and undeveloped open space to the north of the Project site. The fire behavior models have been run considering pre-Project and post-Project conditions. Scenarios 2, 3 and 4 were modeled to represent potential ember cast from a wildfire in the open spaces near the Project site, but do not represent the fire burning onto the Project site, therefore the results for the pre- and post-Project conditions for these runs generated the same results.

Under the average summer wind conditions modeled in pre-Project Scenario 1, a fire burning through the grasslands to the south of the Project site would move at a low rate of speed (0.9 mph during sustained winds), produce moderate flame lengths (6.9 feet during sustained winds), and produce embers that could travel 0.3 miles during sustained winds. During post-Project conditions, when the fire reaches the Project site, it would move at a reduced rate of speed (0.1 mph during sustained winds), produce lower flame lengths (1.9 feet during sustained winds), and produce embers that could travel 0.1 miles. The Ocean Kamp Residential development would include structures with ignition resistant, and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk potential than pre-Project conditions.

Under the extreme Santa Ana wind conditions modeled in Scenario 2, a fire burning through the grass and shrublands to the south of the Project site would move at a moderate rate of speed (1.0 mph during sustained winds), produce high flame lengths (16.4 feet during sustained winds), and produce embers that could travel 0.6 miles during sustained winds. The Ocean Kamp Residential development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the average summer wind conditions modeled in Scenario 3, a fire burning through the riparian vegetation to the west of the Project site would move at a moderate rate of speed (1.0 mph during sustained winds), produce high flame lengths (16.4 feet during sustained winds), and produce embers that could travel 0.6 miles during sustained winds. The Ocean Kamp Residential development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore have a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the extreme Santa Ana wind conditions modeled in Scenario 4, a fire burning through the riparian fuels to the north of the Project site would move at a moderate to high rate of speed (2.4 mph during sustained winds, 6.8 mph during gusts), produce very high flame lengths (27.8 feet during sustained winds, 44.4 feet during gusts), and produce embers that could travel 2.4 miles during gusting winds. The Ocean Kamp Residential development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore have a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the extreme Santa Ana wind conditions modeled in pre-Project Scenario 5, a fire burning through the grass and shrublands in the open space to the northeast of the Project site would move at a moderate to high rate of speed (2.4 mph during sustained winds, 6.8 mph during gusts), produce very high flame lengths (27.8 feet during sustained winds, 44.4 feet during gusts), and produce embers that could travel 2.4 miles during gusting winds. During post-Project conditions, when the fire reaches the Project site, it would move at a reduced rate of speed (0.1 mph during sustained winds, 0.2 mph during gusts), produce lower flame lengths (2.2 feet during sustained winds, 3.0 feet during gusts), and produce embers that could travel 0.4 miles. The Ocean Kamp Residential development would include structures with ignition resistant, and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore have a much lower ignition risk potential than pre-Project conditions.

Post-Project conditions in the onsite Project areas would result in a reduction of up to 40 feet in flame lengths and up to 6.6 mph in spread rates. As a result of the proposed fuel modification, the fire hazard presented by the site would be reduced compared to its current state. This means reduced fire risk for nearby residents. Further, the anticipated surface fire would not be anticipated to transition to any proposed structures due to their planned ignition resistance and the proposed integration of the ember-resistant Zone 0. The proposed Project structures will be at a minimum of 100 feet away from the nearest offsite fuels. Unmaintained fuels surrounding the Project site could pose a threat of fire ignition risk due to ember spread, but during post-Project conditions, the majority of wildfire risk would be reduced as vegetation is converted to paved and ignition resistant landscapes, and vegetation is regularly irrigated and maintained.

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 4, BehavePlus Analysis Map.

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

Fire Scenarios	Flame Length[1] (feet[2])	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; mmer winds (50th percentile onshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
Low load dry climate grass (GR2)	6.9	382	0.9	0.3
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south,, southeast of the Project site.				
Moderate load dry climate grass-shrub (GS2)	6.5	330	0.4	0.3
Moderate load dry climate shrub (SH2)	2.1	28	0.0	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 3 (Pre-Project Offsite): 4% slope; Average summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Low load humid climate timber-shrub (SH4)	3.4	84	0.2	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 4 (Pre-Project Offsite): 3% slope; Santa Ana winds (97th percentile), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Low load humid climate timber-shrub (SH4)	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
High load dry climate shrub (SH5)	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Pre Project Offsite/Onsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
Low load dry climate grass (GR2) (Onsite)	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Moderate load dry climate shrub (SH2)	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
High load dry climate shrub (SH5)	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)

Note:

1 Wind-driven surface fire.

2 Values in parentheses represent the respective output in the presence of 50 mph gusts.

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

Fire Scenarios	Flame Length[1] (feet[2])	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; average summer winds (50th percentile offshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
(Zone 1 & 2 Onsite) FM8	1.9	22	0.1	0.1
Offsite Fuels: GR2	6.9	382	0.9	0.3
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south,, southeast of the Project site.				
Offsite Fuels: GS2	6.5	330	0.4	0.3
Offsite Fuels: SH2	2.1	28	0.0	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 3 (Post-Project Offsite): 4% slope; Average summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Offsite Fuels: SHh4	3.4	84	0.2	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 4 (Post-Project Offsite): 3% slope; Santa Ana winds (97th percentile), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Offsite Fuels: SH4	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
Offsite Fuels: SH5	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Post Project Onsite/Offsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
(Zone 1 & 2 Onsite) FM8	2.2 (3.0)	32 (60)	0.1 (0.2)	0.2 (0.4)
Offsite Fuels: GR2	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Offsite Fuels: SH2	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
Offsite Fuels: SH5	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A

Note:
1 Wind-driven surface fire.
2 Values in parentheses represent the respective output in the presence of 50mph gusts.

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 grasslands and shrublands. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley and Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Native landscapes, from forest to grasslands, become highly flammable each fall and 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 6-month drought period each year.

Based on this research, the predicted growing population of WUI areas, and the region's fire history, it can be anticipated that periodic wildfires may start on, burn onto, or spot into the Project site. The most common type of fire predicted in the vicinity of the Project site is a wind-driven fire from the east/northeast moving through the riparian areas or open space found on the lands adjacent to the Project.

Therefore, it will be critical that the latest fire protection technologies, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced. The Project, once developed, would not help wildfire spread and would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the Project site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire Project site landscape.

RAWS BehavePlus Fire Behavior Model Results - Existing Conditions

Fire Scenarios	Flame Length[1] (feet[2])	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
Low load dry climate grass (GR2)	6.9	382	0.9	0.3
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, southeast of the Project site.				
Moderate load dry climate grass-shrub (GS2)	6.5	330	0.4	0.3
Moderate load dry climate shrub (SH2)	2.1	28	0.0	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 3 (Pre-Project Offsite): 4% slope; Average summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Low load humid climate timber-shrub (SH4)	3.4	84	0.2	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 4 (Pre-Project Offsite): 3% slope; Santa Ana winds (97th percentile offshore), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Low load humid climate timber-shrub (SH4)	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
High load dry climate shrub (SH5)	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Pre Project Offsite/Onsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
Low load dry climate grass (GR2) (Onsite)	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Moderate load dry climate shrub (SH2)	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
High load dry climate shrub (SH5)	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)

RAWS BehavePlus Fire Behavior Model Results - Post Proposed Project Conditions

Fire Scenarios	Flame Length[1] (feet[2])	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; average summer winds (50th percentile offshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
(Zone 1 & 2 Onsite) FM8	1.9	22	0.1	0.1
Offsite Fuels: GR2	6.9	382	0.9	0.3
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, southeast of the Project site.				
Offsite Fuels: GS2	6.5	330	0.4	0.3
Offsite Fuels: SH2	2.1	28	0.0	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 3 (Post-Project Offsite): 4% slope; Average summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Offsite Fuels: SHh4	3.4	84	0.2	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 4 (Post-Project Offsite): 3% slope; Santa Ana winds (97th percentile), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Offsite Fuels: SH4	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
Offsite Fuels: SH5	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Post Project Onsite/Offsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
(Zone 1 & 2 Onsite) FM8	2.2 (3.0)	32 (60)	0.1 (0.2)	0.2 (0.4)
Offsite Fuels: GR2	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Offsite Fuels: SH2	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
Offsite Fuels: SH5	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A

Note:
1 Wind-driven surface fire.
2 Values in parentheses represent the respective output in the presence of 50mph gusts.



DUDEK N 0 750 1,500 Feet

FIGURE 4
Behave Plus Analysis Map
Ocean Kamp Project

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4 Emergency Response and Service

4.1 Emergency Response

The Project is located within the Oceanside Fire District (OFD) jurisdictional response area. Regionally, OFD fire, emergency medical, and rescue services respond from 8 stations. As of 2024, the OFD serves an estimated population of 174,061 throughout the City of Oceanside. Figure 5 illustrates the fire station locations and Table 6 provides a summary of the location, equipment, and staffing levels for the closest responding fire stations.

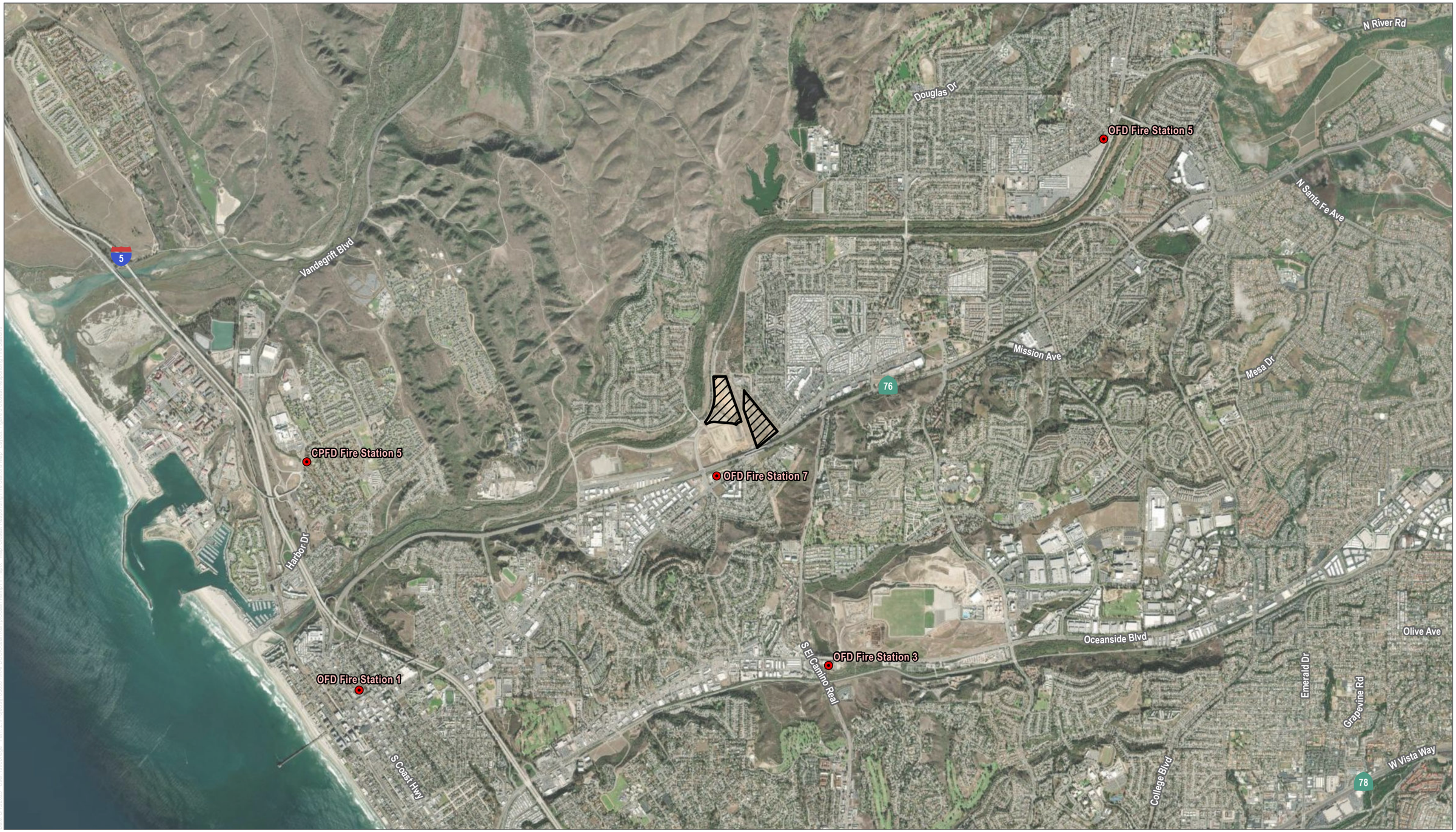
OFD has mutual aid agreements through the North Regional Zone Master Automatic Aid Agreement for Fire-Rescue Responses & Support activities (OFD 2024). North Regional Zone Master Automatic Aid Agreement participants include: Camp Pendleton Fire and Emergency Services, Carlsbad Fire Department, Deer Springs Fire Protection District, Del Mar Fire Department, Encinitas Fire Department, CSA 107 (Elfin Forest), Escondido Fire Department and Rincon Del Diablo Fire Protection District, North County Fire Protection District, Oceanside Fire Department, Pala Reservation Fire Department, Pauma Reservation Fire Department, Rancho Santa Fe Fire Protection District, Rincon Reservation Fire Department, San Diego County Fire-CAL FIRE, San Marcos Fire Department/Fire Protection District, San Pasqual Reservation Fire Department. OFD operates eight fire stations (FS 1 - 8), which are each staffed with at minimum, a 3-person Type 1 fire engine. Multiple stations also operate an aerial ladder truck, and cross-staffed brush engines. OFD provides structural and wildland fire protection, emergency medical services, hazardous materials response, and technical rescue.

OFD Fire Station No. 7 (FS 7) will provide an initial response to the Project within 3 minutes. FS 7 is located at 3350 Mission Avenue, Oceanside, CA 92058. FS 7 is staffed 24 hours a day and 7 days a week by ten personnel and is equipped with one Type 1 Engine, one Type 3 Wildland Engine, one Aerial Ladder Truck, and one BLS ambulance.

OFD Fire Station No. 3 (FS 3) will provide secondary response to the Project within 6 minutes. FS 3 is located at 3101 Oceanside Boulevard, Oceanside, CA 92056. FS 3 is staffed 24 hours a day and 7 days a week by seven personnel and is equipped with one Type 1 Engine, one OES Type 6 Brush Engine, one ALS ambulance, and one BLS ambulance.

OFD Station's 1 and 5 are each approximately 3.3 miles away from the Project site and can provide emergency response within 8 minutes.

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SOURCE: Esri Clarity Basemap, OpenStreetMap, City of Oceanside

DUDEK

N

0 1,500 3,000 Feet

FIGURE 5

Closest Responding Fire Stations Map

Ocean Kamp Project

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Table 6. Oceanside Fire Department Closest Responding Stations Summary*

Station	Location	Equipment	Staffing
OFD FS 7	3350 Mission Ave, Oceanside, California 92058	▪ 1 Engine (E217) ▪ 1 Truck (T217) ▪ 1 BLS Ambulance (BLS217) ▪ 1 Brush Engine (BR 217)	On-Duty: 10
OFD FS 3	3101 Oceanside Blvd, Oceanside, California 92056	▪ 1 Engine (E213) ▪ 1 ALS Ambulance (RA213) ▪ 1 BLS Ambulance (BLS213) ▪ Type 6 Brush (OES6612)	On-Duty: 7
OFD FS 1	714 Pier View Way, Oceanside, California 92054	▪ 1 Engine (E221) ▪ 1 ALS Ambulance (RA 211)	On-Duty: 4
OFD FS 5	4841 North River Road, Oceanside, California 92057	▪ 1 Engine (E215) ▪ 1 Water Tender (WT215) ▪ 1 Type 6 Engine (PT215)	On-Duty: 3

Note:
* https://fire.ci.oceanside.ca.us/home/showpublisheddocument/15545/638701105709430000

Although not included in the table above, OFD participates in the North Regional Zone Master Automatic Aid Agreement for Fire-Rescue Responses and Support activities, which includes Camp Pendleton Fire and Emergency Services. Camp Pendleton Fire Station 5 is located along Wire Mountain Road, Oceanside 92058, and may respond to the Project site if necessary.

As described above, within the area's emergency services system, fire and emergency medical services can be provided by other agencies. Generally, each agency manages 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, including the North Regional Zone Master Automatic Aid Agreement for Fire-Rescue Responses and Support activities, that typically include interdependencies that exist among the region's fire protection agencies for structural and medical responses but are primarily associated with the peripheral "edges" of each agency's boundary.

4.2 Emergency Response Travel Time Coverage

In an effort to understand fire department response capabilities, Dudek conducted an analysis of the travel-time response coverage from the closest responding fire stations. The response time analysis was conducted using travel distances that were derived from Google Road data. Travel times were calculated applying the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH) as well as the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance) for comparison. Tables 7 and 8 present tabular results of the emergency response time analysis using the distance at speed formula and the ISO formula, respectively.

Table 7. Project Emergency Response Analysis using Speed Limit Formula

Station	Travel Distance to Project Site	Travel Time to Project Site*	Total Response Time**
OFD FS 7	0.4 miles	41 seconds	3 minutes, 1 second
OFD FS 3	2.1 miles	3 minutes, 36 seconds	5 minutes, 56 seconds
OFD FS 1	3.3 miles	5 minutes, 39 seconds	7 minutes, 59 seconds
OFD FS 5	3.3 miles	5 minutes, 39 seconds	7 minutes, 59 seconds

Notes:

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

** Assumes travel distance and time to the Project site into development from the respective fire station, and application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed along with dispatch and turnout time, which can add an additional two minutes and 20 seconds to travel time. Distance to the Project site was calculated to the entrance to the Project located at 3500 Mission Avenue.

Table 8. Project Emergency Response Analysis using ISO Formula

Station	Travel Distance to Project Entrance	Travel Time to Project Entrance*	Total Response Time**
OFD FS 7	0.4 miles	1 minute, 17 seconds	3 minute, 37 seconds
OFD FS 3	2.1 miles	4 minutes, 10 seconds	6 minutes, 30 seconds
OFD FS 1	3.3 miles	6 minutes, 13 seconds	8 minutes, 33 seconds
OFD FS 5	3.3 miles	6 minutes, 13 seconds	8 minutes, 33 seconds

Notes:

* Assumes travel distance and time to the Project site into the development for the respective fire station. Also assumes application of the ISO formula, T=0.60+1.7(Distance), a 35-mph travel speed, and does not include turnout time.

** Assumes travel distance and time to the Project site into development from the respective fire station, and application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed along with dispatch and turnout time, which can add an additional two minutes and 20 seconds to travel time. Distance to the Project site was calculated to the entrance to the Project located at 3500 Mission Avenue.

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

- FS 7 is located approximately 0.4 miles from the Project site and is the closet fire station to the Project site. FS 7 can provide an aerial ladder truck and respond to an incident at the Project site within approximately 3 minutes and 37 seconds.
- The second closet fire station is FS 3 located approximately 2.1 miles from the Project site. FS 3 can respond to an incident at the Project site with approximately 6 minutes and 30 seconds total response time.
- FS 1 and 5 are located approximately 3.3 miles from the Project site and can respond to an incident with 8 minutes and 33 seconds total response time.

Emergency response time target thresholds include travel time along with dispatch and turnout time, which can add two minutes and 20 seconds to travel time.[5] FS 7 would provide an initial response as the closest fire station. As shown in Table 7 and Table 8, the total response time from FS 7 to the Project site meets the response time

[5] OFD SOC

standard of 6 minutes and 20 seconds[6] for fire incidents, according to the OFD Standard of Cover (OFD 2024). FS 3 would provide secondary response to the Project site, and meets the response time standard of 6 minutes and 20 seconds.

4.3 Estimated Calls and Demand for Service from the Project

Determining the potential impact associated with the Project's estimated population increase is needed 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 added persons that would be expected on site. Emergency call volumes related to typical projects, such as new residential developments, can be reliably estimated based on the historical per-capita call volume from a particular fire jurisdiction.

The following estimated annual emergency call volume generated by the Project is based upon per capita data for OFD CY 2023 (OFD 2024).

- **Total population served:** 174,061
- **Total annual calls:** 25,991,
- **Per capita call generation:** 0.15

Using the data above, the estimated annual emergency call volume for the Project site can be calculated. In order to provide this conceptual estimate, Dudek made assumptions about the residential populations within the Project site to estimate at 2.71 persons per household[7]. The Project has 571 residential units. The Project site estimated population for 571 units is approximately 1,548 residents. Based on this estimate, the calculated call volume by type of calls is provided in Table 9.

Table 9. Call Volume Associate with the Project

Population Associated with the Project	Per Capita Call Generation Factor	Number of Estimated Annual Residential calls (1,548x0.15)
1,548	0.15	232.2

As mentioned, the residential population 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 233 calls per year for OFD (0.64 calls per day or 19.42 calls per month). Each of the eight OFD Fire Stations responded to approximately 3,249 calls on average in 2023, (approximately 9 calls per day or 271 calls per month). The level of service demand for the Project raises overall call volume but it is not predicted to impact FS 7 to a point that they cannot meet the demand. For perspective, 5 calls per day are typical in an urban or suburban area. A busy fire station company would be one with 10 to 15 or more calls per day. When the Ocean Kamp Residential Project site is built out, FS 7 could potentially respond to an additional 0.64 calls per day or 19.42 calls per month, although the number may be likely lower based on the conservative nature of the population and calls per capita data used in this estimate.

6 OFD Standard of Cover, 2024. Figure 2: 2023 Risk-based Response Time Goals.
7 https://fire.ci.oceanside.ca.us/home/showpublisheddocument/15545/638701105709430000

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

The OFD Fire Code, 2022 CFC, and 2022 CRC (adopted by reference with local amendments and OFD standards) govern the building, infrastructure, and defensible space requirements detailed in this FPP. The Project will meet applicable codes or will provide alternative materials and/or methods, if called for. The following summaries highlight important fire protection features.

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

5.1 Roads

5.1.1 Primary/Fire Access

The proposed Project would involve the construction of new structures and roadways and would generate new trips to and from the Project site. Site access, including road widths and connectivity, will comply with the city's development standards, including review for compliance with the OFD Fire Code Section 503, Fire Apparatus Access Roads, as well as compliance with applicable emergency access standards that would help emergency vehicle access during Project construction and operation such as OFD's Guideline for Fire Access Roadways. Additionally, an adequate water supply and approved paved access roadways shall be installed prior to any combustibles on site and will include the following:

- Primary access to the Project site will be provided by Mission Avenue. Proposed on-site interior streets will provide access throughout the site to meet fire department access requirements to each structure. All primary circulation roads shall comply with two-way access road standards, shall be capable of supporting an imposed load of not less than 78,000 pounds of fire apparatus, and shall be provided with an approved paved surface so as to provide all-weather driving capabilities. Paved surfaces shall be asphalt, concrete or other approved materials by OFD.
- Interior circulation streets include all roadways that are considered common or primary roadways for traffic flow through the site and for fire department access serving all proposed structures. The Project would be required to provide approved fire apparatus turnarounds on all dead-end fire apparatus access roadways over 150 feet in length.
- Typical interior Project roads, including collector and local roads, will be constructed to minimum code required unobstructed widths, as stated in Section 503.2.1, Dimensions, and shall be improved with aggregate cement or asphalt paving materials. The primary interior circulation road will be designed to accommodate a minimum of at least 78,000 pounds of fire apparatus load.
- The edge of the fire accessway shall be located not less than 10 feet and not more than 30 feet from the building(s) and shall be approved by the fire code official.

- Private and public streets shall meet all Project approved fire code requirements for maximum allowable dead-end distance, paving, and fuel management prior to combustibles being brought to the site.
- Vertical clearance of vegetation (lowest-hanging tree limbs) along roadways will be maintained at clearances of 13.5 feet to allow fire engines passage. Unobstructed vertical clearance must be clear to the sky to allow aerial ladder truck operation.
- Cul-de-sacs and fire apparatus turnarounds will meet requirements and OFD standards.
- 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 designed to reduce speed (e.g., speed bumps, humps, speed control dips, planters, and fountains) are prohibited from being installed without prior approval of the fire code official and must be in accordance with the City of Oceanside Neighborhood Traffic Calming Program Manual.
- 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 OFD for updating of the OFD's response maps.

5.1.2 Road Width and Circulation

The primary fire apparatus access roadway will be constructed to meet current OFD Fire Code Section 503.2, and the 2022 CFC (or then current edition), including minimum 28-foot unobstructed road width. All fire apparatus access roads shall be constructed with an all-weather surface, such as concrete or asphalt, and shall be designed and maintained to support imposed loads of not less than 78,000 pounds of fire apparatus. All turns or curves in fire department access roads shall have no less than a 30-foot inside turning radius and no less than a 50-foot outside turning radius for emergency equipment.

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

The northern parcel of the proposed Project has three ingress/egress roads and the eastern parcel has two ingress/egress roads, which allow access into the interior residential roads of the Project. Dead end streets longer than 150 feet shall have approved provisions for fire apparatus access; however, no streets in the current design exceed 150 feet.

Fire apparatus turnarounds shall include turning radius widths approved by OFD.

5.1.4 Gates

Though the Project does not propose any onsite access gates, gates on private roads are permitted, but subject to the OFD Fire Code, including:

- No person shall install a security gate, security device, or other roadway obstruction across a fire access roadway without the fire code official's approval.
- Automatic gates across a fire access roadway or driveway shall be equipped with an approved emergency key-operated switch overriding all command functions and opening the gate.

- Automatic gates shall also be equipped with an approved emergency traffic control-activating strobe light sensor or other device approved by the fire code official, which will activate the gate on the approach of emergency apparatus in both directions of travel.
- Automatic gates shall be provided with a battery back-up or manual mechanical disconnect in case of power failure.
- Automatic gates shall meet fire department policies deemed necessary by the fire code official for rapid, reliable access.
- When required by the fire code official, an automatic gate in existence at the time of adoption of this chapter is required to install an approved emergency key-operated switch or other mechanism approved by the fire code official, at an approved location, which overrides all command functions and opens the gate. A property owner shall comply with this requirement within 90 days of receiving written notice to comply.
- Where this section requires an approved key-operated switch, it may be dual-keyed or equipped with dual switches provided to facilitate access by law enforcement personnel or other emergency response agencies.
- All gates providing access from a road to a driveway shall be located a minimum of 30 feet from the nearest edge of the roadway and shall be at least two feet wider than the width of the traffic lane(s) serving the gate.
- Electric gate openers, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

5.1.5 Driveways

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

Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus (not less than 78,000 lbs. unless authorized by the OFD) and shall be provided with an approved paved surface so as to provide all weather driving capabilities. Private driveways serving no more than two single family residences within 150 feet from a fire apparatus access roadway, measured from the rear of the structure(s), shall have an unobstructed improved width of not less than 16 feet. Private driveways serving three or more single family residences, or any single-family residences that are more than 150 feet from a fire apparatus access roadway, measured from the rear of the structure(s), shall comply with requirements set forth in the City of Oceanside Engineering Design Manual.

5.1.6 Premises Identification

Identification of roads and structures will comply with OFD Fire Code Section 505.1, Address Identification, as follows:

- Approved address numbers, building numbers, building identification and/or addresses shall be placed on all new and existing buildings and at appropriate additional locations, plainly visible and legible from the street or roadway fronting the property when approaching from either direction.
- The numbers shall contrast with their background and shall meet the following minimum size standards: 4" high with a ½" stroke for residential buildings, 6" high with a ½" stroke for multi-residential buildings and 12" high with a 1" stroke for commercial and industrial buildings.
- Additional numbers shall be required where deemed necessary by the fire code official, such as rear access doors, building corners and entrances to commercial centers.

- Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure.
- The Fire Code Official may establish different minimum sizes for numbers for various categories of projects. Address identification shall be maintained.

5.1.7 Ongoing Infrastructure Maintenance

Once the homes are built and the development is completed, the property owner will be responsible for ongoing maintenance. Individual lots would be the responsibility of the homeowners, whereas the HOA or similar entity would manage the maintenance of commonly owned lots. Maintenance of commonly owned lots may be covered by collection of annual/monthly dues or one-time assessments for unanticipated projects. The HOA would manage the maintenance of private streets, whereas the City would be responsible for the maintenance of public streets.

The below-grade infrastructure maintenance would fall to the responsible entity – water purveyor, electric company, gas company, etc. Sewer and wastewater are typically the responsibility of a public agency or district.

5.1.8 Pre-Construction Requirements

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

5.2 Ignition Resistant Construction

All new structures onsite will be constructed to City of Oceanside Municipal Code, OFD standards, and 2022 CRC standards (or then current edition). Each of the proposed dwelling units will comply with the enhanced ignition-resistant construction standards of the 2022 CRC Section R337. These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at elevated levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. (See Appendix D, *Ignition-Resistant Construction Requirements*.)

There are two primary concerns for structure ignition: (1) radiant and/or convective heat and (2) burning embers (National Fire Protection Association [NFPA] 1144 2008). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant. Likewise, radiant, and convective heat impacts on structures have been minimized through the CRC Section 337 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 for the Project are required by OFD (Fire Code Chapter 9, Fire Protection Systems) and state codes; however, they are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior 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 that 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. Application of CRC Section R337, ignition resistant building requirements.
2. Class-A fire rated roof and associated assembly. Class-A fire rated roofs with attic or void spaces above the living spaces require 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). Minimum vent size is provided as smaller mesh may result in ventilation issues. All vents used for this Project will be approved by OFD.
3. Multi-pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when evaluated according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be evaluated to meet the performance requirements of State Fire Marshal Standard 12-7A-2.
4. Interior automatic fire sprinkler system according to code requirements for all residential dwellings and attached garages.
5. Modern infrastructure, access roads, and water delivery system.

5.3 Fire Protection Systems

5.3.1 Water Supply

Water service for the Project site will be provided by the City of Oceanside Water Utilities Department and will be consistent with OFD standards. The public water system will be through connections to existing water mains next to the Project. The minimum flow required shall be determined using the 2022 CFC, current adopted edition, by the OFD. The OFD may modify fire flow due to the severity of the hazard.

5.3.2 Hydrants

The number, location, distribution, and spacing of public and private fire hydrants is required to be in accordance with CFC Appendix C, the standards of the City of Oceanside Water Utilities Department, and OFD Fire Code Section 507, Fire Protection Water Supply Systems. When the required fire flow exceeds the capacity of the number of fire hydrants required by these standards, the fire flow is required to be provided by installing additional hydrants in a quantity and manner acceptable to the fire code official.

5.3.3 Fire Sprinklers

All structures will be protected by an automatic fire sprinkler system. Automatic fire sprinklers systems shall be in accordance with OFD Fire Code Chapter 9, Fire Protection Systems, and NFPA 13-D or NFPA 13-R, as appropriate for the occupancy type, construction type, and square footage. Fire sprinkler monitoring plans for each building will be submitted to OFD for approval before installation.

5.4 Fuel Modification

5.4.1 Fuel Modification Zone Requirements

A fuel modification zone (FMZ) is a strip of land between a structure and open space acting as a buffer where combustible vegetation has been removed and/or modified and partially or totally replaced with more appropriately spaced, drought-tolerant, fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. A typical landscape/fuel modification installation requires a 100-foot-wide fuel modification zone from the structure outwards towards undeveloped areas. This 100-foot-wide fuel modification zone is required to provide defensible space which is defined as managed and maintained areas adjacent to structures that enable fire suppression activities through the removal of flammable fuels and maintenance of landscapes that would not readily transmit wildfire. Defensible space enables firefighters to safely position themselves at the development edge and begin tactical protection efforts.

As a wildfire approaches the paved and landscaped areas of the FMZ, fire behavior is affected substantially as the fire is "starved" for fuel reducing flame lengths, spread rates and intensity, thus causing wildfires to weaken as they struggle to find available fuels. FMZs or "brush management" was initially made part of the Public Resources Code 4290 and 4291 to protect natural resources from fires originating in neighboring developed areas and have since become focused on protecting communities and structures. However, FMZs, or fuel maintenance zones continue to have the same benefit of buffering preserved open space areas from accidental ignitions within communities. Positioning the low plant density, irrigated zone directly adjacent to the structure provides a significant buffer between the structure and other landscape fire and native vegetation. The same way that fuel modification will set back a wildland fire from a structure, the fuel modification will set back a structure fire from the more burnable native plants. Embers can be generated by a structure fire and can be blown over the fuel modification into native fuels, but the inclusion of automatic sprinklers in every building combined with the presence of staffed fire stations with fast response significantly reduces the potential for a structure fire to reach a size that produces significant impacts.

Fuel Modification Zone Measurements

Defensible space is crucial for a home's wildfire safety. It is the buffer zone that is created between the property and the surrounding wildland area. This space is key to slowing or stopping wildfire spread and protecting a home from embers, flames, or heat. It also gives firefighters a safer area to defend property. In each zone, the intensity of vegetation management increases as it gets closer to a home. The goal is to start at the house and work outward, reaching up to 100 feet or the property line.

The Project site will consist of three fuel modification zones that extend across the Project site, as depicted in Figure 6. A typical landscape/fuel modification installation in the City of Oceanside consists of a 0-5-foot-wide Zone 0, 5-30-foot-wide, fully irrigated Zone 1, and a 30-100-foot-wide, non-irrigated, thinned Zone 2 measured outward from the structure. The following are requirements of Fuel Modification Zones 0, 1, and 2:

Zone 0 Requirements – 0 to 5 feet from the structures

- This area shall be constructed of continuous hardscape or non-combustible ground covers acceptable to the OFD.
- This space shall be free of combustible materials.
- The use of mulch is prohibited.

Zone 1 Requirements – between 5 and 30 feet from the proposed structure (unless constrained by property lines)

- Zone 1 will consist of primarily irrigated landscape along with a paved development area.
- Zone 1 width shall be provided between native or naturalized vegetation and any structure. The width shall be measured from the exteriors of the structure to the vegetation or property boundary.
- There shall be no habitable structures, structures that are directly attached to habitable structures, or other combustible construction that can mean transmitting fire to habitable structures,
- Structures such as fences, gazebos, walls, palapas, play structures, and non-habitable gazebos with this zone shall be made of non-combustible, one hour-fire rated, or Type IV heavy timber as defined in the CBC.
- Plants within Zone 1 shall be primarily low-growing and less than 4 feet in height with the exception of trees. Plants shall be low-fuel and fire-resistive.
- Trees within Zone 1 shall be located away from structures to a minimum distance of 10 feet as measured from the structure to the drip line of the tree at maturity and spaced horizontally and vertically in accordance with the Landscape Standards of the Land Development Manual.
- Canopy of existing trees that extend within 10 feet of and structure shall be pruned to maintain a minimum horizontal and vertical clearance of 10 feet of the structure and/or a chimney outlet.
- Permanent irrigation is required for all planting areas within Zone 1 with the following exceptions:
  - When planting areas only contain species that do not grow taller than 24 inches in height
  - When planting areas contain only native or naturalized species that are not summer-dormant and have a maximum height at plant maturity of less than 24 inches.
- Zone 1 irrigation overspray and runoff shall not be allowed into adjacent areas of native or naturalized vegetation.
- Zone 1 shall be maintained regularly by pruning and thinning plants, controlling weeds, and maintain irrigation systems.

Zone 2 Requirements – between 30 and 100 feet from proposed structure (unless constrained by property lines)

- Plants shall be drought-tolerant and fire resistive species of moderate height.
- Brush and plants shall be limbed up off the ground, so the lowest branches are 1/3 height of bush/tree/plant or up to 6’ off the ground on mature trees.
- This area would be considered selective clearing of natural vegetation and dense chaparral by removing a minimum 50% of the square footage of this area.

Private property owners and/or the Project’s HOA shall be responsible for ensuring long-term funding and ongoing compliance with fuel modification and maintenance requirements within individual lots. All vegetation management areas shall be completed annually no later than May 1st of each year and more often as needed for fire safety, as determined by the OFD.

5.4.2 Vegetation Management and Fire Hazard Abatement

City of Oceanside Nuisance Vegetation and Waste Clearance Standards establish vegetation fire hazard abatement provisions that are consistent throughout the district and that are in accordance with the City of Oceanside Code of Ordinances, Chapter 11, Fire Protection, Article III – Abatement of Certain Vegetation and Waste Matter. This standard defines "nuisance vegetation", determines where it should be abated, and provides more information regarding notice and enforcement of the provisions in this standard.

5.4.3 Undesirable Plants and Trees

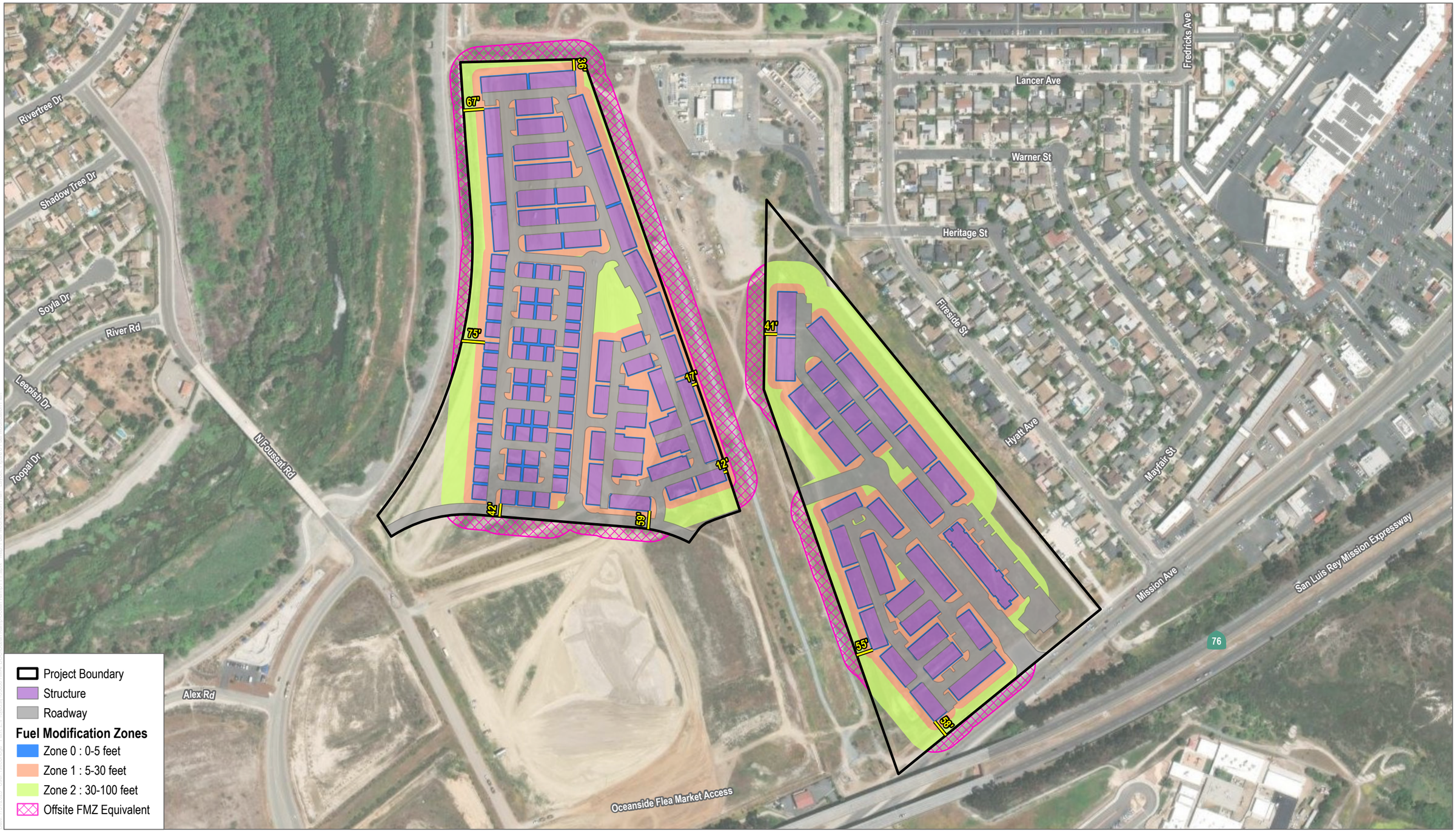
Certain plants are undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be physical (structure promotes ignition or combustion) or chemical (volatile chemicals increase flammability or combustion characteristics). The plants included in the Undesirable Plants List at the end of Appendix E are undesirable from a fire safety standpoint and will not be planted on the Project site or allowed to establish opportunistically within FMZs or landscaped areas.

5.4.4 Construction Phase Vegetation Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management shall be performed pursuant to OFD requirements 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.

5.4.5 Annual Fuel Modification Zone Compliance Inspection

To confirm that the Project's FMZs and landscape areas are being maintained according to the OFD's and this FPP's standards, OFD inspectors, or a mutually agreed upon third party, shall perform an annual inspection. If the FMZ areas are not compliant, the management company will have a specified period to correct any noted issues so that a re-inspection can occur, and certification can be achieved. Annual inspection fees are subject to the current City of Oceanside Fee Schedule.



SOURCE: Esri Clarity Basemap, OpenStreetMap, CalFIRE 2025

DUDEK

0 150 300 Feet

FIGURE 6

Fuel Modification Plan

Ocean Kamp Project

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5.5 Project Fuel Modification Zone Measurements

Fire safety requirements that will be provided on-site include all measures described in Section 7 of this FPP. In addition to on-site and building perimeter FMZ requirements implemented by the homeowners and the community HOA, off-site FMZ equivalents around the Project site perimeter are present in the form of existing developments, planned projects, easements and roadways. In lieu of meeting the code minimum defensible space onsite, the areas with non-conforming fuel modification zones are able to meet the intent of the code through offsite fuel modification equivalencies, as described below.

As indicated in this report, the FMZs and added fire protection measures proposed for the Project include equivalent off-site wildfire buffer but are not standard zones. Rather, they are based on a variety of analysis criteria including predicted flame length, fire intensity (Btu), site topography and vegetation, extreme and typical weather, the position of structures on pads, position of roadways, adjacent fuels, fire history, current vs. proposed land use, neighboring communities relative to the proposed Project, and type of construction. The fire intensity research conducted by Cohen (1995), Cohen and Butler (1996), Cohen and Saveland (1997), and Tran et al. (1992) supports the fuel modification alternatives proposed for this Project.

As evaluated in Figure 6, Fuel Modification Plan, Zone 0 is fully obtainable around all pads. Zone 1 is impaired in one location, and Zone 2 is impaired in multiple locations, although off-site FMZ equivalency absolves these scenarios as described herein. The following zone impairments are observed:

Zone 1 Impairments:

- Zone 1 is impaired along the eastern boundary of the northern parcel. Zone 1 is restricted to 12 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The northeastern boundary of the Project is adjacent to a utility easement. It is the responsibility of the utility company to maintain hazardous vegetation on their property, which will provide reciprocal offsite fuel modification for the Project site, achieving 100 feet of defensible space from the proposed structures. The southeastern boundary of the northern parcel is adjacent to a proposed dog park, which meets the requirements for Fuel Modification due to the irrigated and maintained vegetation in the dog park.

Zone 2 Impairments:

- Zone 2 is impaired along the western boundary of the northern parcel. Zone 2 is restricted to 67 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The western boundary of the Project is adjacent to a paved pedestrian and bike trail, which provides offsite fuel modification for the Project site, achieving 100 feet of defensible space from the proposed structures.
- Zone 2 is impaired along the northern boundary of the northern parcel. Zone 2 is restricted to 36 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The northern boundary of the Project is adjacent to disturbed habitats, and a paved drainage system, which provides the additional 64 feet of offsite fuel modification for the Project site to achieve 100 feet of defensible space.
- Zone 2 is impaired along a portion of the eastern boundary of the northern parcel. Zone 2 is restricted to 12 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ

equivalency. The northeastern boundary of the Project is adjacent to a utility easement8. It is the responsibility of the utility company to maintain hazardous vegetation on their property, which will provide reciprocal offsite fuel modification for the Project site, achieving 100 feet of defensible space from the proposed structures. A dog park is proposed between the northern and eastern parcels of the proposed Project site. This area will comply with Zone 2 vegetation requirements, providing FMZ equivalency in that area.

- Zone 2 is impaired along the southern boundary of the northern parcel. Zone 2 is restricted to 42 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The southern boundary of the Project is adjacent to Loop Road North which exceeds the requirements for Fuel Modification by creating a complete paved fuel break void of combustible vegetation. Further, the land to the south of the northern parcel is another planned project, which at buildout will be primarily ignition resistant construction, paved surfaces, and irrigated and maintained vegetation.
- Zone 2 is impaired along the northwestern boundary of the eastern parcel. Zone 2 is restricted to 41 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The northwestern boundary of the Project is adjacent to a parcel owned by a utility company. It is the responsibility of the utility company to maintain hazardous vegetation on their property, which will provide reciprocal offsite fuel modification for the Project site, achieving 100 feet of defensible space from the proposed structures.
- Zone 2 is impaired along the western boundary of the eastern parcel. Zone 2 is restricted to 55 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. A dog park is proposed between the northern and eastern parcels of the proposed Project site. This area will comply with Zone 2 vegetation requirements, providing FMZ equivalency in that area. The land adjacent to the southwestern boundary of the eastern parcel is an additional phase of the Ocean Kamp Project. At buildout, this Project will be primarily ignition resistant construction, paved surfaces, and irrigated and maintained vegetation
- Zone 2 is impaired along the southern boundary of the eastern parcel. Zone 2 is restricted to 58 feet of onsite FMZ. This portion of the Project site will meet the intent of the code through offsite FMZ equivalency. The southern boundary of the Project is adjacent to the existing Mission Avenue, which exceeds the requirements for Fuel Modification by creating a complete paved fuel break void of combustible vegetation and therefore provides the remaining 42 feet of offsite fuel modification for the Project.

8 https://geo.sandag.org/portal/apps/experiencebuilder/experience/?id=1d105857933641e0a8496d2769b31aec#data_s=id%3AdataSource_1-1936f278884-layer-2%3A828137

6 Wildfire Education Program

The occupants of the Ocean Kamp Residential Project will be provided with an initiative-taking educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go!" stance on evacuation. Additionally, management of on-site entities occupying the site's structures will be required to register for emergency alerts via the AlertSanDiego messaging system (https://www.alertsandiego.org). Occupants will be strongly encouraged to also register to receive emergency alerts.

6.1 Recognition for Fire Safety and Maintaining Fire Insurance

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

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

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

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

7 Alternative Means and Methods for Fire Access Compliance

When a project cannot meet the prescriptive requirements of the applicable codes and standards, a request to use alternate materials and methods (AM&M) can be submitted to the fire agency having jurisdiction for consideration. An AM&M request must meet the intent of the code not being met. In considering whether an AM&M request can meet the intent of the applicable code, it must be determined if there are viable alternatives. Three conditions require AM&M including road widths, fire access road setbacks, and separation of multiple points of entry.

7.1 AM&M for Fire Access Road Setbacks

The intent of a fire access road setback is to provide sufficient separation distance to establish an effective laddering angle (no greater than 75 degrees). The adopted fire code requires that all fire apparatus access roads for structures up to four-stories be setback from the structure they serve by 10-30 feet. This local amendment mirrors the requirement from optional Appendix D of the California Fire Code not adopted by the OSFM that requires aerial apparatus access roads be setback by 15 to 30 feet from structures greater than 30 feet in height.

The measured Fire Access Road Setbacks are approximately 3 feet in width at the narrowest, which is 7 feet less than the OFD requirement. The following laddering angle analysis was completed to evaluate if the building heights could successfully be laddered with an acceptable laddering angle (<75 degrees) given 29-foot to 34-foot building heights. The calculations were performed by utilizing a right-angle calculator with the base of the ladder 8 feet above grade as if mounted on an aerial apparatus truck.

- In order to successfully place an aerial ladder to the roof of the 29-foot-tall townhomes in Area B with a maximum ladder angle of 75 degrees, the ladder can be placed as close as 5.63 feet from the building.
- In order to successfully place an aerial ladder to the roof of the 34-foot-tall townhomes in Area B with a maximum ladder angle of 75 degrees, the ladder can be placed as close as 6.97 feet from the building

Positioning an aerial apparatus alongside these structures would result in a ladder base that is 8 feet from the roadside, given a 4-foot stabilizer width and an 8-foot-wide apparatus with the ladder mounted in the center of the apparatus. When adding the 3-foot roadside setback, this results in a ladder that is 11 feet from the structure and would therefore provide a laddering angle between 62-69 degrees, which is an acceptable climbing angle.

The adopted fire code amendment requiring a minimum setback of 10 feet is appropriate for taller buildings but is not necessarily the minimum for shorter buildings such as the Project's as demonstrated by the laddering angle analysis. The 3-foot roadside setback allows a ladder base mounted to an aerial apparatus to be positioned as close as 11 feet from the structure and complies with the maximum allowable climbing angle of 75 degrees. The aerial apparatus, with stabilizers extended would be 16 feet wide, allowing 12 feet on either side of the apparatus for passing apparatus and other fire scene operations. In actuality, the aerial apparatus could set-up on the farther side of the street, or be positioned further up the street, to allow a reduced laddering angle and keep the area in front of the involved structure clear for other responders. The circulation provided for by the site plan allows aerial apparatus and other responding apparatus to maneuver around one another, even if an aerial apparatus is already committed and deployed at the scene.

7.2 AM&M for Remoteness of Secondary Access for North Parcel

Projects that exceed a specific number of units require secondary access, which is a separate access road that allows project occupants to evacuate to a main roadway at a location remote from the primary access. As stated in the OFD Guideline for Fire Access, "A new residential community exceeding 200 multi-family dwelling units or exceeding 30 one-and-two family dwelling units shall be required to have two fire apparatus access roads into the community." The proposed project exceeds both thresholds and is therefore required to provide 2 access roads.

Then, as stated in the Guideline for Fire Access and Appendix D, "When two points of fire apparatus access is required, the two points shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses."

The North Parcel is landlocked by the San Luis Rey River to the west and the utility corridor to the east, and therefore cannot provide the required remoteness which would require the two points of access to be approximately 675 feet apart, given a total diagonal distance of 1,375 feet. In lieu of this remoteness, the Project has provided an additional access point, for 3 total access points, thereby exceeding the requirement for 2 access points.

The intent of the requirement for remoteness of access points is to prevent a roadway obstruction from blocking in the entire community or obstructing fire apparatus from responding into the community. The 3 points of access provide additional options so that if any one access is blocked, two other options are available.

7.3 AM&M for Hose Pull Exceedance

Per the OFD Fire Code / CFC Section 503.1.1, approved fire apparatus access roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (45 720 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility. This requirement has certain exceptions including:

1. The fire code official is authorized to increase the dimension of 150 feet (45 720 mm) where any of the following conditions occur:
   1.1 The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1,903.3.1.2 or 903.3.1.3.
   1.2 Fire apparatus access roads cannot be installed because of location on property, topography, waterways, non-negotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.

The Project has various areas that do not conform with the150-foot hose pull requirement. The maximum distance to a structure would be approximately 196 feet, when measured from an approved location along the fire access lane identified on the Project Site Plan (Figure 3). At buildout, all structures will be equipped with an approved automatic sprinkler system, and 26-foot driveways will be provided to allow firefighters access to the frontage of the structures beyond the identified fire lane.

The exception in Section 503.1.1 allows the fire code official to extend the maximum allowable hose pull beyond 150 feet when the structure is equipped with automatic fire sprinklers as the Project will be.

8 Conclusion

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

Ultimately, it is the intent of this FPP to guide the fire protection efforts for the Project in a comprehensive manner. Implementation of the measures detailed in this FPP will reduce the risk of wildfire spreading from the Project site into surrounding areas and will improve the ability of firefighters to fight fires on the Project property and neighboring properties and resources, irrespective of the cause or location of ignition. Among the measures detailed herein, this FPP provides guidance for vegetation maintenance for the landscaped areas on the Project site. As described, vegetation maintenance measures will be provided on all landscaped areas of the proposed Project. OFD may elect to develop and/or implement enforcement of vegetation management requirements in addition to those included in this FPP.

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

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

It will be extremely important for all homeowners, the Project's HOA and/or property managers, and occupants to comply with the recommendations and requirements described and required by the FPP on their property. The responsibility to maintain the fuel modification and fire protection features required for the Project site lies with the homeowners, the Project's HOA, and/or Property Manager or similar entity. Said responsible party would oversee ongoing education and maintenance of the communal areas, and the OFD would enforce the vegetation

management requirements detailed in this FPP. Such requirements would be made a part of deed encumbrances and CC&Rs for each lot, as appropriate.

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

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

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

It is common to plan for these contingencies by adopting a "Ready, Set, Go" stance on emergency preparedness (whether fire, earthquakes, flooding, chemical spills, etc.), dislocation, or evacuation where appropriate. Experience garnered from other situations tends to support that "shelter-in-place" may be an option. Fire and/or law enforcement officials may, during an emergency, determine that it is safer to temporarily refuge residents on-site. Again, where evacuation is ordered, ideally it will align with pre-established evacuation decision-tree points. In some communities, community meetings and even drills are considered beneficial to augment the preparedness of owners, occupants, workers, and other potentially affected persons within the community for an incident that could occur with little or no warning.

Limitation On Reliance Or Dependence Upon Report

Any person or entity furnished with this report and/or who reviews it agrees that the advance written consent of Dudek be sought and furnished to such person or entity prior to the review, reliance or authorization as to any

matters that are the subject of the reports by any person or entity (whether through act or omission as set forth in the report), other than Dudek's direct client. In such case, obtaining Dudek's consent shall not be subject to any fee or charge (other than reasonable copy costs, where applicable).

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

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Appendix A

Ocean Kamp Residential Representative Photo Log



Photo Location Map



Photo 1. Photo Location 1, looking north standing on the right side of the existing road



Photo 2. Photo Location 1, looking northeast



Photo 3. Photo Location 1, looking east.



Photo 4. Photo Location 1, looking southeast.



Photo 5. Photo Location 1, looking south.



Photo 6. Photo Location 1, looking southwest.



Photo 7. Photo Location 1, looking northwest standing on the left side of the existing road.



Photo 8. Photo Location 2, looking north.



Photo 9. Photo Location 2, looking northeast.



Photo 10. Photo Location 2, looking east.



Photo 11. Photo Location 2, looking southeast.



Photo 12. Photo Location 2, looking south.



Photo 13. Photo Location 2, looking southwest.



Photo 14. Photo Location 2, looking west.



Photo 15. Photo Location 3, looking north.



Photo 16. Photo Location 3, looking northeast.



Photo 17. Photo Location 3, looking east.



Photo 18. Photo Location 3, looking southeast



Photo 19. Photo Location 3, looking south.



Photo 20. Photo Location 3, looking southwest.



Photo 21. Photo Location 3, looking west



Photo 22. Photo Location 4, looking north.



Photo 23. Photo Location 4, looking northeast.



Photo 24. Photo Location 4, looking east.



Photo 25. Photo Location 4, looking southeast.



Photo 26. Photo Location 4, looking south.



Photo 27. Photo Location 4, looking southwest.



Photo 28. Photo Location 4, looking west



Photo 29. Photo Location 4, looking northwest



Photo 30. Photo Location 4, looking north

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Appendix B
Fire History Map



SOURCE: Esri Clarity Basemap, OpenStreetMap, City of Oceanside

DUDEK

0 4,000 8,000 Feet

APPENDIX B

Fire History Map

Ocean Kamp Project

Appendix C

BehavePlus Fire Behavior Analysis

1 BehavePlus Fire Behavior Modeling History

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

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

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

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

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

2 Modeling Inputs

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

2.1 Vegetation (Fuels)

The seven fuel characteristics help define the 13 standard fire behavior fuel models and the five custom fuel models developed for Southern California (Anderson 1982; Weise & Regelbrugge 1997). According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading

(tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in BehavePlus. The following describes the distribution of fuel models among general vegetation types for the standard 13 fuel models and the custom Southern California fuel models:

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

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

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

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

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) [1]
GR2	Low load dry climate grass	Represents the annual grasslands on and off the proposed Project site	1 ft
GS2	Moderate load dry climate grass-shrub	Offsite grass and shrublands to the south of the Project.	1.5 ft
SH2	Moderate load dry climate shrub	Represents the shrublands on and off the proposed project site.	1 ft
SH4	Low load humid climate timber-shrub	Represents the riparian areas surrounding the Project site	3 ft
SH5	High load dry climate shrub	Represents the scrub/shrublands on and off the proposed project site.	4-6 ft

Note:

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

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)[1]
FM8	Compact Litter	Onsite Zone 1 and 2 fuel modification	0.2 ft.
GR2	Low load dry climate grass	Offsite grassland to the west of the Project site	1 ft
GS2	Moderate load dry climate grass-shrub	Offsite grass and shrublands to the south of the Project.	1.5 ft
SH2	Mod. load dry climate shrub	Represents the offsite vegetation to the southwest of the Project site.	1 ft
SH4	Low load humid climate timber-shrub	Represents the riparian areas surrounding the Project site	3 ft
SH5	High load dry climate shrub	Represents the offsite vegetation to the northeast of the Project site.	4 – 6 ft
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft

Note:

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

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope in the absence of wind. Flat terrain tends to have little effect on fire spread, resulting in fires that are driven by wind. The Project site is relatively flat with terrain that varies slightly and has an elevation of approximately 28 feet above mean sea level (asml) to approximately 46 feet asml. The land surrounding the Project site is mostly flat, with slopes approaching the Project site from the north reaching up to 5% in some areas.

2.3 Weather Analysis

Historical weather data for the Fallbrook region was utilized in determining appropriate fire behavior modeling inputs for the proposed Project area. Average, on-shore (50th weather percentile and extreme off-shore (97th percentile) weather conditions were derived from Remote Automated Weather Stations (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. The Las Flores RAWS Station (RAWS ID 045733) was utilized to find average and extreme weather values for the proposed Project area. The station was closest as it is the closest at approximately 8.59 miles north of the proposed Project site and would adequately approximate proposed Project site weather conditions. Data from fire seasons dating back to 2014 and up through 2025 were included in the analysis.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through December 31 for each year between 2014 and 2025 for 97th percentile weather conditions and from June 1 through September 30 for each year between 2014 and 2025 for 50th percentile weather conditions.

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

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

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

Table 3. BehavePlus Fine Dead Fuel Moisture Calculation.

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

Table 4. Wind and Weather Input Variables

Model Variable	Summer Weather (50th Percentile) On and Offshore Wind	Peak Weather (97th Percentile) Offshore Wind
Fuel Models	SH4, SH5	GR2, GS2, SH2, SH4, SH5
1 h fuel moisture	2%	1%
10 h fuel moisture	12%	4%
100 h fuel moisture	17%	8%
Live herbaceous moisture	66%	30%
Live woody moisture	132%	59%
20 ft. wind speed	19 mph (sustained winds)	15 mph, 21 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	248	45
Wind adjustment factor	0.4	0.4
Slope	0-1.5%	2-5%

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

Fire Scenario Locations and Descriptions:

Pre-Project Conditions On/Offsite Scenarios

- Scenario 1. Fire flaming front burning onto the Project site from the south, with average summer onshore winds (19 mph sustained) being fueled onsite as it burns through grass and disturbed habitats.
- Scenario 2. Fire flaming front burning south of the Project site with average summer onshore winds (19 mph sustained) being fueled offsite as it burns through grass and shrubs.
- Scenario 3. Fire flaming front burning in the riparian area west of the Project site with average summer winds (19 mph) being fueled by riparian vegetation.

- **Scenario 4.** Fire flaming front burning in the riparian area to the north of the Project site with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by riparian vegetation.
- **Scenario 5.** Fire flaming front burning in the open space to the north of the Project with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by grass and shrublands.

Post Project Conditions Onsite/Offsite Scenarios

- **Scenario 1.** Fire flaming front burning onto the Project site from the south, with average summer onshore winds (19 mph sustained) being fueled onsite as it burns through irrigated and managed vegetation.
- **Scenario 2.** Fire flaming front burning south of the Project site with average summer onshore winds (19 mph sustained) being fueled offsite as it burns through grass and shrubs.
- **Scenario 3.** Fire flaming front burning in the riparian area west of the Project site with average summer winds (19 mph) being fueled by riparian vegetation.
- **Scenario 4.** Fire flaming front burning in the riparian area to the north of the Project site with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by riparian vegetation.
- **Scenario 5.** Fire flaming front burning in the open space to the north of the Project with extreme Santa Ana winds (21 mph, 50 mph gusts) being fueled by grass and shrubs, until it reaches the irrigated vegetation onsite.

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.

The proposed Project site maintains similar slope and vegetation types on and directly offsite. The slope and vegetation varies further away from the Project site, with the riparian area near the Project site, and undeveloped open space to the north of the Project site. The fire behavior models have been run considering pre-Project and post-Project conditions. Scenarios 2, 3 and 4 were modeled to represent potential ember cast from a wildfire in the open spaces near the Project site, but do not represent the fire burning onto the Project site, therefore the results for the pre- and post-Project conditions for these runs generated the same results.

Under the average summer wind conditions modeled in pre-Project Scenario 1, a fire burning through the grasslands to the south of the Project site would move at a low rate of speed (0.9 mph during sustained winds), produce moderate flame lengths (6.9 feet during sustained winds), and produce embers that could travel 0.3 miles during sustained winds. During post-Project conditions, when the fire reaches the Project site, it would move at a reduced rate of speed (0.1 mph during sustained winds), produce lower flame lengths (1.9 feet during sustained winds), and produce embers that could travel 0.1 miles. The Beacon Point development would include structures with ignition resistant, and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk potential than pre-Project conditions.

Under the average summer onshore wind conditions modeled in Scenario 2, a fire burning through the grass and shrublands to the south of the Project site would move at a moderate rate of speed (1.0 mph during sustained winds), produce high flame lengths (16.4 feet during sustained winds), and produce embers that could travel 0.6 miles during sustained winds. The Beacon Point development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures.
Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the average summer wind conditions modeled in Scenario 3, a fire burning through the riparian vegetation to the west of the Project site would move at a moderate rate of speed (1.0 mph during sustained winds), produce high flame lengths (16.4 feet during sustained winds), and produce embers that could travel 0.6 miles during sustained winds. The Beacon Point development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the extreme Santa Ana wind conditions modeled in Scenario 4, a fire burning through the riparian fuels to the north of the Project site would move at a moderate to high rate of speed (2.4 mph during sustained winds, 6.8 mph during gusts), produce very high flame lengths (27.8 feet during sustained winds, 44.4 feet during gusts), and produce embers that could travel 2.4 miles during gusting winds. The Beacon Point development would include structures with ignition resistant and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk from potential ember cast than pre-Project conditions.

Under the extreme Santa Ana wind conditions modeled in pre-Project Scenario 5, a fire burning through the grass and shrublands in the open space to the northeast of the Project site would move at a moderate rate of speed (2.4 mph during sustained winds, 6.8 mph during gusts), produce very high flame lengths (27.8 feet during sustained winds, 44.4 feet during gusts), and produce embers that could travel 2.4 miles during gusting winds. During post-Project conditions, when the fire reaches the Project site, it would move at a reduced rate of speed (0.1 mph during sustained winds, 0.2 mph during gusts), produce lower flame lengths (2.2 feet during sustained winds, 3.0 feet during gusts), and produce embers that could travel 0.4 miles. The Beacon Point development would include structures with ignition resistant, and non-combustible construction methods and materials as well as an ember-resistant Zone 0 around all structures. Any vegetation onsite would be managed and irrigated and therefore has a much lower ignition risk potential than pre-Project conditions.

Post-Project conditions in the onsite Project areas would result in a reduction of up to 40 feet in flame lengths and up to 6.6 mph in spread rates. As a result of the proposed fuel modification, the fire hazard presented by the site would be reduced compared to its current state. This means reduced fire risk for nearby residents. Further, the anticipated surface fire would not be anticipated to transition to any proposed structures due to their planned ignition resistance and the proposed integration of the ember-resistant Zone 0. The proposed Project structures will be at a minimum of 100 feet away from the nearest offsite fuels. Unmaintained fuels surrounding the Project site could pose a threat of fire ignition risk due to ember spread, but during post-Project conditions, the majority of wildfire risk would be reduced as vegetation is converted to paved and ignition resistant landscapes, and vegetation is regularly irrigated and maintained.

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)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
Low load dry climate grass (GR2)	6.9	382	0.9	0.3
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, southeast of the Project site.				
Moderate load dry climate grass-shrub (GS2)	6.5	330	0.4	0.3
Moderate load dry climate shrub (SH2)	2.1	28	0.0	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 3 (Pre-Project Offsite): 4% slope; summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Low load humid climate timber-shrub (SH4)	3.4	84	0.2	0.2
High load dry climate shrub (SH5)	16.4	2,495	1.0	0.6
Scenario 4 (Pre-Project Offsite): 3% slope; Santa Ana winds (97th percentile offshore), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Low load humid climate timber-shrub (SH4)	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
High load dry climate shrub (SH5)	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Pre Project Offsite/Onsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
Low load dry climate grass (GR2) (Onsite)	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Moderate load dry climate shrub (SH2)	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
High load dry climate shrub (SH5)	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)

Note:
1 Wind-driven surface fire.
2 Values in parentheses represent the respective output in the presence of 50 mph gusts.

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

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 1 (Pre-Project Onsite/ Offsite): 1.5% slope; average summer winds (50th percentile offshore), sustained 19 mph winds from the south, fire originating south of the Project site.				
(Zone 1 & 2 Onsite) FM8	1.9	22	0.1	0.1
Offsite Fuels: GR2	6.9	382	0.9	0.3
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A

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

Fire Scenarios	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet/ second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)
Scenario 2 (Pre-Project Offsite): 20% slope; summer winds (50th percentile onshore), sustained 19 mph winds from the south, southeast of the Project site.				
Offsite Fuels: GS2	6.5	330	0.4	0.3
Offsite Fuels: SH2	2.1	28	0.0	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 3 (Post-Project Offsite): 4% slope; average summer winds (50th percentile onshore), sustained 19 mph winds west of the site.				
Offsite Fuels: SHh4	3.4	84	0.2	0.2
Offsite Fuels: SH5	16.4	2,495	1.0	0.6
Scenario 4 (Post-Project Offsite): 3% slope; Santa Ana winds (97th percentile), sustained 21 mph winds (50 mph gusts), northeast of the Project site				
Offsite Fuels: SH4	13.8 (23.9)	1,707 (5,631)	1.3 (4.3)	0.6 (1.6)
Offsite Fuels: SH5	27.8 (44.4)	7,807 (21,596)	2.4 (6.8)	1.0 (2.4)
Scenario 5 (Post Project Onsite/Offsite): 1.5% Slope; Santa Ana winds (97th percentile offshore), sustained 21 mph wind (50 mph gusts), north of the site				
(Zone 1 & 2 Onsite) FM8	2.2 (3.0)	32 (60)	0.1 (0.2)	0.2 (0.4)
Offsite Fuels: GR2	11.6 (18.0)	1,175 (3,037)	2.4 (6.2)	0.5 (1.3)
Offsite Fuels: SH2	9.2 (15.8)	706 (2,289)	0.3 (1.0)	0.4 (1.2)
Offsite Fuels: SH5	27.8 (44.4)	7,805 (21,593)	2.4 (6.8)	1.0 (2.4)
(Paved Areas Onsite) NB	N/A	N/A	N/A	N/A

Note:

1 Wind-driven surface fire.

2 Values in parentheses represent the respective output in the presence of 50mph gusts.

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

Surface Fire:

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

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

Table 7. Fire Suppression Interpretation

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

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, downspouts 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 approved alternative material determined 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 E
Undesirable Plant List

Appendix E
Examples of Prohibited Plants

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

Appendix E
Examples of Prohibited Plants

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

Appendix E
Examples of Prohibited Plants

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

Appendix E
Examples of Prohibited Plants

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

*F = flammable, I = Invasive

NOTES:

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

Appendix F

Fire Safe San Diego County Recommended Plant List

California Native Plant list



Sustaining Native Plant Communities

Contributors

California Native Plant Society

bewaterwise.com

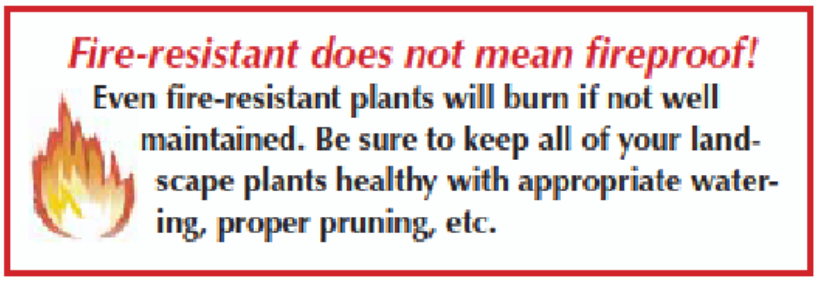
Armstrong Garden Centers

Theodore Payne

County of San Diego



What are fire-resistant plants? Fire-resistant plants are those that do not readily ignite from a flame or other ignition sources. These plants can be damaged or even killed by fire; however, their foliage and stems do not significantly contribute to the fuel and, therefore, the fire's intensity. There are several other significant factors that influence the fire characteristics of plants, including plant moisture content, age, total volume, dead material, and chemical content.



SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE

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

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

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

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

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

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

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

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

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

Fire Resistant Native Plants with High Wildlife Value

Compiled by The Theodore Payne Foundation *for Wildflowers and Native Plants, Inc.*
10459 Tuxford Street, Sun Valley, CA 91352 Phone: (818) 768-1802 http://www.theodorepayne.org

Important Note: All plants will eventually burn. There is no such thing as a fireproof plant. There are some plants that can retain moisture, even in dry areas, and are called fire resistant. This list is designed to identify some Californian native plants that are fire resistant and have wildlife value. These plants with few exceptions are listed as acceptable to plant in Fuel Modification Zones by Los Angeles County Fire. The purpose of this list is to help place fire resistant and wildlife important plants in areas where brush clearance can leave an area barren.

LA Country approved plant list for Fuel Modification: http://www.lacofd.org/forestry_folder/pdf/fmpg.pdf

GROUNDCOVERS

- *Atriplex barclayana.* **Beach Carpet Saltbush.** A low growing form of saltbush (6" high, spreading). This saltbush provides good ground cover for soil erosion and provides seeds, salt and cover for wildlife.
- *Atriplex canescens.* **Four-wing Saltbush.** A low growing form of saltbush (1-2' high, 3' wide) that happily grows in the desert. It provides seeds, salt and cover for wildlife.
- *Baccharis piluaris "Pigeon Point".* **Dwarf Coyote Bush.** While not a "showy" plant, it does produce some flowers and has a deep root system, that provides good erosion control. It grows 12" to 18" in height. It adds cover and seeds for a variety of birds. *(LA County Fire approved)*
- *Monardella linoides viminea.* **Willowy Coyote Mint.** This federally protected coyote mint grows up to 18" tall and prefers North facing (somewhat shaded) or riparian areas. It has a long blooming cycle, flowering through the summer and fall and is an attractant to hummingbirds and butterflies. Songbirds also eat the seeds.

SHRUBS

- *Atriplex lentiformis breweri.* **Quail Bush.** A larger saltbush (4' high, 6-8' wide) that provides critical habitat for the California quail and other birds.
- *Galvezia speciosa.* **Island Bush Snapdragon.** This CNPS "rare" plant is from the Channel Islands and stays evergreen year round producing trumpet shape red flowers favored by hummingbirds. It grows in 18" to 24" in height and 3' to 5' in width. It also adds excellent cover for wildlife.
- *Isomeris arborea.* **Bladderpod.** A very drought tolerant shrub that forms yellow flowers and seedpods. *(LA County Fire approved)*
- *Mahonia nevinii (aka Berberis nevinii).* **Nevin's Barberry.** A federally endangered species, once common in the Verdugo Mountains, grows berries that are favored by many songbirds. The spiny leaves also add a protective cover. The shrub can grow up to 4' in height and 6' in width and is evergreen. *(LA County Fire approved)*
- *Mahonia, Aquifolium and all subspecies.* **Mahonia/ Barberry.** It's purple berries and yellow flowers are favored by many songbirds. The spiny leaves also add a protective cover. *(LA County Fire approved)*
- *Rhus laurina (aka Malosma laurina)*. **Laurel Sumac.** While laurel sumac does have a high oil content, it has found to have a much higher incineration point than most other plants. It has been found to be one of the last plants to burn in fires. It provides important cover, food and nesting resource for many types of wildlife. A laurel sumac that has the lower third of it's branches pruned is considered fire-safe. It is a favorite shrub amongst warbler.
- *Mimulus sp. "Big Tujunga" or "La Tuna".* **Monkeyflower (local varieties).** These two local varieties of Monkeyflower do well in the summer heat and provide pale to deep orange flowers. It grows 18" to 36" in height and 3' to 5' in width. The flowers and seeds provide wildlife value
- *Ribes aureum.* **Golden Currant.** This currant grows upright to 6' and is lacy in structure. In summers, it can go semi-drought deciduous, though with some water in will remain evergreen. It's berries offer a high wildlife value. *(LA County Fire approved)*
- *Rhus integrifolia.* **Lemonade Berry.** A very drought-resistant shrub that provides cover and food to wildlife. California Thrasher uses it's fruit and leaf material for nesting. It also is an excellent erosion control plant.
- *Symphoricarpos albus.* **Common Snowberry.** While not the favorite berry choice of most wildlife, it still gets eaten. Its root system is vigorous and deep enough to hold most banks. Snowberry has been seen on North-facing slopes in the full sun, though shaded areas such as under oaks is best.

TREES

- *Heteromeles arbutifolia.* **Toyon.** This small tree is found readily in La Tuna Canyon. It is very drought tolerant and provides red berry for months that are a favorite amongst many birds found in the area.
- *Quercus agrifolia.* **Coastal Live Oak.** Oak trees are important wildlife resources and have actually been found to suppress fire.

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Fire-Resistant Plant Guide

One of the first steps to firescaping is identifying plants with fire retardant abilities. Below is a sample of trees, shrubs, ground cover and perennials that are ideal plants for firescaping.

Fire-Resistant Trees

Tree selection should be done with care as this is a plant that will be with you and your home for years to come.

African Sumac (Rhus lancea)
Ash (Fraxinus sp.)
Carob (Ceratonia seliqua)
California Sycamore (Platanus racemosa)
Carrotwood Tree (Cupaniopsisanarcardiodes)
California Bay Laurel (umbellularia californica)
Catalina Ironwood (Lyonothamnus sp.)
Chinese Pistache (Pistacia chinensis)
Coast Live Oak (Quercus agrifolia)
Coral Tree (Erythrina caffra)
Cork Oak (Quercus suber)
Crape Myrtle (Lagerstroemia indica)
Elm (Ulmus sp.)
Flowering Cherry (Prunus sp.)
Guadelupe Fan Palm (Brahia edulis)
Honey Locust (Gleditisa triacanthos)
King Palm (Archontophoenix cunninghamiana)
Loquat (Eriobotrya japonica)
Macadamia (Macadamia sp.)
Maidenhair Tree (Ginkgo biloba)
Manzanita (Arctostaphylos sp.)
New Zealand Christmas Tree (Metrosideros sp.)
Palo Verde Tree (Parkinsonia sp.)
Paperbark Tree (Melaleuca sp.)
Purple Leaf Plum (Prunus cerasifera)
Silver Maple (Acer saccharinum)
Strawberry Tree (Arbutus unedo)
Sweet Gum (Liquidambar stryaiflua)
Toyon (Heteromeles arbutifolia)
Tulip Tree (Liriodendron tulipifera)
Victorian Box (Pittosporum undulatum)
Western Redbud (Cercis occidentalis)
White Alder (Alnus rhombifoli)

Fire-Resistant Shrubs

California Lilac (Ceanothus sp.)
Bronze Loquat (Eriobotrya deflexa)
Bush Morninglory (Convolvulus cneorum)
Flannel Bush (Fremontodendron sp.)
India Hawthorn (Raphiolepis indica)
Lantana (Lantana sp.)
Lilac (Syringa vulgaris)
Matilija Poppy (Romneya coulteri)
Mock Orange (Pittosporum sp.)
Monkey Flower (Mimulus sp.)
Natal Plum (Carissa grandiflora)
Ocotillo (Fouquieria splendens)
Pineapple Guava (Feijoa sellowiana)
Pink Escallonia (Escallonia sp.)
Rockrose (Cistus sp.)
Rose (Rosa hydrida)
Sage (Salvia sp.)
Shiny Xylosma (Xylosma congestum)
Silverberry (Elaeagnus punge)

Fire-Resistant Ground Cover

Creeping Coprosma (Coprosma kirkii)

Dwarf Myrtle (Vinca minor)
Gazania (Gazania sp.)
Lantana (Lantana sp.)
Manzanita (Arctostaphylos sp.)
Myoporum (Myoporum parvifolium)
Periwinkle (Vinca major)
Red Apple Ice Plant (Aptenia cordfolia)
Rosea Ice Plant (Drosanthemum hispidu)

Fire-Resistant Perennials
Blue-Eyed Grass (Sisrinchium bellum)
Coral Bells (Heuchera sp.)
Douglas Iris (Iris douglasiana)
Golden-Eyed Grass (Sisyrinchium californicum)
Lavender (Lavandula sp.)
Red-Hot Poker (Kniphofia uvaria)
Seafoam Statice (Limonium perezi)

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Fire-Resistant California Friendly Plants

Shrubs | Trees | Perennials and Annuals | Groundcover

Shrubs



California Redbud
An interesting plant all year long, with magenta flowers on leafless stems in summer, followed by crimson seedpods and heart-shaped blue-green leaves. Deciduous, with yellow or red fall foliage falling away in winter to reveal smooth reddish brown trunks. Long lived, very drought tolerant, and flowers more profusely as it matures.



Monkeyflower (Mimulus)
This entire species is endorsed for use by San Diego County planners and the Los Angeles and Orange County fire departments. Be sure to check out the drought-tolerant varieties.



Ceanothus 'Concha'
This California lilac is a large shrub with a dense mass of dark green, 1-inch leaves, with dark blue clusters of flowers appearing in spring. Requires good drainage; can tolerate summer water. Grows to six feet.



Sage (Salvia)
Nothing evokes California quite like a sage-scented hillside. Beloved by hummingbirds and firefighters alike, the autumn sage pictured here is endorsed for use by the Orange County Fire Authority, while the entire sage species is endorsed by the Los Angeles County Fire Department.



Common Yarrow (Achillea millefolium)
It appears on fire-resistant lists for California Native Plant Society, Western MWD (zone 3), San Diego County, and Orange County fire. However it is not on the approved list for Los Angeles County fire. Yarrow also can be used as a groundcover if mowed.



French Lavender (Lavandula dentata)
Although not a true California native, this attractive drought-tolerant plant is endorsed for Zone B use in Los Angeles County, and also makes fire-resistant lists for the Inland Empire and Orange and San Diego counties.

Trees



Coast Live Oak
Handsome shade tree. Round-headed with dense foliage, grows 20-70 feet tall. Smooth, dark grey bark, with leathery dark green leaves. Native to coastal central and Southern California.



California Sycamore
Sycamores have delighted generations of Californians, and this particular variety is endorsed for use by the Los Angeles and Orange County fire departments, plus San Diego County.



Toyon (Hetereomeles arbutifolia)
A classic California native, it has white flowers in the summer and berries in the winter, it gets good marks from Los Angeles, Orange, San Diego and the Inland Empire.

Perennials and Annals



California Fuchsia (Epilobium canum/californica)
This sprawling plant is one of the few perennials listed by Los Angeles, Orange and San Diego counties.



Beard Tongue (Penstemon palmeri)
This particular variety is native to the Southland, but the entire species has been embraced by native plant enthusiasts and firefighters alike, and is approved for use in L.A., Orange and San Diego counties.

Groundcover



Wild Strawberry (Fragaria chilolensis)
Looking for a low-growing plant that you can plant next to your home? This species has the rare distinction of being approved by Los Angeles County fire department for any zone in your yard.

Firewise Brochure.qxd 6/4/08 10:29 AM Page 1

Pyrophytic Characteristics

HIGH PYROPHYTIC plants, shrubs and trees ignite and burn intensely and typically share certain characteristics:

1) They are usually blade-leaf or needle-leaf evergreens
2) They have stiff, woody, small or fine, lacey leaves
3) Their leaves and wood usually contain volatile waxes, fats, terpenes or oils (crushed leaves have strong odors)
4) Their sap is usually gummy, resinous and has a strong odor
5) They usually contain plentiful fine, twiggy, dry or dead materials
6) They may have hair covered leaves
7) They may have loose or papery bark
8) These plants flame (not smolder) when preheated and ignited with a match

Defensible Space

Every home requires defensible space. Defensible space is the area around the home free from dangerous accumulations of flammable pyrophytic vegetation. This allows firefighters a safe working area from which to defend against an oncoming wildfire.

A firewise landscape includes LOW pyrophytic plants, shrubs and trees (those less likely to burn and slower to ignite), strategically placed and maintained to resist the spread of fire. It also, is a landscape maintained free of dead and dry plant materials, with living plants, shrubs and trees properly spaced and managed so they will not serve as ladder fuels during a wildfire.

Understanding Pyrophytic

A plant, shrub or tree with HIGH PYROPHYTIC properties means they will ignite easily and burn intensely.

Understanding the characteristics of Xeriscape plants, native plants, shrubs and trees, will help determine the correct placement and proper selection of your plants. This will help to make your landscape more fire resistant and help your local firefighters protect your home during the threat of a wildfire.

HIGH PYROPHYTIC plants, shrubs and trees should be planted in areas further than 15 feet from a structure, including decks and patios. Maintenance of high pyrophytic plants, shrubs and trees should include removing all dead plant material. The crowns (lower branches) of shrubs should be raised at least 2 to 3 feet off the ground and limited to a single specimen with spacing between plants of 2 times the height of the tallest shrub, unless the shrub is isolated or heavily modified.

For more information on how to make your home more fire resistant, log on to *www.thinisin.org*

Working Together
We Can Make the Big Bear Valley
A More Fire Safe, Firewise Community.

Get In The Race For Defensible Space

City of Big Bear Lake
Fire Department

This brochure was created in cooperation with the Big Bear Group of the Sierra Club







Can You Say...
"PYROPHYTIC"

BIG BEAR
Firewise
Planting Guide

Get In The Race For Defensible Space

City of Big Bear Lake
Fire Department

Firewise Brochure.qxd 6/4/08 10:29 AM Page 2

Many Xeriscape and native plants, shrubs and trees found in the Big Bear Valley are listed here, and are low in Pyrophytic properties (they **WILL NOT** easily ignite or burn intensely).

The Xeriscape and native plants, shrubs and trees listed that are in a ***RED BOLD ITALIC TYPEFACE*** & identified with the icon are HIGH in PYROPHYTIC PROPERTIES (they **WILL** easily ignite or burn intensely).

HIGH PYROPHYTIC plants, shrubs and trees should be planted in areas further than 15 feet from a structure, including decks and patios. Maintenance of HIGH pyrophytic plants should include removing all dead plant material. The crowns (lower branches) of shrubs should be raised at least 2 to 3 feet off the ground and limited to a single specimen with spacing between plants of 2 times the height of the tallest shrub, unless the shrub is isolated or heavily modified.

Flowering Perennials

Alum Root
Beardtongue
Bergenia
Blue Catmint
Buckwheat - Sulphur-flowered
Buckwheat - Wright's
Coral Bells
Daylily
Dianthus
Fuchsia - California
Goldenrod - California
Hollyhock
Honeysuckle
Iris - Bearded
Jupiter's Beard
Lamb's Ears
Lavender
Mallow - Apricot
Mint - Coyote
Mint - Hummingbird
Mojave Mound
Penstemon - Beakflowered
Penstemon - Bumblebee
Penstemon - Firecracker
Penstemon - Scarlet
Phlox - Creeping
Poppy - California
Poppy - Oriental
Poppy - Prickly
Primrose - California Evening
Primrose - Fragrant Evening
Rydberg's Horkelia
Sage - Desert Purple
Sage - Garden
Sage - Meadow
Sage - Rose
Sage - Russian
Sage - Silver
Wallflower - Western
Western Blue Flag
Whirling Butterflies
Yarrow - Moonshine
Yarrow - Paprika
Yarrow - Wooly

Shrubs

Bitter Brush –
Blue Mist
Butterfly Bush
Currant
Flannel Bush –
Gray Santolina (Lavender)
Juniper Shrubs (any type) –
Lilac
Manzanita - Greenleaf –
Mountain Mahogany (Ironwood) –
Mountain Whitethorn –
Oregon Grape
Sagebrush –
Serviceberry –
Snowberry
Wild Rose

Trees

Black Oak
Incense Cedar –
Jeffrey Pine –
Juniper – (all types, including Western Juniper)
Leyland Cypress –
Pinyon Pine –
White Fir –

CNPS San Diego Chapter California Native Plant Society

Sources for Native Plants in Southern California

Annual Plant Sales
Sources for California Native Seeds and Bulbs
CNPS San Diego Chapter Monthly Meetings: We usually carry a small selection of native plants at our monthly meetings. New members who sign up at the meeting will receive a free gift. For more info contact us info@cnpssd.org

Nurseries in the San Diego Area that Specialize in California Native Species

In addition to the following specialty nurseries, many other nurseries do grow and stock a limited choice of species.
Be aware that many lists of California Native Plants provided by non-speciality nurseries are not accurate.
If in doubt check on species on the Cal Flora www.calflora.org website or the San Diego Plant Atlas Project website www.sdplantatlas.org
If any readers learn of other nurseries in the Southern California region, please contact me - Kay Stewart

Cal-Native Plants Nursery, (Formerly Plants for Dry Places) 25735 Garbani Road, Menifee, CA (near Temecula) 92584, ph 909-301-8075/fax 909-301-8314. Specializing in natives under new ownership.

****new****City Farmers Nursery**, San Diego. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 4832 Home Ave. San Diego CA 92105. 619-284-6358. Ask for Farmer Bill.

****new**** **Cedros Gardens**, Solana Beach. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 330 South Cedros Ave., Solana Beach CA 92075. 858-792-8640. Ask for Mia or Matt.

Coastal Sage Gardening, 3685 Voltaire Street, (Ocean Beach), San Diego, CA 92106-1253, ph 619-223-5229. A garden shop with a selection of native plants and wildflower seeds. Owner John Noble will deliver plants from Tree-of-Life Nursery. Open weekends or by appointment, email coastalsagegardening@cox.net

El Nativo Growers, 200 S. Peckham Rd., Azusa, CA 91702-3238, ph 626-969-8449/fax 626-969-7299. Well-established wholesale grower, 500 species in sizes from 4" to 24" box for some trees; will contract grow.

****new**** **El Plantio Nursery**, Escondido. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 1322 san Pasqual Valley Road, Escondido CA 92027. 760-745-8736.

****new** Green Thumb Nursery**, San Marcos. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 1019 San Marcos Blvd. San Marcos CA 92069. Contact Jeff Funk. 760-744-3822.

Las Pilitas Nursery, Nelson Way at Old Highway 395, Escondido, CA 92026, ph 760-749-5930. The satellite of a 30-year old natives nursery near Morro Bay. Increasing variety, 1 to 5 gallon sizes. Retail, wholesale, contract grow, consulting, growing guide.

Manzanita Native Plant Nursery, 39397 Highway 94, Boulevard, CA 91905, ph 619-733-9843, manzanitanursery@aol.com. Most Saturdays or by appointment. Local California native conifers, penstemons and other interior natives and carries more familiar species and cultivars as well. Will contract grow.

Matilija Nursery, 8225 Waters Road, Moorpark, CA 93021, ph 805-523-8604, matilijanursery@gtemail.net. Entertaining web site includes contests and details on the plants available. Wholesale and retail available.

Mission Hills Nursery , 1525 Fort Stockton Dr. San Diego, ph. 619-295-2808. Now has California Native Plants. Currently there are 40 species in stock but an additional 150 species are available for special order. For special orders, you can download the availability list at www.moosacreeknursery.com/availability-list.pdf. The prices are very reasonable so stop by this weekend and check it out!
Fausto, the owner, or Tiger the Manager will be happy to help with your native plant requirements.

Moosa Creek Nursery, 28435 Wilkes Road, Valley Center, CA 92082, Hank and Su Kraus, ph 760-749-3216, Grow plants from San Diego County chaparral and woodlands. Availability list on website and monthly plants.

Native Plant Connection, in the Descanso area, juljanssen@yahoo.com , (619) 445-8771

Rancho Jojoba Nursery, 11935 Hwy 67, Lakeside, CA 92040, ph 619-561-0751/fax 619-504-2017, allenj.k@sbcglobal.net. Stocks and grows a wide variety of native plants, wholesale and retail.

Rancho Santa Ana Botanical Garden,100 N. College Ave, Claremont, CA 91711-3157, ph 909-625-8767/fax 909-626-7670. Rancho Santa Ana Botanic Garden is devoted to the collection, cultivation, study, and display of native California plants and to graduate training and research in plant systematics and evolution. Native plants are sold during the Fall Sale on the first weekend of November, the Spring Sale on the first Saturday in April, and in the Garden Shop year-round except during the summer.

Recon Native Plant Nursery, Wholesale to the industry, 1755 Saturn Blvd. San Diego, CA 92154 Ph: 619-423-2284 Fax: 619-423-0632. Large grower of native plants to the Southwestern US. Current plant inventory available online, contract grow, and consulting. Plants grown at Recon now available at these retail locations: Simpsons Garden Town in Jamul, Miramar Wholesale Nursery (over 70 varieties in stock, ask for Wayne), Walter Andersen Nursery in Pt. Loma.

****new** San Carlos Hardware**, San Carlos. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 7375 Jackson Drive, San Diego CA 92119

Santa Barbara Botanic Garden, 1212 Mission Canyon Road, Santa Barbara, CA 93105, ph 805-682-4726 x127. Sells plants and seeds in the gift shop.

Simpsons Garden Town in Jamul

Theodore Payne Foundation for Wildflowers and Native Plants, 10459 Tuxford Street, Sun Valley, CA 91352-2126, ph 818-768-1802. 80-year old nonprofit retail nursery sells California native plants, seeds and books. Over 300 native species for sale.

Tree of Life Nursery, Mailing: PO Box 635, San Juan Capistrano, CA 92693; Physical: 33201 Ortega Highway, San Juan Capistrano, CA 92675, ph 949-728-0685, fax 949-728-0509. Wholesale, restoration, contract grow; retail Monday through Friday and most Saturdays. Over 600 types of native plants for landscaping and revegetation.

****new**** **Walter Anderson**, Poway. 40 different native plant species available with ability to special order 200 additional species and have them delivered within one week. 12755 Danielson Court, San Diego CA 92064. Contact David. 858-513-4900.

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Horticulture | **Home**