FIRE PROTECTION PLAN
Stoneridge Commerce Center
County of Riverside

Prepared for:

Richland Properties
144 North Orange Street
Orange, California 92866
Contact: Brian Hardy, Vice President-Land Entitlement

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Michael Huff, Project Manager

NOVEMBER 2019

Table of Contents

APPENDICES

FIGURES

TABLES

Executive Summary

This Fire Protection Plan (FPP) has been prepared for Stoneridge Commerce Center (Proposed Project) located in the eastern portion of the unincorporated area in the County of Riverside, California. This FPP evaluates and identifies the potential fire risk associated with the Proposed Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, 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 Riverside County Fire Department (RCFD) along with project-specific measures based on the site, its intended use, and its fire environment.

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

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

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

The developed portion of this property is proposed for improvements that include construction of approximately 8.8 million square feet of commercial development on roughly 699 gross-acres. 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 all sides of every building. Water availability and flow will be consistent with requirements including fire flow and hydrant distribution required by local and state codes. These features along with the ignition resistance of all buildings, the interior sprinklers, and the pre-planning, training and awareness will assist responding firefighters through prevention, protection and suppression capabilities.

As detailed in this FPP, the project site's fire protection systems will include a redundant layering of protection methods that have proven to reduce overall fire risk. The requirements and recommendations included herein are performance based and site–specific, considering the Project's unique characteristics rather than a prescriptive, one-size-fits-all approach. The fire protection systems are designed to increase occupant and building safety, reduce the fire risk on site, to minimize risks associated with typical uses, and aid the

responding firefighters during an emergency. No singular measure is intended to be relied upon for the site's fire protection, but rather, a system of fire protection measures, methods, and features combine to result in enhanced fire safety, reduced fire potential, and improved safety in the development.

Early evacuation for any type of wildfire emergency at Stoneridge Commerce Center Project is the preferred method of providing for occupant and business safety, consistent with the Owner's and RCFD current approach for evacuation. As such, Stoneridge Commerce Center Project's Owner and Property Management Company will formally adopt, practice, and implement a "Ready, Set, Go!" (Riverside County Fire Department 2018) approach to site evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the state of California and most fire agencies, including; Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing potential for errors, maintaining the site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and site uses during periods of fire weather extremes.

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

1. Project buildings will be constructed of ignition resistant[1] construction materials and include automatic fire sprinkler systems based on the latest adopted Building and Fire Codes for occupancy types.
2. Fuel Modification will be provided as needed around the perimeter of the site, as required by RCFD and will be 100 feet wide. If an area exits where 100 feet of fuel modification cannot be achieved, exterior building construction will be further enhanced to provide a 1-hour to 2-hour rated exterior wall with no openings, or with fire rated and protected door openings, based on requirements and approval of RCFD. On-going maintenance will managed by Owner's, Property Management Company, or another approved entity, at least annually or as needed.
3. Landscape plantings will not utilize prohibited plants that have been found to be highly flammable.
4. Fire apparatus access roads (i.e., public and private streets) will be provided throughout the commercial development and will vary in width and configuration, but will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances required by applicable codes. Primary access and internal circulation will comply with the requirements of the RCFD.
5. Buildings will be equipped with automatic commercial fire sprinkler systems meeting RCFD requirements.
6. Water capacity and delivery provide for a reliable water source for operations and during emergencies requiring extended fire flow.
7. The Property Owner's or Property Management Company, will provide business owners informational brochures at time of occupancy, which will include an outreach and educational role to ensure fire safety measures detailed in this FPP have been implemented and prepare development-wide "Ready, Set, Go!" plans.

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

1 Introduction

This Fire Protection Plan (FPP) has been prepared for the proposed Stoneridge Commerce Center Project (Proposed Project) in easterly portion of Riverside County (County), California. The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. Additionally, this plan generates and memorializes the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the Riverside County Fire Department (RCFD). Requirements and recommendations are based on site-specific project characteristics and incorporate input from the project applicant and the FAHJ.

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

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

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

1.1 Applicable Codes/Existing Regulations

This FPP demonstrates that Stoneridge Commerce Center Project will comply with applicable portions of Riverside County Fire Department, Fire Prevention Standards and County Ordinances No. 460 and No. 787-8. The project will also be consistent with the 2016 edition of the California Building Code (CBC), Chapter 7A; 2016 edition of the California Fire Code (CFC), Chapter 49; and the 2015 edition of the International Fire Code (IFC) as adopted and amended by RCFD. Additionally, RCFD references Fire Prevention Standards for informational purposes in clarifying and interpreting provisions of the CFC, National Fire Protection Association (NFPA) and California Public Resources Code (PRC). Chapter 7A of the CBC focuses primarily on preventing ember penetration into buildings, a leading cause of structure loss from wildfires.

Thus, it is an important component of the requirements of this FPP given the Project's wildland-urban interface (WUI) location is primarily in an area statutorily designated as a High Fire Hazard Severity Zone (FHSZ) local responsibility area (LRA) by California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2008). The designations of Fire Hazards are based on topography, vegetation, and weather, amongst other factors with more hazardous sites, which include steep terrain, un-maintained fuels/vegetation, and WUI locations. As described in this FPP, the Proposed Project will meet all applicable fire and building code requirements for building in these higher fire hazard areas, or meet the intent of the code through the application of site-specific fire protection measures. These codes have been developed through decades of after fire structure save and loss evaluations to determine what causes building loss during wildfires. The resulting fire codes now focus on mitigating former structural vulnerabilities through construction techniques and materials so that the buildings are resistant to ignitions from direct flames, heat, and embers, as indicated in the 2016 California Building Code (Chapter 7A, Section 701A Scope, Purpose and Application).

1.2 Stoneridge Commerce Center Project Summary

1.2.1 Project Overview

In April 1992, the County of Riverside Board of Supervisors approved the Stoneridge Specific Plan No. 239 (SP 239), and certified its Environmental Imapct Report (SCH No. 1988103120). The adopted 605.4-acre Specific Plan provided for residential units, commercial/mixed-use land uses, three school sites, and a fire station. The Proposed Project provides for a light industrial and retail center on approximately 699.5 acres (See Project Description, below). This Stoneridge Commerce Center Specific Plan is Amendment #1 to the approved Stoneridge Specific Plan No. 239 (SP239A1).

1.2.2 Location

The 699.5-gross-acre project site is located in the Lakeview/Nuevo Area Plan in the western portion of Riverside County. The proposed project site is approximately 0.5-mile east of the City of Perris, approximately one mile south of Lake Perris, approximately three miles south-southeast of the city of Moreno Valley. (Figure 1, Project Location Map). More specific, the Proposed Project site is located, immediately South of Ramona Expressway and the alignment of the Mid-County Parkway, immediately north of Nuevo Road, and west of San Jacinto River.. The Proposed Project site is situated within Sections 14 and 23 of Township 4 South, and Range 3 West on the Perris, California, United States Geological Survey (USGS), 7.5-minute topographic map.

Stoneridge Commerce Center Project site is located on the following Assessor Parcel Numbers: 397-090-002; 307-100-004; 307-100-005; 307-070-005; 307-080-008; 307-070-003; 307-080-005; 307-110-008; 307-230-019; 307-090-001; 307-090-005; 307-100-001; 307-110-003; 307-080-006; 307-090-004; 307-100-003; 307-110-007; 307-220-001; 307-230-020; 307-070-004; and 307-090-006.

1.2.3 Existing Land Use

The Project site is currently undeveloped land that has been subject to disturbances from various sources including, off-road vehicles and trash dumping. The proposed parcels are primarily vegetated with non-native grasses and sage scrub. Numerous dirt roads were observed throughout the site. The site's terrain is relatively flat, with gentle slopes toward the southeast.

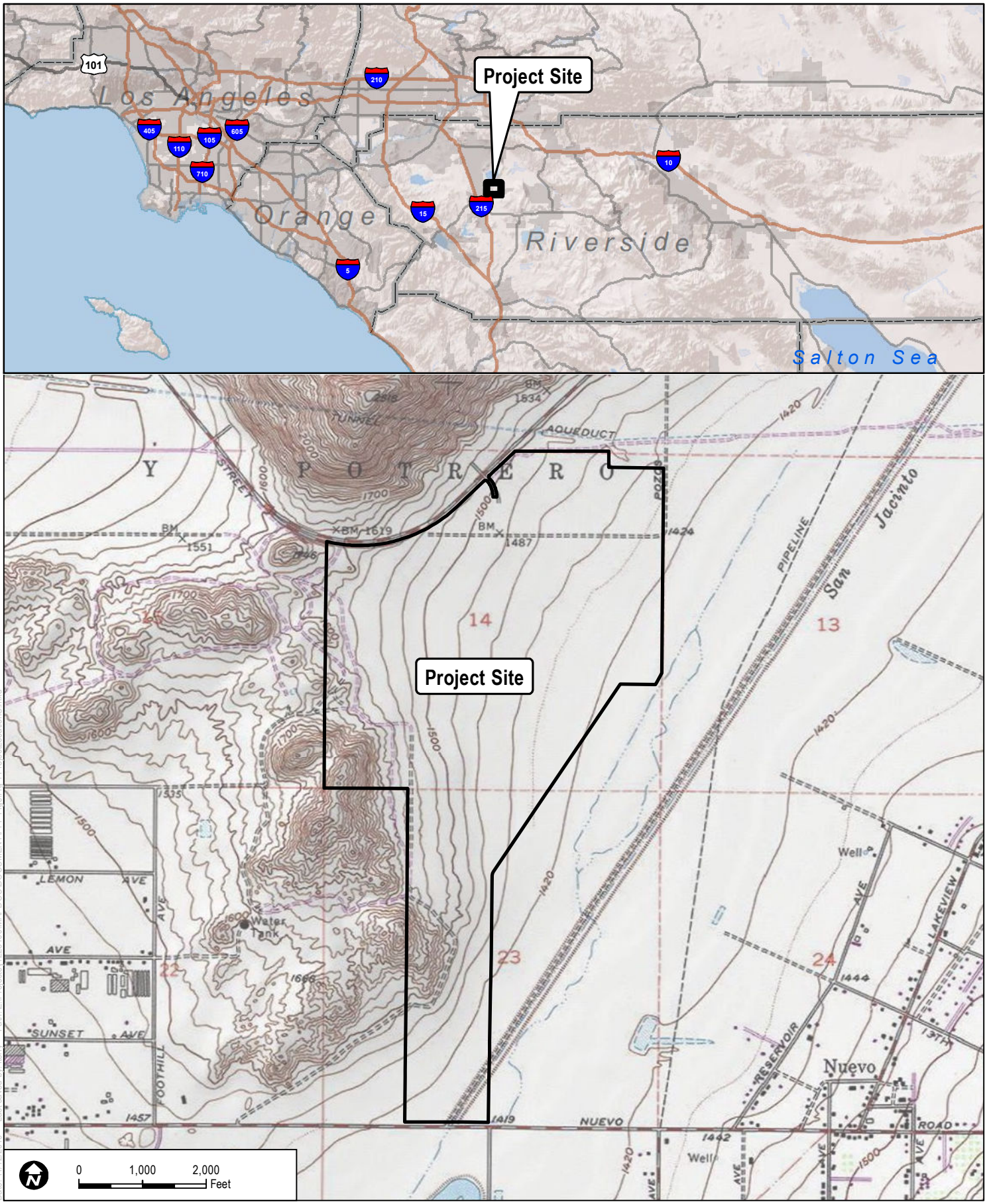
Surrounding Land uses that lie adjacent to the Proposed Project site include the Riverpark Mitigation Bank, McCanna Hills Specific Plan (SP 246), and undeveloped, vacant land. Land associated with the Riverpark Mitigation Bank is located to the east of the site and proposes widening and improvements to the river banks for flood control and wildlife corridors. The bordering property to the west is undeveloped, vacant land within the boundaries of SP 246 and is planned for residential, open space, and public facility land uses. The Lakeside Middle School and Sierra Vista Elementary School are located approximately 0.5-mile west of the Stoneridge Commerce Center Specific Plan. The existing two lane wide, Ramona Expressway, follows the northern boundary of the Proposed Project site with the Lake Perris State Recreation Area located north of Ramona Expressway. Nuevo Road borders the southern boundary of the Proposed Project with vacant land, public facility land uses, and the San Jacinto River, which is located on the south side of Nuevo Road.

1.2.4 Project Description

The Stoneridge Commerce Center Project proposes development of approximately 699.5 acres for a master-planned, industrial mixed-use development (Figure 2, Land Use Plan). The Project is broken down into multiple Planning Areas for various uses (Refer to Figure 3, Conceptual Master Plan for building locations). The Stoneridge Commerce Center provides for a total maximum building space of 8,803,470 square feet and establishes: Light Industrial uses on approximately 442.8 acres with a maximum of 7,488,800 square feet of building space, Business Park uses on 83.4 acres with a maximum of 1,170,570 square feet of building space; Commercial Retail uses with a maximum of 144,100 square feet of building space on 13.3 acres; 36.6 acres of Open Space-Conservation, and 81.6 acres of Open Space-Conservation Habitat. The proposed circulation pattern of arterial roads and access to proposed parking areas will divide the project site into 16 Planning Areas, with 4 of those proposed Planning Areas being set aside for dedicated open space. Circulation improvements with the development comprise the remaining 41.8 acres of the Stoneridge Commerce Center Project. Ramona Expressway and Nuevo Road provide primary local access to the Commerce Center and serve as important components of the Lakeview/Nuevo area's local circulation system. Antelope Road and Orange Avenue serve as the backbone arterials for the Stoneridge Commerce Center providing the connections between Ramona Expressway to the north, Nuevo Road to the south, and for through-traffic from the east and west.

The Stoneridge Commerce Center Project includes multiple structures composed of individual planning areas, which indicate the location of proposed uses for Business Park, Commercial and Industrial use and Open Space. Development within Stoneridge Commerce Center Project site will be formed in part by individual land uses, the composition of industrial and mixed-use product types, and internal street patterns. However, these industrial or mixed-use level delineations could change during the tentative parcel map stage of the development process. The accompanying infrastructure will consist of an internal road circulation system, water, sewer, and storm water drainage systems, and utilities.

INTENTIONALLY LEFT BLANK



SOURCE: USGS 7.5 Minute Series, Perris Quadrangle
Township 4 South, Range 3 West, Sections 14 and 23

DUDEK

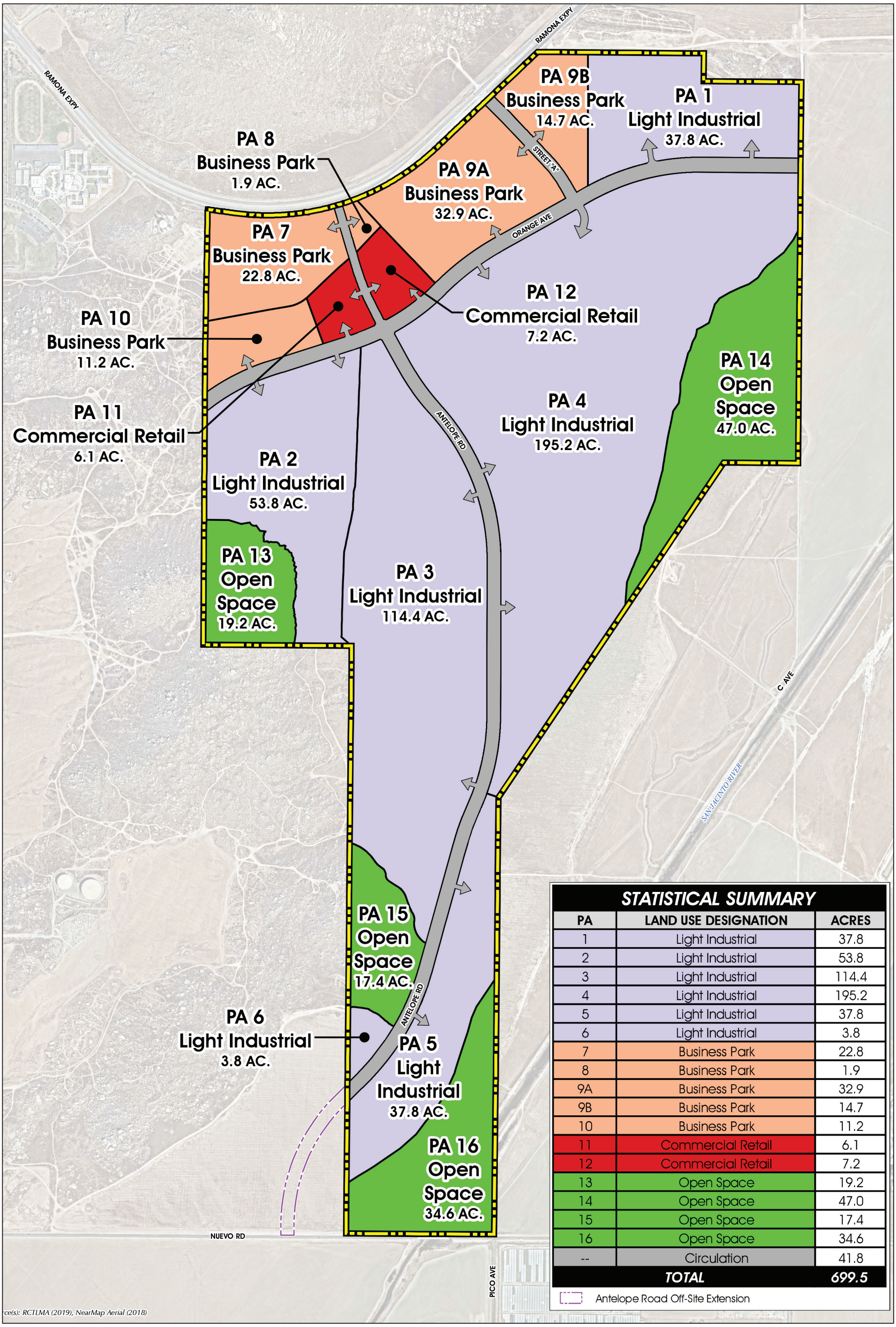
0 1,000 2,000 Feet

FIGURE 1

Project Location

Stoneridge Commerce Center Fire Protection Plan

INTENTIONALLY LEFT BLANK



STATISTICAL SUMMARY

PA	LAND USE DESIGNATION	ACRES
1	Light Industrial	37.8
2	Light Industrial	53.8
3	Light Industrial	114.4
4	Light Industrial	195.2
5	Light Industrial	37.8
6	Light Industrial	3.8
7	Business Park	22.8
8	Business Park	1.9
9A	Business Park	32.9
9B	Business Park	14.7
10	Business Park	11.2
11	Commercial Retail	6.1
12	Commercial Retail	7.2
13	Open Space	19.2
14	Open Space	47.0
15	Open Space	17.4
16	Open Space	34.6
--	Circulation	41.8
	TOTAL	**699.5**

Antelope Road Off-Site Extension

SOURCE: T&B PLANNING 2019

FIGURE 2

Project Land Use Plan

Stoneridge Commerce Center Fire Protection Plan

INTENTONALLY LEFT BLANK

PROJECT SUMMARY

INDUSTRIAL

BUILDING	LA: NET	BUILDING S.F.	COVERAGE
1	273,879	138,000	50.3%
2	228,058	100,000	43.8%
3	211,576	89,000	42.0%
4	202,480	93,000	45.9%
5	238,113	102,000	42.8%
6	307,085	150,000	48.8%
7	239,448	82,000	34.2%
8	397,614	189,000	47.5%
9	1,146,866	565,000	49.2%
10	471,371	175,000	37.1%
11	1,537,415	730,000	47.4%
12	3,014,973	1,575,000	52.2%
13	463,361	195,000	42.0%
14	124,194	41,000	33.0%
15	492,530	250,000	50.7%
16	658,668	312,000	47.3%
17	128,475	55,000	42.8%
18	3,326,111	1,760,000	52.9%
19	714,881	312,000	43.6%
20	850,771	446,000	52.4%
21	383,098	181,000	47.2%
22	523,568	228,000	43.5%
SUB-TOTAL	15,934,535	7,768,000	48.7%

LETTER LOTS

LOT	LA: NET	BUILDING S.F.	COV./ F.A.R.
A	456,764	192,000	±42.0%
B	899,011	360,000	±40.0%
C	226,701	72,000	±32.0%
D	192,712	59,000	±30.5%
E	109,469	60,000	±54.8%
F	216,299	87,000	±40.0%
SUB-TOTAL	2,100,956	830,000	±39.5%

GRAND TOTAL	18,035,491	8,598,000	~

CONSERVATION AREA/FLOODPLAIN

CONSERVATION AREA/FLOODPLAIN

CONSERVATION AREA

CONSERVATION AREA

PROP. TRACT BOUNDARY

MID COUNTY PARKWAY

N

0 150' 300' 600' 900'

DISCLAIMER:
ALL INFORMATION CONTAINED HEREIN MAY BE SUBJECT TO CHANGE PENDING OWNER AND OR AGENCY REVIEW AND IS FOR INFORMATION ONLY

SOURCE: T & B PLANNING 2019

DUDEK

FIGURE 3
Project Conceptual Master Plan
Stoneridge Commerce Center Fire Protection Plan

INTENTIONALLY LEFT BLANK

2 Proposed Project Site Risk Analysis

2.1 Field Assessment

A field assessment of Stoneridge Commerce Center Project area was conducted on October 17, 2019 in order to confirm/acquire site information, document existing site conditions, and to determine potential actions for addressing the protection of the project's structures. While on site, Dudek's Fire Planner assessed the area's topography, natural vegetation and fuel loading, surrounding land use and general susceptibility to wildfire. Among the field tasks that were completed are:

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

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

2.2 Site Characteristics and Fire Environment

Fire environments are dynamic systems and include many types of environmental factors and 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 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 the site is necessary to understand the potential for fire within and around the Proposed Project site.

The following sections discuss the site characteristics, local climate, and fire history within and surrounding the site. Stoneridge Commerce Center 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 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 Proposed Project site is generally situated along the eastern flank of relatively small hills associated with Lakeview Mountain plutonic rock and gently slopes southeast toward the San Jacinto River. The elevations on the site range from approximately 1,420 feet above mean sea level (amsl) in the east portion of the site to approximately 1,630 feet amsl in the northwest portion of the site.

2.2.2 Climate

Throughout southern California, and specifically at the project site, climate has a large influence on fire risk. The climate of Riverside County is typical of a Mediterranean area, with warm, dry summers and cold, wet winters. Temperatures average (average annual) around 61° F and reach up to 100°F. Precipitation has been averaging less than 16 inches and typically occurs between December and March. The prevailing wind is an on-shore flow between 7 and 11 mph from the Pacific Ocean.

Fires can be a significant issue during summer and fall, before the rainy period, especially during dry Santa Ana wind events. The seasonal Santa Ana winds can be particularly strong in the Project area as warm and dry air is channeled through nearby Cajon Pass from the dry, desert land to the east. Although Santa Ana events can occur anytime of the year, they generally occur during the autumn months, although the last few years have resulted in spring (April May) and summer events. Santa Ana winds may gust up to 75 miles per hour (mph) or higher. This phenomenon markedly increases the wildfire danger and intensity in the project area by drying out and preheating vegetation (fuel moisture of less than 5% for 1-hour fuels is possible) as well as accelerating oxygen supply, and thereby, making possible the burning of fuels that otherwise might not burn under cooler, moister conditions.

2.2.3 Vegetation

2.2.3.1 Fuels (Vegetation)

The Proposed Project property and surrounding areas primarily support disturbed habitat, non-native grasslands, and sage scrub plant community. Vegetation types were were derived from an on-site field assessment of the project site. The majority of the south and east facing slopes adjacent to the site are vegetated with sage scrub interspersed with large rock outcropping and boulder areas. The flat lands ae primarily disturbed, non-native grasslands. The vegetation cover types were assigned a corresponding fuel models for use during site fire behavior modeling. Section 3.0 describes the fire modeling conducted for the Project Area.

2.2.3.2 Vegetation Dynamics

The vegetation characteristics described above are used to model fire behavior, discussed in Section 3.0 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, non-native grass dominated plant communities

become seasonally prone to ignition and produce lower intensity, higher spread rate fires. In comparison, sage scrub can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels.

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

2.2.4 Fire History

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

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

Appendix B – Stoneridge Commerce Center Project Vicinity Fire History exhibit, presents a graphical view of the project area's recorded fire history. As presented in the exhibit, there have been 50 fires recorded since 1953 by CALFIRE in their FRAP database (FRAP 2018) [2] in the vicinity of the Proposed Project, including in the upper northwest third of the site. These fires, occurring in 1953, 1958 (x3), 1973, 1974, 1977, 1978, 1979 (x9), 1981 (x2), 1982, 1986, 1988 (x2), 1989, 1991, 1992, 1993, 1994, 1995, 1996 (x4), 1997 (x2), 1998 (x2), 2005, 2011 (x2), 2012, 2014, 2015 (x2) and 2016; burned within a five mile radius of the Project Area. A total of two

[2] Based on polygon GIS data from CAL FIRE's FRAP, which includes data from CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2018.

fires, ranging from 1,145 acres (Yeager Fire 1958) to 228 acres (#10 Fire), have burned onto the northwest portion of the Proposed Project site. Based on an analysis of the CAL FIRE FRAP fire history data set, specifically the years in which the fires burned, the average interval between wildfires in the area (includes areas up to roughly 5 miles from the project site) was calculated to be 2 years with intervals ranging between 1 and 7 years. Based on this analysis, it is expected that wildfire that could impact the project may occur, if weather conditions coincide, roughly every 2 years with the realistic possibility of shorter or longer interval occurrences, as observed in the fire history records.

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 adjacent to the project site given characteristic site features such as topography, vegetation, and weather. Dudek utilized BehavePlus software package version 5.5 (Andrews, Bevins, and Seli 2008) to analyze potential fire behavior for the northern, eastern, southern, and western edges of the project site, with assumptions made for the pre- and post-project slope and fuel conditions. Results are provided below and a more detailed presentation of the BehavePlus analysis, including fuel moisture and weather input variables, is provided in Appendix C.

3.2 Fire Behavior Modeling Analysis

An analysis utilizing the BehavePlus software package was conducted to evaluate fire behavior variables and to objectively predict flame lengths, intensities, and spread rates for four modeling scenarios. These fire scenarios incorporated observed fuel types representing the dominant on-site and off-site vegetation on vacant land to the north, east, south and west, in addition to measured slope gradients, and wind and fuel moisture values derived from Remote Automated Weather Stations (RAWs) weather data sets (Clark Station, ID No. 43624)) for both the 50th percentile weather (summer, on-shore winds) and the 97th percentile weather (fall, off-shore winds). Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent the site.

Vegetation types, which were derived from the field assessment for the project site, were classified into a fuel model. Fuel Models are simply tools to 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 anticipated pre- and post-project vegetation conditions, three different fuel models were used in the fire behavior modeling effort presented herein. Fuel model attributes are summarized in Table 1.

Table 1. Fuel Model Characteristics

Fuel Model Assignment	Description	Tons/acre, Btu/lb.	Fuel Bed Depth (Feet)
8	Fuel Modification Zone 1 – irrigated, landscapes	5.0 tons/acre; 8,000 Btu/lb.	<0.5
Gr4	Moderate Load, Dry Climate Grass	0.4 tons/acre; 8,000 Btu/lb.	<2.0 ft.
SH5	Dry Climate Shrub (sage scrub)	6.4 tons/acre; 8,000 Btu/lb.	<6.0 ft.

The results of fire behavior modeling analysis for pre- and post-project conditions are presented in Tables 2 and 3, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 4, BehavePlus Fire Behavior Analysis.

Table 2. BehavePlus Modeling Results for Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[2])	Spotting Distance[3] (miles)
Scenario 1: sage scrub-grasslands, 11% to 52% slope, 35 mph high wind speed (97th Percentile)				
Fuel Model Gr4- grasses	30.4 (38.6)	9,518 (15,965)	10.0 (16.7)	1.5 (2.2)
Fuel Model Sh5- sage scrub	38.2 (46.9)	15,599 (24,346)	5.0 (7.4)	1.7 (2.5)
Scenario 2: grasslands, 3% slope, 35 mph high wind speed (97th Percentile)				
Fuel Model Gr4	30.5 (38.6)	9,548 (15,996)	10.0 (16.8)	1.5 (2.2)
Scenario 3: grasslands, 3% slope, 20 mph high wind speed (50th Percentile)				
Fuel Model Gr4	13.3	1,582	2.2	0.6
Scenario 4: Sage scrub, 27% downhill slope, 20 mph sustained winds (50th Percentile)				
Fuel Model Sh5	17.9	3,019	1.3	1.3

Table 3. BehavePlus Modeling Results for Post-Project Conditions

Scenario	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph[2])	Spotting Distance[2] (miles)
Scenario 1: Fuel treatments on south-facing, approximately 3% slope, 35 mph maximum winds (97th Percentile)				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 2: Fuel treatments on flat, landscaped area, 35 mph maximum winds (97th Percentile)				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 3: Fuel treatments on flat, landscaped area, 20 mph maximum winds (50th Percentile)				
Fuel modification zone 1 (FM8)	1.6	15	0.05	0.1
Scenario 4: Fuel treatments on flat, landscaped area, 20 mph maximum winds (50th Percentile)				
Fuel modification zone 1 (FM8)	1.6	16	0.06	0.1

Notes (Tables 2 and 3):

1. Parentheses represents modeling results for 50 mph wind gusts.
2. mph = miles per hour
3. Spotting distance from a wind driven surface fire.

The results presented in Tables 2 and 3 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, 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 Summary

3.3.1 Existing Condition

As presented in Figure 4, wildfire behavior in non-treated sage scrub, modeled as a Sh5, and non-native grasslands, modeled as a Gr4, varies based on timing of fire (Refer to Table 2). A worst-case fire under gusty Santa Ana winds and low fuel moistures is expected to be fast moving between 7.4 (sage scrub fuel type) and 16.7 mph (grass fuel type). Flame length values with intense radiant heat would range between 38.6 feet to 46.9 feet for grass and sage scrub fuels burning, respectively, in specific portions adjacent to the property. Spotting is projected to occur up to nearly 1.3 miles during a fire influenced by onshore winds and nearly 2.5 miles during a fire fanned by offshore, gusty winds.

3.3.2 Post-development Condition

As presented in Table 3, Dudek conducted modeling of the site for post-FMZ fuel recommendations for this project. Fuel modification includes establishment of irrigated landscaping on the periphery of the proposed commercial development. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the FMZ 1 (Fuel Model 8). Fuel model assignments for all other areas remained the same as those classified for the existing condition. As depicted, the fire intensity and flame lengths in untreated, biological open space areas would remain the same. Conversely, the FMZ areas experience a significant reduction in flame length and intensity. The 46.9-foot (sage scrub fuel bed) and 16.8-foot (grass fuel bed) tall flames predicted during pre-treatment modeling during extreme weather conditions are reduced to less than 3.0 feet tall at the outer edges of the development due to the higher live and dead fuel moisture contents.

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, like those found adjacent to Stoneridge Commerce Center site. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from forest to grasslands, become highly flammable each fall and 2) the climate of southern California has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with high winds (Santa Ana) occurring during autumn after a six-month drought period each year. Based on this research, the anticipated growing population of northwest Riverside County WUI areas, and the regions fire history, it can be anticipated that periodic wildfires wildfires may start on, burn onto, or spot into the site. The most common type of fire anticipated in the vicinity of the Project Area is a wind-driven fire from the north/northeast, moving through the non-native grasses and sage scrub shrubs found on the slopes and base of the Bernasconi Hills.

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 Stoneridge Project, once developed, would not facilitate wildfire spread and would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire site landscape.

BehavePlus Fire Behavior Modeling Inputs

Variable	50th Percentile (Onshore flow)	97th Percentile (Offshore/Santa Ana condition)
1h Moisture	5%	1%
10h Moisture	6%	2%
100h Moisture	12%	6%
Live Herbaceous Moisture	48%	30%
Live Woody Moisture	96%	50%
20-foot Wind Speed	10-20 mph	35 mph (50 mph gusts)
Slope Steepness	3% to 33%	3% to 52%
Wind Adjustment Factor	0.4	0.4

BehavePlus Fire Behavior Model Results
Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: sage scrub-grasslands, 11% to 52% slope, 35 mph high wind speed				
Fuel Model Gr4- grasses	30.4 (38.6)	9,518 (15,965)	10.0 (16.7)	1.5 (2.2)
Fuel Model Sh5- sage scrub	38.2 46.9)	15,599 (24,346)	5.0 (7.4)	1.7 (2.5)
Scenario 2: grasslands, 3% slope, 35 mph high wind speed				
Fuel Model Gr4	30.5 (38.6)	9,548 (15,996)	10.0 (16.8)	1.5 (2.2)
Scenario 3: grasslands, 3% slope, 20 mph high wind speed				
Fuel Model Gr4	13.3	1,582	2.2	0.6
Scenario 4: Sage scrub, 27% downhill slope, 20 mph sustained winds				
Fuel Model Sh5	17.9	3,019	1.3	1.3

BehavePlus Fire Behavior Model Results
Post-Project Conditions

Scenario	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: Fuel treatments on south-facing, approximately 3% slope, 35 mph maximum winds				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 2: Fuel treatments on flat, landscaped area, 35 mph maximum winds				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 3: Fuel treatments on flat, landscaped area, 20 mph maximum winds				
Fuel modification zone 1 (FM8)	1.6	15	0.05	0.1
Scenario 4: Fuel treatments on flat, landscaped area, 20 mph maximum winds				
Fuel modification zone 1 (FM8)	1.6	16	0.06	0.1

SCENARIO RUN #1
SCENARIO RUN #2
SCENARIO RUN #3
SCENARIO RUN #4
Project Site

SOURCE: AERIAL-BING MAPPING SERVICE

DUDEK
0 350 700 1,400 Feet

FIGURE 4
BehavePlus Analysis Map
Stoneridge Commerce Center Fire Protection Plan

INTENTIONALLY LEFT BLANK

4 Emergency Response And Service

4.1 Emergency Response

The project site is located within Riverside County Fire Department (RCFD) response area, which includes Perris's corporate limits and the County areas within the City's sphere of influence. The City of Perris contracts with RCFD for emergency and administrative services. Table 4 presents a summary of the location, equipment, staffing levels, maximum travel distance, and travel time for the two closest, existing RCFD stations responding to the Project. Travel distances are derived from Google road data while travel times are calculated applying the nationally recognized Insurance Services Office (ISO) Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance). The ISO response travel time formula discounts speed for intersections, vehicle deceleration and acceleration, and does not include turnout time.

Table 4. Closest Responding RCFD Fire Stations Summary

Station No.	Location	Equipment	Staffing*	Maximum Travel Distance**	Travel Time**
90	333 Placentia Ave. Perris, California 92571	Medic Quint -75 Ft. Aerial	4	5.2 mi.	9 min. 29 sec.
3	30515 Tenth Street Nuevo, California 92567	Medic Engine Co.	3	6.0 mi.	10 min. 31 sec.

* Staffing levels per shift

** Assumes travel distance and time to the furthest point within the project site from either Station 3 or 90.

North Perris Station 90, staffed 24/7 with career firefighters, would provide initial response. Station 90 is located east of Interstate 215 at 333 Placentia Avenue. The North Perris Fire Station is staffed by RCFD with four captains, four engineers, four firefighter/paramedics, for a total staffing of 12 positions (covering three 24-hour shifts). It is equipped with one medic quint-aerial 75-foot ladder truck. Station 90 will be capable of responding within 6.7 minutes to the proposed northern entrance of the Stoneridge Commerce Center and 9.49 minutes to the most southernly portion of the site. Secondary response would be provided from RCFD Station 3, which is located east of the project site at 30515 Tenth Street in Nuevo, and can respond within 6 minutes to the southern entrance, and up to 10.5 minutes to the northeastern portion of the site. Station 3 staffs three on-duty, 24-hours per day and houses a Paramedic Engine.

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

On March 7, 2017, the Riverside County Board of Supervisors (Board) received and filed RCFD's "Alternative Staffing Model Recommendation." The Alternative Staffing Model Recommendation was fiscally driven and developed by RCFD due to funding difficulties to retain 3-person engine companies. The RCFD FY 17-18 Service Alternatives report, dated March 7, 2017, recommends the following response times based on four Board Approved Land Use Classifications as described in Table 5:

Table 5. Land Use Classification Information with Staffing/Time Response Standards

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

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

Based on the Project area's inclusion of large commercial and industrial complexes with approximately 2,514 employees on roughly 699-acre site, it is assumed that the Proposed Project may be classified as "Heavy Urban", with a 5.0-minute first-in fire engine response time. As previously mentioned, response to the Proposed Project site from the closest existing Fire Station (Station 90) would achieve a 6.7 minute travel time[3] to the entrance of the Stoneridge Commerce Center and approximately 9.5 minutes to the most southernly portion of the site. However, Fire Station 3 could cover the lower portion of the site within 8 minutes. Although this does not strictly conform to the 5 minute first-in engine for the entire project, the City has some latitude in strictly conforming to the 5 minute timeframe due to their 90% of the time language. This project may not adversely impact the overall goal achievement due to the low number of calls (discussed below) that are projected. Ultimately, the City will need to determine whether this timeframe is acceptable. If not acceptable, then mitigation may be proposed to the satisfaction of RCFD.

[3] Fire Station 90 is capable of responding to the site within 5 minutes (Station 90 Fire Captain, per phone comm., November 7, 2019).

4.2 Estimated Calls and Demand for Service from the Project

The following estimated annual emergency call volume generated by the Project (Commercial-Industrial products) is based upon per capita data for 2017 from RCFD calls within their jurisdiction[4].

- Total population[5] served by : 77,837
- Total annual calls: 7,166. Per capita call generation: 0.09
- Total annual fire calls, including structure, vegetation, vehicle fires, and other fire calls (4.61% of total calls): 330. Per capita call generation: 0.004
- Total annual Emergency Medical Services (76% of total calls): 5,410. Per capita call generation: 0.069
- Total other calls (Rescue, Traffic Collisions, Hazardous Materials, Public Service, etc.; 11.7% of total calls): 838. Per capita call generation: 0.011

Using the data above, the estimated annual emergency call volume for the Project site was calculated. In order to provide this conceptual estimate, Dudek made assumptions regarding industrial/mixed-use populations within Stoneridge Commerce Center Project. The commercial population is based on a conservative total of 7,542 occupants (Pokharel, pers. comm. October 2019) for all buildings and areas within this type of development. The onsite population for each building and areas of use within the building will vary based on occupancy classification and use. The number may likely be up to two-thirds lower than the estimate (7,542) provided, due to employee shift work, estimated transient population and operating hours of individual businesses. Based on this information, the total maximum estimated total population (which includes employees and transient use) of the Project site, is projected to be 2,514 persons (total occupant load for all buildings). Based on this population estimate, the calculated call volumes by type of call are provided in Table 5.

Table 6. Calculated Call Volume (Conceptual Based on 2,514 Persons)

Type of Call	Per Capita Call Generation Factor	Number of Estimated Annual Calls
Total Other Calls	0.011	28
Total Fires	0.004	10
Total EMS Calls	0.069	173
Total Calls	0.090	226

As mentioned, the new industrial/mixed-use development will increase the call volume at a rate of a conservatively calculated (the actual number of calls may be lower than this estimate) up to 226 calls per year

4 2017 Riverdside County Fire Department Annual Report and City of Perris Incidents for fiscal year 2017, Page 14.5 City of Perris 2018 Southern California Association of Government Annual Report

5 City of Perris 2018 Southern California Association of Government Annual Report

(4 calls per week or 17 calls per month). Fire Stations 3 and 90 combined emergency responses in 2017[6] totaled 7,166 calls per year (20 calls per day, or approximately 10 calls per day per station). The level of service demand for the Project raises overall call volume, but is not anticipated to impact the existing fire stations to a point that they cannot meet the demand. For perspective, five calls per day are typical in an urban or suburban area. A busy fire station company would be one with 10 to 15 or more calls per day. When Stoneridge Commerce Center Project site is built out, Fire Station 90 could potentially respond to an additional 4 calls per week, although the number will likely be lower than that based on the conservative nature of the population and calls per capita data used in this estimate.

6 2017 Summary of Division 1- Perris Call Volume Data; provided by 2017 Riverside County Fire Department Annual Report

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

The RCFD Fire Code and 2016 CFC and 2016 CBC adopted by reference with several modifications) governs 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 warranted. The following summaries highlight important fire protection features.

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

A response map update, including roads and fire hydrant locations, in a format compatible with current RCFD mapping shall be provided to Riverside County Fire Department (CAL Fire)

5.1 Roads

5.1.1 Access

Site access, including road widths and connectivity, will comply with the requirements of the Road Circulation and Design Guidelines and will include:

- Primary access to the Project site will be provided by Ramona Expressway, and proposed onsite roads Antelope Road (runs north to south) and Orange Avenue (runs east to west) within the project site, are designed as interior streets and will facilitate access throughout the site. Other interior roads will be provided to meet fire department access requirements to each structure. All perimeter roads comply with one-way access road standard of not less than 24 feet, unobstructed width and are capable of supporting an imposed load of at least 75,000 pounds (lbs.).
- 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 structure. Any dead-end streets serving new buildings that are longer than 150 feet shall have approved provisions for fire apparatus turnaround.
- Typical, interior Project roads, including collector and local roads, will be constructed to minimum 24-foot, unobstructed widths and shall be improved with aggregate cement or asphalt paving materials. Private or public streets that provide fire apparatus access to buildings three stories or more in height shall be improved to 30 feet unobstructed width. All interior residential streets will be designed to accommodate a minimum of a 75,000-lb. fire apparatus load.

- Private and public streets for each phase shall meet all project approved fire code requirements and/or mitigated exceptions for maximum allowable dead-end distance, paving, and fuel management prior to combustibles being brought to the site.
- Vertical clearance of vegetation (lowest-hanging tree limbs), along roadways will be maintained at clearances of 14 feet, 6 inches to allow fire engines passage. Unobstructed vertical clearance must be clear to the sky to allow aerial ladder truck operation.
- Roads with a median or center divider will have 20 feet unobstructed width on both sides of the center median or divider. Maximum road grade will not exceed 15%.
- Cul-de-sacs and fire apparatus turnarounds will meet requirements and RCFD Fire Prevention Standards.
- Any roads that have traffic lights shall have approved traffic pre-emption devices (Opticom) compatible with devices on the Fire Apparatus.
- Roadways and/or driveways will provide fire department access to within 150 feet of all portions of the exterior walls of the first floor of each structure.
- Roadway design features (e.g., speed bumps, humps, speed control dips, planters, and fountains) that could interfere with emergency apparatus response speeds and required unobstructed access road widths will not be installed or allowed to remain on roadways. Traffic Calming features, such as speed dots, will be allowed approximately every 650 feet in and adjacent to residential and park areas.
- 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 RCFD for updating of Fire Department response maps.

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

- Each planning area varies in the number of ingress/egress roads or streets. All areas shall include at least two ingress/egress streets. Dead end streets no longer than 350 feet shall have approved provisions for fire apparatus turnaround or cul-de-sac. Cul-de-sac streets may exceed 350 feet, but not 600 feet in length with provisions for appropriate mitigations to the approval of the Fire Marshal or Fire Chief.
- Fire apparatus turnarounds to include turning radius of a minimum 45 feet, measured to inside edge of improved width (RCFD Fire Prevention Standard).

5.1.3 Gates

Gates on private roads are permitted, but subject to Fire Code requirements and standards, including:

- Gates shall be equipped with conforming sensors for detecting emergency vehicle “opticom” strobe lights from any direction of approach, if required.
- All entrance gates will be equipped with a key switch, which overrides all command functions and opens the gate.
- Gate activation devices will be equipped with a battery backup or manual mechanical disconnect in case of power failure.

- Further, gates will be:
  - Minimum 20 feet wide of clearance for one-way traffic when fully open at entrance.
  - Minimum of two feet wider than road width at exit.
  - Constructed from non-combustible or exterior fire-rated treated wood materials.
  - Inclusive of provisions for manual operation from both sides, if power fails. Gates will have the capability of manual activation from the development side or a vehicle (including a vehicle detection loop).

5.1.4 Driveways

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

- Grades 15% or less with surfacing and sub-base consistent with .

5.1.5 Premises Identification

Identification of roads and structures will comply with RCFD Fire Prevention Standards, as follows:

- All commercial/industrial structures required to be identified by street address numbers at the structure. Numbers to be minimum 8 inches high with 1-inch stroke, visible from the street. Numbers will contrast with background and shall be electrically illuminated during the hours of darkness where building setbacks exceed 100 feet from the street or would otherwise be obstructed; numbers shall be displayed at the property entrance. Numbers will contrast with background.
- Multiple structures located off common driveways or roadways will include posting addresses on structures and on the entrance to individual driveway/road or at the entrance to the common driveway/ road for faster emergency response.
- Proposed private and public streets within the development will be named, with the proper signage installed at intersections to satisfaction of the Department of Public Works.
- Streets will have street names posted on non-combustible street signposts. Letters/numbers will be per RCFD standards.
- Temporary street signs shall be installed on all street corners within Stoneridge Commerce Center Project Projects prior to the placing of combustible materials on site. Permanent signs shall be installed prior to occupancy of buildings.

5.1.6 Ongoing Infrastructure Maintenance

Stoneridge Commerce Center Project Owner/Property Management Company shall be responsible for long term funding and maintenance of internal private roads.

5.1.7 Pre-Construction Requirements

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

5.2 Ignition Resistant Construction and Fire Protection Systems

All new structures within Stoneridge Commerce Center Project Proposed Project site will be constructed to Fire Code standards. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the 2016 CBC (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. Appendix D provides a summary of the requirements for ignition resistant construction.

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

5.3 Fire Protection Systems

5.3.1 Water Supply

Water service for Stoneridge Commerce Center Project site will be provided by Eastern Municipal Water District through primary connection points to existing 36-inch waterlines at Walnut Avenue and a 36-inch waterline on Nuevo Avenue. Within the internal roadways, additional water supply lines ranging in size from 12 inch to 36-inch water lines will provide the main water supply to commercial and domestic service to each structure and common landscape area. These internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required on site fire hydrants and interior fire sprinkler systems for all structures. There are two existing 2.5 to 3 million gallon water tanks located off-site, approximately 500 feet west of the site.

5.3.2 Hydrants

Fire Hydrants shall be located along fire access roadways and adjacent to each structure, as determined by the RCFD Fire Marshal and current fire code requirements to meet operational needs. Fire Hydrants will be consistent with applicable Design Standards.

5.3.3 Fire Sprinklers

All structures, of any occupancy type, will be protected by an automatic, internal fire sprinkler system. Fire sprinklers systems shall be in accordance with RCFD, and National Fire Protection Association (NFPA) Standards 13. Fire sprinkler plans for each structure will be submitted and reviewed by RCFD for compliance with the applicable fire and life safety regulations, codes, and ordinances as well as the RCFD Fire Prevention Standards for fire protection systems.

5.4 Defensible Space and Vegetation Management

5.4.1 Defensible Space

WUI fire protection requires a systems approach, which includes the components of infrastructure and water, structural safeguards (addressed in the FPP), and adequate defensible space setbacks. This section provides defensible space details for Stoneridge Commerce Center Project Project.

5.4.2 Fuel Modification Zone Requirements

A fuel modification zone (FMZ) is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought-tolerant, fire resistant plants in order to provide a reasonable level of protection to structures from wildland fire. A typical landscape/fuel modification installation for Stoneridge Commerce Center Project consists of a 100-foot wide fuel management area from the side or rear lot boundary extending outwards towards undeveloped areas.

Cohen (1995) performed structure ignition fire research studies that suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid Structure Ignition Assessment Modeling results indicate that a 20-foot-high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas, a 70-foot-high flame requires about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). For this fire study example, bare wood was used, which is more combustible unlike the fire rated split face concrete masonry unit (CMU) and textured insulated metal panel exterior wall designs to be implemented on the Costco Warehouse building. For this project, assuming 45-foot flame lengths, reduced fuel modification zones are justifiable for limited areas.

Based on the site plan, the majority of the project site achieves 100 feet or more of on-site FMZ, which consists of asphalt roadways and parking stalls, and a fully irrigated landscape with RCFD approved plant species. However, some of the conceptual building footprints protrude into the 100 feet FMZ along the western boundary, more specifically, Buildings 21 and 22 located in Planning Area 2 of the development. This area is constrained to providing between 31 and 50 feet of achievable on-site fuel modification. Additionally, Buildings numbered as 15, 16 and 17 in Planning Area 5, are constrained to providing between 20 and 77 feet of achievable on-site fuel modification between the western and eastern boundary lines. Buildings 15, 16 and 17 are located adjacent to the proposed Open Space in Planning Areas 15 and 16. In addition, Building 9 shown in Planning Area 12, which is located adjacent to Open Space in Planning Area 14, is constrained to providing 70 feet of achievable on-site fuel modification. Appendix E, Conceptual Site Fuel Modification Plan shows the locations where 100 feet of FMZ is not achieveable.

Appendix E illustrates the configuration of the FMZs along the western boundary of Buildings 21 and 22 in Planning Area 2; the northern boundary of Building 17 in Planning Area 5, the eastern boundary of Buildings 15 and 16 in Planning Area 5 and the eastern boundary of Building 9 in Planning Area 12. For the area achieving less than 100 feet FMZ, the proposed building construction design features consisting of fire rated split face CMU and textured insulated metal panel exterior walls along the west side of each building, an National Fire Protection Association (NFPA) 13 Commercial Fire Sprinkler System, and fire rated exterior doors (including rated roll-up

doors), along with asphalt roadways and parking, and a fully irrigated landscape, would provide adequate separation and radiant heat protection from a wildfire. The final FMZ map is presented graphically for Stoneridge Commerce Center Project in Appendix E. Vegetation management will also be implemented as an interim FMZ throughout the construction phases for each structure as there may be a period as long as one or more years where developing phases are exposed on multiple sides to wildland fuels. FMZs will be implemented according to the following requirements for the entire Project.

5.4.2.1 Fuel Modification Zone Reduction Justifications

An important component of a fire protection system for this Project is the provision for ignition- resistant construction and modified vegetation buffers. The Fire and Building codes, structure ignition resistance requirements will enable the structures to withstand the type of wildfire that may occur in the fuels outside the development footprint. Fire behavior modeling, as previously presented, was used to predict flame lengths and was not intended to determine sufficient fuel modification zone widths. However, the results of the fire modeling provide important fire behavior projections, which is key supporting information for determining buffer widths that would minimize structure ignition and provide "defensible space" for firefighters. Based upon Dudek's analysis of the project, the enhanced building features and commercial interior fire sprinkler system augment the proposed reduced FMZ configuration for the west side of the project in Planning Area 2, buildings numbered as 21 and 22; the north side of Building 17 in Planning Area 5, the east side Buildings 15 and 16 in Planning Area 5 and the east side of Building 9 in Planning Area 12. The combination of these fire prevention measures provided as a functional safety equivalency of a 100-foot fuel modification zone. In addition to the above mentioned design features, Dudek recommends the following additional fire protection enhancement be required to provide further justification for the reduced FMZ along portions of the western boundary of the proposed structures:

- Structures in Planning Area 2, which include buildings 21 and 22, that have west-facing walls that will not meet the minimum 100-foot fuel modification requirement, shall provide enhanced Exterior wall construction. Walls shall be a minimum one-hour rated construction (or greater rating); with no openings, (windows or doors) unless openings are approved by RCFD. If exterior openings are provided in the west wall, exterior fire sprinklers are recommended.
- Structures in Planning Area 5, which include Buildings 15, 16 and 17; that have north or east facing walls that will not meet the minimum 100-foot fuel modification requirement, shall provide enhanced Exterior wall construction. Walls shall be a minimum one-hour rated construction (or greater rating), with no openings, (windows or doors) unless openings are approved by RCFD. If exterior openings are provided in the west wall, exterior fire sprinklers are recommended.
- Structures in Planning Area 12, which includes Building 9, that have east facing walls which will not meet the minimum 100 foot fuel modification requirement, shall provide enhanced Exterior wall construction. Walls shall be a minimum one-hour rated construction (or greater rating); with no openings, (windows or doors) unless openings are approved by RCFD. If exterior openings are provided in the west wall, exterior fire sprinklers are recommended.

5.4.2.2 Zone 1 – Irrigated Zone (0-50 feet wide)

Zone 1 is applicable site wide for every perimeter structure. Most of the interior landscaped areas also will meet Zone 1 standards. However, the FMZ Zone 1 occurs around the perimeter of the project's wildland exposures at Project build out. The standard Zone 1 will be 50 feet wide starting from the rear lot boundary for the perimeter

properties and moving outward. All highly flammable native vegetation, especially found on the Prohibited Plant List (Appendix F) shall be removed except for species approved by the fire marshal. This zone will be planted with drought-tolerant, less flammable plants. The Proposed Project's plant palette will be approved by the fire department. A permanent, automatic irrigation system will be installed in Zone 1 to maintain hydrated plants.

Zone 1 includes the following key components:

- All trees shall be planted and maintained at a minimum of 10 feet from the tree's drip line to any combustible structure
- Tree spacing of a minimum 10 feet between canopies
- Mature trees shall be limbed to eight feet or 3x the height of understory plants to prevent ladder fuels, whichever is greater. No tree limb encroachment within 10 feet of a structure or chimney, including outside barbecues or fireplaces
- Tree maintenance includes limbing-up (canopy raising) 6 feet or one-third the height of the tree
- Maintenance including ongoing removal and/or thinning of undesirable combustible vegetation, replacement of dead/dying plantings, maintenance of the programming and functionality of the irrigation system, regular trimming to prevent ladder fuels[7].
- A minimum of 36 inches wide pathway with unobstructed vertical clearance around the exterior of each structure (360°) provided for firefighter access (2016 CFC, Section 503.1.1). Within this clearance area, landscape such as low ground covers and shrubs are permitted so long as their placement and mature height do not impede firefighter access, consistent with purpose of this guideline.
- Trees and tree form shrub species that naturally grow to heights that exceed 2 feet shall be vertically pruned to prevent ladder fuels.
- Grasses shall be cut to 4 inches in height. Native grasses can be cut after going to seed
- Ground covers within first 3 feet from structure restricted to non-flammable materials, including stone, rock, concrete, bare soil, or other. Combustible ground covers, such as mulch or wood chips, are prohibited adjacent to structures with an exterior stucco wall and weep screed.

5.4.2.3 Zone 2 – Thinning Zone (50 feet wide)

A thinning zone reduces the fuel load of a wildland area adjacent to Zone 1, and thereby, reduces heat and ember production from wildland fires, slows fire spread, and reduces fire intensity. Zone 2 adjoins Zone 1 and measures 50 feet for this project.

Zone 2 includes the following key components if thinning of native vegetation is required:

- Zone 2 requires a minimum of 50% thinning or removal of plants (50% no fuel) focusing on removal of dead and dying plants and highly flammable species.
- Fuel continuity should be interrupted so that groupings of shrubs are separated from adjacent groupings.

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

- Maintenance including ongoing removal and thinning of dead/dying planting, and regular trimming to prevent ladder fuels.
- Trees and tree-form shrub species that naturally grow to heights that exceed 4 feet shall be vertically pruned to prevent ladder fuels.
- Grasses shall be cut to 4 inches in height. Native grasses can be cut after going to seed.
- Single specimen native shrubs, exclusive of chamise and sage, may be retained, on 20-foot centers.
- No vegetation found on the Prohibited Plant List (Appendix F) shall remain in Zone 2.

5.4.3 Vegetation Management Maintenance

Vegetation management, i.e., assessment of fuel modification zone condition and removal of dead and dying and undesirable species; as well as thinning as necessary to maintain specified plant spacing and fuel densities, shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined by the during the interim period where FMZ is maintained on- or off-site. The interim period vegetation management will be funded by Stoneridge Commerce Center and shall be conducted by their contractor. Stoneridge Commerce Center shall be responsible for all vegetation management throughout the mixed-use development, in compliance with the project FPP that is consistent with requirements.

The permanent FMZ required for Stoneridge Commerce Center Project will be maintained by the developer who will be responsible for FMZ vegetation management once the project is built out and the adjacent areas are developed. The Owner or Property Manager will be responsible for streetscape and public area vegetation management in perpetuity.

On-going/as-needed fuel modification zone maintenance during the interim period while Stoneridge Commerce Center Project is built out and adjacent parcels are developed, which may be one or more years, will include necessary measures for consistency with the FPP, including:

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

5.4.4 Environmentally Sensitive Areas/Open Space

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

5.4.5 Prohibited Plants

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

5.4.6 Construction Phase Vegetation Management

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

INTENTIONALLY LEFT BLANK

6 Wildfire Education Program

The business owners of the Stoneridge Commerce Center Project will be provided a proactive educational component disclosing the potential wildfire risk and this report's requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go[8]" stance on evacuation.

[8] https://www.Perris.org/DocumentCenter/View/2143/Personal-Wildfire-Action-Plan

INTENTIONALLY LEFT BLANK

7 Conclusion

This FPP for The Stoneridge Commerce Center Project provides guidance for vegetation maintenance for the proposed FMZs and landscaped areas on the site. As described, vegetation maintenance measures will be provided on all sides of the proposed development. The requirements and recommendations provided in this FPP have been designed specifically for the Stoneridge Commerce Center 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 Proposed Project design features, asphalt roads and parking stalls, and a fully irrigated landscape, along with the additional required fire protection measure for certain structures located on the west side of the project near the dedicated open space, would provide a level of safety equal to a 100-foot wide FMZ.

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

It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and minimizing actions identified in this report are designed to reduce the likelihood that fire will impinge upon Stoneridge Commerce Center Project assets or threaten its visitors. Additionally, there are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the fuel modification requirements provided in this FPP will reduce the site's vulnerability to wildfire. It will also help accomplish the goal of this FPP to assist firefighters in their efforts to defend structures.

It is recommended that Stoneridge Commerce Center 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. This 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 Stoneridge Commerce Center Project, determine that it is safer to temporarily refuge employees or visitors on the 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.

INTENTIONALLY LEFT BLANK

8 List of Preparers

Project Manager

Michael Huff
Senior Fire Protection Planner
Dudek

Fire Protection Plan Preparer

Robert Scott
Senior Fire Protection Planner
Dudek

Fire Behavior Modeling

Michael Scott
Senior Fire Protection Planner
Dudek

Computer Aided Design/Drafting

Lesley Terry
CADD Specialist
Dudek

INENTIONALLY LEFT BLANK

9 References

(including references from Appendices)

Alexander, M.E. 1998. Crown fire thresholds in exotic pine plantations of Australasia. Australian National University, Canberra, Australian Capital Territory. Ph.D. Thesis. 228p.

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

Andrews, P.L. 1980. Testing the fire behavior model. In Proceedings 6th conference on fire and forest meteorology. April 22–24, 1980. Seattle, WA: Society of American Foresters. Pp. 70–77.

Andrews, Patricia L., Collin D. Bevins, and Robert C. Seli. 2008. BehavePlus fire modeling system, version 3.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106 Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

Brown, J.K. 1972. Field test of a rate-of-fire-spread model in slash fuels. USDA Forest Service Res. Pap. Int-116. 24 p.

Brown, J.K. 1982. Fuel and fire behavior prediction in big sagebrush. USDA Forest Service Res. Pap. INT-290. 10p.

Bushey, C.L. 1985. Comparison of observed and predicted fire behavior in the sagebrush/ bunchgrass vegetation-type. In J.N. Long (ed.), Fire management: The challenge of protection and use: Proceedings of a symposium. Society of American Foresters. Logan, UT. April 17–19, 1985. Pp. 187–201.

FireFamily Plus 2008. http://www.firelab.org/project/firefamilyplus.

FRAP (Fire and Resource Assessment Program). 2008. California Department of Forestry and Fire Protection. Website Accessed October 2019, at: http://frap.cdf.ca.gov/.

Gordon, Hazel and T. C. White. 1994. Ecological Guide to Southern California Chaparral Plant Series for Tranverse and Penninsular Ranges: Angeles, Cleveland, and Riverside National Forests. USDA Forest Service Pacifica Southwest Region. R5-ECOL-TP-005. 162 p.

Grabner, K., J. Dwyer, and B. Cutter. 1994. “Validation of Behave Fire Behavior Predictions in Oak Savannas Using Five Fuel Models.” Proceedings from 11th Central Hardwood Forest Conference. 14 p.

Grabner, K.W. 1996. “Validation of BEHAVE fire behavior predictions in established oak savannas.” M.S. thesis. University of Missouri, Columbia.

Grabner, K.W., J.P. Dwyer, and B.E. Cutter. 2001. “Fuel model selection for BEHAVE in midwestern oak savannas.” *Northern Journal of Applied Forestry*. 18: 74–80.

Keeley, J.E. and S.C. Keeley. 1984. Postfire recovery of California coastal sage scrub. The American Midland Naturalist 111:105-117.

Keeley, J.E. and C.J. Fotheringham. 2003. "Impact of Past, Present, and Future Fire Regimes on North American Mediterranean Shrublands." In *Fire and Climatic Change in Temperate Ecosystems of the Western Americas,* edited by T.T. Veblem, W.L. Baker, G. Montenegro, and T.W. Swetnam, 218–262. New York, New York: Springer-Verlag.

Keeley, J.E. 2004. "Invasive Plants and Fire Management in California Mediterranean-Climate Ecosystems." Edited by M. Arianoutsou. *In 10th MEDECOS-International Conference on Ecology, Conservation Management*. Rhodes, Greece.

Lawson, B.D. 1972. Fire spread in lodgepole pine stands. Missoula, MT: University of Montana. 110 p. thesis.

Linn, R. 2003. "Using Computer Simulations to Study Complex Fire Behavior." Los Alamos National Laboratory, MS D401. Los Alamos, NM.

Marsden-Smedley, J.B. and W.R. Catchpole. 1995. Fire behaviour modelling in Tasmanian buttongrass moorlands. II. Fire behaviour. *International Journal of Wildland Fire*. Volume 5(4), pp. 215–228.

McAlpine, R.S. and G. Xanthopoulos. 1989. Predicted vs. observed fire spread rates in Ponderosa pine fuel beds: a test of American and Canadian systems. In Proceedings 10th conference on fire and forest meteorology, April 17–21, 1989. Ottawa, Ontario. pp. 287–294.

Michael Brandman Associates. 2007. Draft Biological Resources Assessment Report, Arboretum Project, Perris, Riverside County, California. December 2007.

Pokharel, M. 2019. "Proposal-Stonebridge." Personal communication (e-mail) with M. Pokharel (DPFG) and Dudek. October 15, 2019.

Quarles, S.L. and F.C. Beall. 2002. Testing protocols and fire tests in support of the performance-based codes. In 'Proceedings of the California 2001Wildfire Conference: 10Years after the 1991 East Bay Hills Fire', 10–12 October 2001, Oakland, California. University of California, Forest Products Laboratory, Technical Report 35.01.462, pp. 64–73. Richmond, California.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. GTR INT-143. Ogden, Utah: USDA Forest Service Intermountain Research Station.161 Rothermel, R.C., and G.C. Rinehart. 1983. "Field procedures for verification and adjustment of fire behavior predictions." Res. Pap. INT-142. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 25 p.

Rothermel, R.C., and G.C. Rinehart. 1983. "Field procedures for verification and adjustment of fire behavior predictions." Res. Pap. INT-142. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 25 p.

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

Sneeuwjagt, R.J., and W.H. Frandsen. 1977. "Behavior of experimental grass fires vs. predictions based on Rothermel's fire model." *Canadian Journal of Forest Resources*. 7:357–367.

Soil Conservation Service. 1980. Soil Survey of Riverside County, Southwestern Part, California.

Stoneridge Commerce Center Project Specfic Plan 239 - (A1) 2019. County of Riverside.

Syphard A.D., and J.E. Keeley. 2016. "Historical Reconstructions of California Wildfires Vary by Data Source." *International Journal of Wildland Fire* 25(12):1221–1227. https://doi.org/10.1071/WF16050.

USDA-Forest Service. 2016. Blue Cut Fire- San Bernardio National Forest, Front Country Ranger District Burned Area Report (FSH 2509.13). September 6, 2016. 39 p.

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

INTENTIONALLY LEFT BLANK

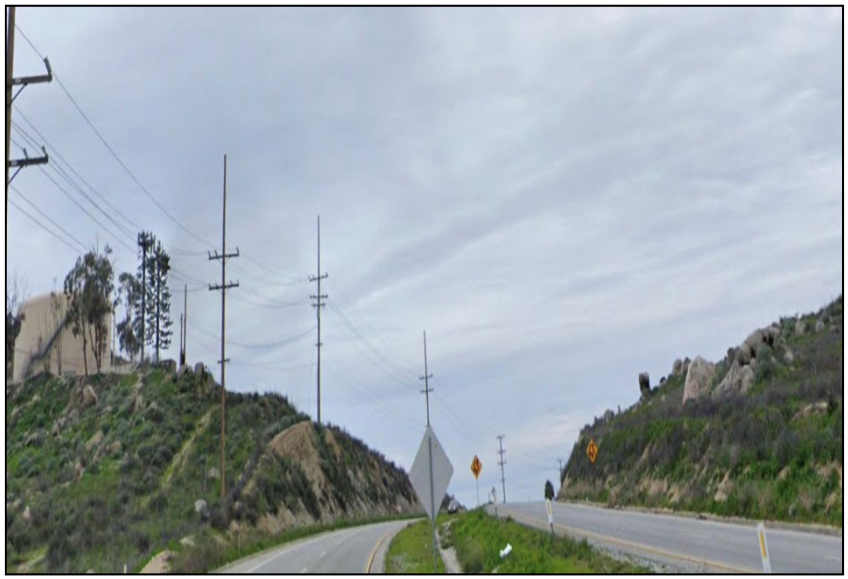
APPENDIX A

Representative Site Photographs

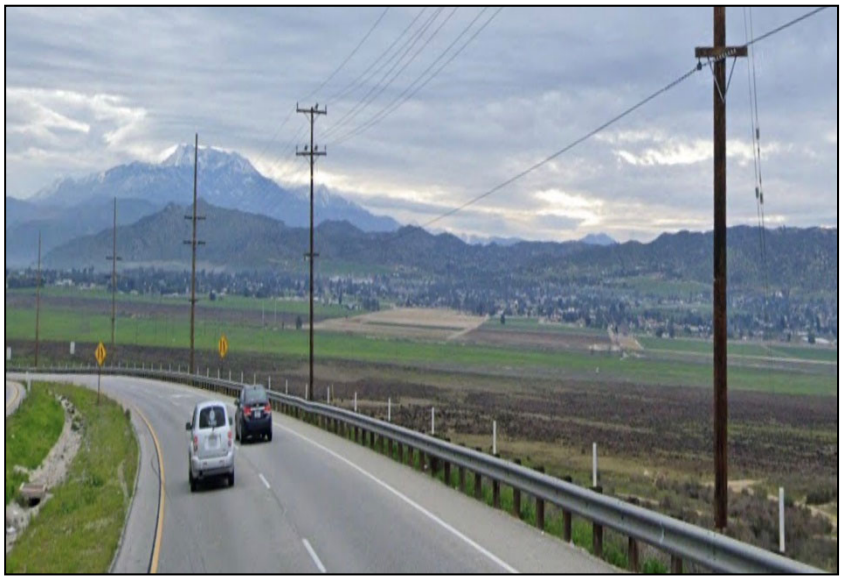
Stoneridge Commerce Center Project

PHOTOGRAPH LOG

Stoneridge Commerce Center Project
Photograph Log



Photograph 1. View to the west along Ramona Expressway near the northwest corner of the project site. The water tank on hillside is directly adjacent to project site.



Photograph 2. View to the east along Ramona Expressway. Power poles run parallel to project site along north edge of property at top of short slope.

Stoneridge Commerce Center Project
Photograph Log

Photograph 3. Panoramic view looking at the northwestern edge of the property. Dirt roads are run along the northwest boundary.

Photograph 4. View at northern edge of lot looking toward southwest corner of the property. Gently sloping terrain is vegetated with non-native grasslands. Existing dirt roads run parallel to Ramona Expressway and to the south of the property.

Stoneridge Commerce Center Project
Photograph Log

Photograph 5. View looking southeast at the project site. The terrain slopes gently from the west side.

Photograph 6. Panoramic View looking south at the Stoneridge project site The vegetation is primarily non-native grassland.

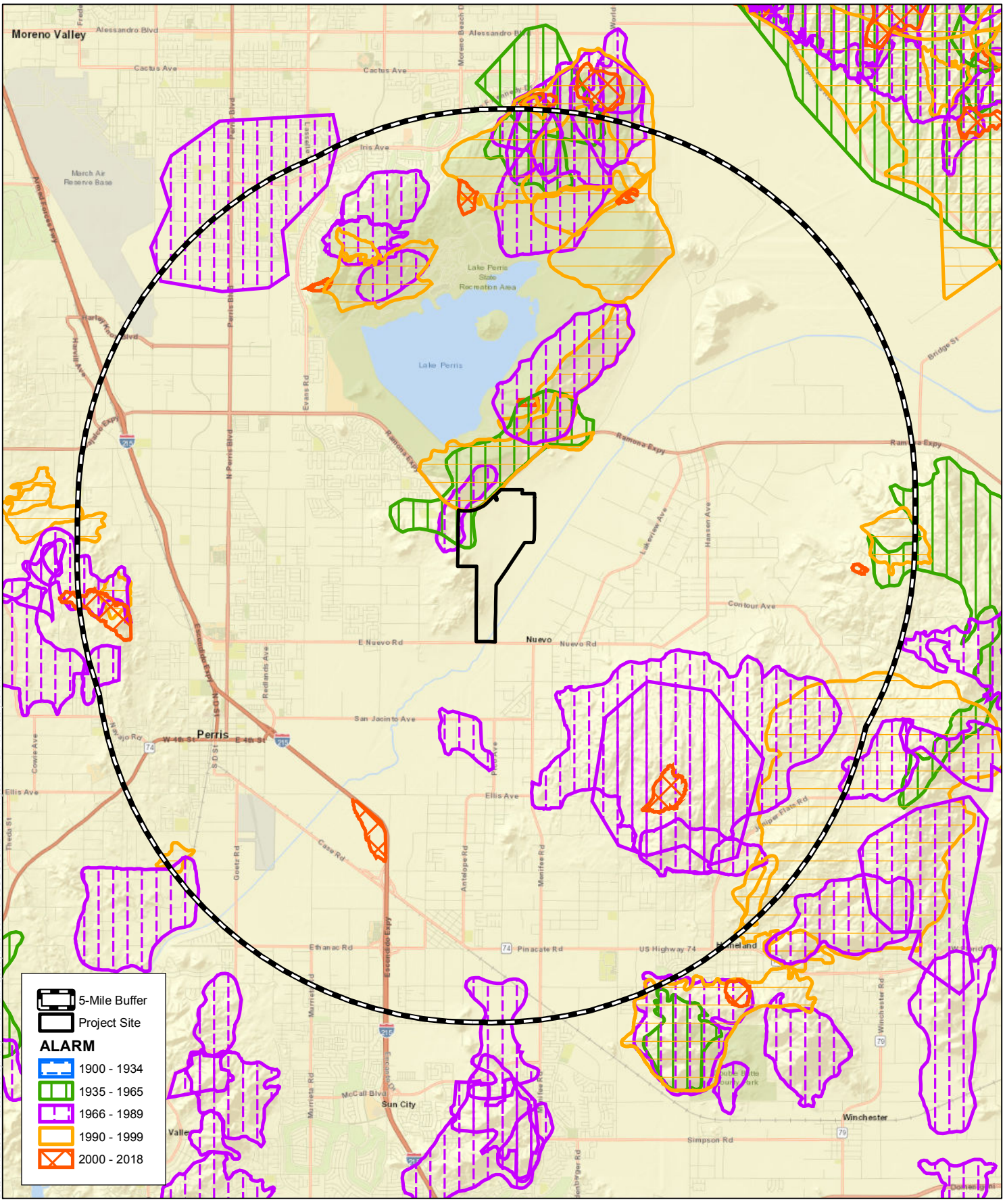
Stoneridge Commerce Center Project
Photograph Log

Photograph 7. Hillside located across Ramona Expressway, directly opposite and north of the proposed project site. This area is vegetated with non-native grasses.

Photograph 8. Photo shows Fire Station 90 in Perris, which is closest to the project site.

APPENDIX B

Stoneridge Commerce Center
Project VicinityFire History Map



SOURCE: AERIAL- BING MAPPING SERVICE; FIRE DATA-CALFIRE 2018

DUDEK

0 1 2 Miles

APPENDIX B

Fire History Map

Stoneridge Commerce Center Fire Protection Plan

APPENDIX C

BehavePlus Fire Behavior Analysis

1 Fire Behavior Modeling History

Fire behavior modeling has been used by researchers for approximately 50+ years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus, V6, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, BehavePlus is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of BehavePlus and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling includes a high level of analysis and information detail to arrive at reasonably accurate representations of how wildfire would move through available fuels on a given site. Fire behavior calculations are based on site specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. Predicting wildland fire behavior is not an exact science. As such, the minute-by-minute movement of a fire will probably never be predictable, especially when considering the variable state of weather and the fact that weather conditions are typically estimated from forecasts made many hours before a fire. Nevertheless, field-tested and experienced judgment in assessing the fire environment, coupled with a systematic method of calculating fire behavior yields surprisingly accurate results. To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

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

Although BehavePlus has limitations, it can still provide valuable fire behavior predictions, which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur in a particular landscape. The type and quantity will depend upon soil, climate, geographic features, and fire history. The major fuel groups

of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content, and chemical properties.

2 Modeling Inputs

2.1 Fuels

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

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

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

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

For the Stoneridge Project BehavePlus analyses, fuel model assignments were based on observed field conditions. As is customary for this type of analysis, the terrain and fuels directly adjacent to the proposed development and fuel modification zones (FMZ) are used for determining flame lengths and fire spread. It is these fuels that would have the potential to affect the project's structures from a radiant and convective heat perspective as well as from direct flame impingement. Fuel beds, including sage scrub and non-native grasslands were observed adjacent to the proposed commercial development. These fuel types can produce flying embers that may affect the project, but defenses have been built into the structures to prevent ember penetration. Table 1 provides a description of the two fuel models observed in the vicinity of the site that were subsequently used in the analysis for this project. Modeled areas include the grasslands (Fuel Model Gr4) on the flat lands in all directions and sage scrub (Fuel Model Sh5), which were found on the steeper east and south facing hillsides to the west and north of the property. Dudek also conducted modeling of the site for post-Fuel Modification Zones' (FMZ) recommendations for this project (Refer to Table 2 for post-FMZ fuel model descriptions). Fuel modification includes establishment of irrigated and thinned zones on the periphery of the Project as well as interior landscape requirements. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the FMZ Gr4 and Sh5 to Fuel Model 8.

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
Gr4	Moderate Load, Dry Climate Grass	Represents grasses on flat lands surrounding the property.	<2.0 ft.
Sh5	High Load Dry Climate Shrub	Sage scrub occurs on south and east facing along southern, western, and eastern edges of property.	<6.0 ft.

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
8	Compact litter	Fuel Modification Zone 1: irrigated landscapes and parking areas in proposed commercial development.	<0.5 ft.

2.2 Weather

Historical weather data for the region was processed and utilized to determine appropriate fire behavior weather input variables for the Stoneridge project site fire behavior evaluations. To evaluate different scenarios, data for both the 50th percentile weather (summer, on-shore winds) and the 97th percentile weather (fall, off-shore

winds) conditions were analyzed using the FireFamily Plus software[1] package. Remote Automated Weather Station (RAWS) data from the Clark RAWS[2] was evaluated from May 1 through November 30 for all available data years. Available data years for the Clark RAWS include 2000-2018. Following analysis in Fire Family Plus, fuel moisture and wind speed information data was incorporated into the BehavePlus modeling runs. Initial wind direction and wind speed values for the BehavePlus modeling runs were manually entered during the data input phase. The input wind speed and direction is roughly an average surface wind at 20 feet above the vegetation over the analysis area. Table 3 summarizes the weather and wind input variables used in the BehavePlus modeling efforts.

Table 3. Fuel Moisture and Wind Inputs

Variable	Summer Weather Condition (50th Percentile)n	Peak Weather Condition (97th Percentile)
1h Moisture	5%	1%
10h Moisture	6%	2%
100h Moisture	12%	6%
Live Herbaceous Moisture	48%	30%
Live Woody Moisture	96%	50%
20-foot Wind Speed	10 – 20 mph[1]	35 mph[1] (50 mph gusts)
BehavePlus Wind Adjustment Factor	0.4	0.4

Note:
1 mph = miles per hour

2.3 Slope

Slope is a measure of angle in degrees from horizontal and can be presented in units of degrees or percent. Slope is important in fire behavior analysis as it affects the exposure of fuel beds. Additionally, fire burning uphill spreads faster than those burning on flat terrain or downhill as uphill vegetation is pre-heated and dried in advance of the flaming front, resulting in faster ignition rates. For the BehavePlus analysis, slope values were measured from google earth maps at the locations of each modeling scenario, and ranged in value between 3 to 52 percent. Slope gradients for landscaped areas are assumed to be relatively flat (3%).

1 https://www.firelab.org/project/firefamilyplus
2 RAWS ID # 045624; Latitude: 33°52'35" Longitude: 117°18'32"; Elevation: 1,720 ft. Clark Station is 8.7 miles northwest of the project site.

INTENTIONALLY LEFT BLANK

3 BehavePlus Analysis

To objectively predict flame lengths, intensities, and spread rates, the BehavePlus V5.05 fire behavior modeling system (Andrews, Bevins, and Seli 2004) was used in four modeling scenarios and incorporated observed fuel types representing the dominant on-site and off-site vegetation, measured slope gradients, and wind and fuel moisture values derived from RAWS data sets. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent the site. The results of fire behavior modeling analysis for pre- and post-project conditions are presented in Tables 4 and 5, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 4, BehavePlus Fire Behavior Analysis exhibit in the Project's FPP.

Table 4. BehavePlus Modeling Results for Existing Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: sage scrub-grasslands, 11% to 52% slope, 35 mph high wind speed				
Fuel Model Gr4- grasses	30.4 (38.6)	9,518 (15,965)	10.0 (16.7)	1.5 (2.2)
Fuel Model Sh5- sage scrub	38.2 (46.9)	15,599 (24,346)	5.0 (7.4)	1.7 (2.5)
Scenario 2: grasslands, 3% slope, 35 mph high wind speed				
Fuel Model Gr4	30.5 (38.6)	9,548 (15,996)	10.0 (16.8)	1.5 (2.2)
Scenario 3: grasslands, 3% slope, 20 mph high wind speed				
Fuel Model Gr4	13.3	1,582	2.2	0.6
Scenario 4: Sage scrub, 27% downhill slope, 20 mph sustained winds				
Fuel Model Sh5	17.9	3,019	1.3	1.3

Notes:
1 Parentheses represents modeling results for 50 mph wind gusts.
2 mph = miles per hour
3 Spotting distance from a wind driven surface fire.

Table 5. BehavePlus Modeling Results for Post-Project Conditions

Scenario	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: Fuel treatments on south-facing, approximately 3% slope, 35 mph maximum winds				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 2: Fuel treatments on flat, landscaped area, 35 mph maximum winds				
Fuel modification zone 1 (FM8)	3.0 (3.0)	62 (62)	0.2 (0.2)	0.3 (0.4)
Scenario 3: Fuel treatments on flat, landscaped area, 20 mph maximum winds				
Fuel modification zone 1 (FM8)	1.6	15	0.05	0.1
Scenario 4: Fuel treatments on flat, landscaped area, 20 mph maximum winds				
Fuel modification zone 1 (FM8)	1.6	16	0.06	0.1

As presented in Table 4, wildfire behavior in non-treated sage scrub, presented as a Fuel Model Sh5, represents the most extreme conditions, varying with different wind speeds. In this case, flame lengths can be expected to reach up to approximately 46.9 feet with 50 mph gusts (extreme fire weather conditions) and 17.9 feet with 20 mph wind speeds (Onshore winds). Spread rates for sage scrub fuel beds range from 1.3 mph (summer-Onshore winds) to 7.4 mph (extreme-Offshore winds). Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 1.3 miles to 2.5 miles. In comparison, a grass fuel type could generate flame lengths up to 28.6 feet high with a rapid spread rate of 16.8 mph. The fire could potentially be spotting for a distance of 2.2 miles.

As presented in Table 5, Dudek conducted modeling of the site for post-FMZ fuel recommendations for this project. Fuel modification includes establishment of irrigated landscaping on the periphery of the proposed commercial development. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the FMZ 1 (Fuel Model 8). Fuel model assignments for all other areas remained the same as those classified for the existing condition. As depicted, the fire intensity and flame lengths in untreated, biological open space areas would remain the same. Conversely, the FMZ areas experience a significant reduction in flame length and intensity. The 46.9-foot (sage scrub fuel bed) and 16.8-foot (grass fuel bed) tall flames predicted during pre-treatment modeling during extreme weather conditions are reduced to less than 3.0 feet tall at the outer edges of the development due to the higher live and dead fuel moisture contents.

It should be noted that the results presented in Tables 4 and 5 depict values based on inputs to the BehavePlus software. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis, but models provide a worst-case wildfire condition as part of a conservative approach. Further, this modeling analysis assumes a correlation between the project site vegetation and fuel model characteristics. 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 information in Table 6 pertains to interpretation of flame length and fireline intensity as it relates to fire suppression efforts. Based on the post-development calculated flame lengths of under 3.0 feet tall, fire fighters should be able to conduct a direct attack on the fire.

Table 6. Fire Suppression Interpretation

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

4 References

Alexander, M.E. 1998. Crown fire thresholds in exotic pine plantations of Australasia. Australian National University, Canberra, Australian Capital Territory. Ph.D. Thesis. 228p.

Anderson, Hal E. 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. USDA Forest Service Gen. Tech. Report INT-122. Intermountain Forest and Range Experiment Station, Ogden, UT. http://www.fs.fed.us/rm/pubs_int/int_gtr122.pdf

Andrews, P.L. 1980. Testing the fire behavior model. In Proceedings 6th conference on fire and forest meteorology. April 22–24, 1980. Seattle, WA: Society of American Foresters. Pp. 70–77.

Andrews, Patricia L., Collin D. Bevins, and Robert C. Seli. 2008. BehavePlus fire modeling system, version 4.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106WWW Revised. Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

Brown, J.K. 1972. Field test of a rate-of-fire-spread model in slash fuels. USDA Forest Service Res. Pap. Int-116. 24 p.

Brown, J.K. 1982. Fuel and fire behavior prediction in big sagebrush. USDA Forest Service Res. Pap. INT-290. 10p.

Bushey, C.L. 1985. Comparison of observed and predicted fire behavior in the sagebrush/ bunchgrass vegetation-type. In J.N. Long (ed.), Fire management: The challenge of protection and use: Proceedings of a symposium. Society of American Foresters. Logan, UT. April 17–19, 1985. Pp. 187–201.

FireFamily Plus 2008. http://www.firelab.org/project/firefamilyplus.

Grabner, K., J. Dwyer, and B. Cutter. 1994. "Validation of Behave Fire Behavior Predictions in Oak Savannas Using Five Fuel Models." Proceedings from 11th Central Hardwood Forest Conference. 14 p.

Grabner, K.W. 1996. "Validation of BEHAVE fire behavior predictions in established oak savannas." M.S. thesis. University of Missouri, Columbia.

Grabner, K.W., J.P. Dwyer, and B.E. Cutter. 2001. "Fuel model selection for BEHAVE in midwestern oak savannas." *Northern Journal of Applied Forestry*. 18: 74–80.

Lawson, B.D. 1972. Fire spread in lodgepole pine stands. Missoula, MT: University of Montana. 110 p. thesis.

Linn, R. 2003. "Using Computer Simulations to Study Complex Fire Behavior." Los Alamos National Laboratory, MS D401. Los Alamos, NM.

Marsden-Smedley, J.B. and W.R. Catchpole. 1995. Fire behaviour modelling in Tasmanian buttongrass moorlands. II. Fire behaviour. *International Journal of Wildland Fire*. Volume 5(4), pp. 215–228.

McAlpine, R.S. and G. Xanthopoulos. 1989. Predicted vs. observed fire spread rates in Ponderosa pine fuel beds: a test of American and Canadian systems. In Proceedings 10th conference on fire and forest meteorology, April 17–21, 1989. Ottawa, Ontario. pp. 287–294.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. GTR INT-143. Ogden, Utah: USDA Forest Service Intermountain Research Station.161 Rothermel, R.C., and G.C. Rinehart. 1983. "Field procedures for verification and adjustment of fire behavior predictions." Res. Pap. INT-142. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 25 p.

Rothermel, R.C., and G.C. Rinehart. 1983. "Field procedures for verification and adjustment of fire behavior predictions." Res. Pap. INT-142. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 25 p.

Scott, Joe H. and Robert E. Burgan. 2005. *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

Sneeuwjagt, R.J., and W.H. Frandsen. 1977. "Behavior of experimental grass fires vs. predictions based on Rothermel's fire model." *Canadian Journal of Forest Resources*. 7:357–367.

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

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.

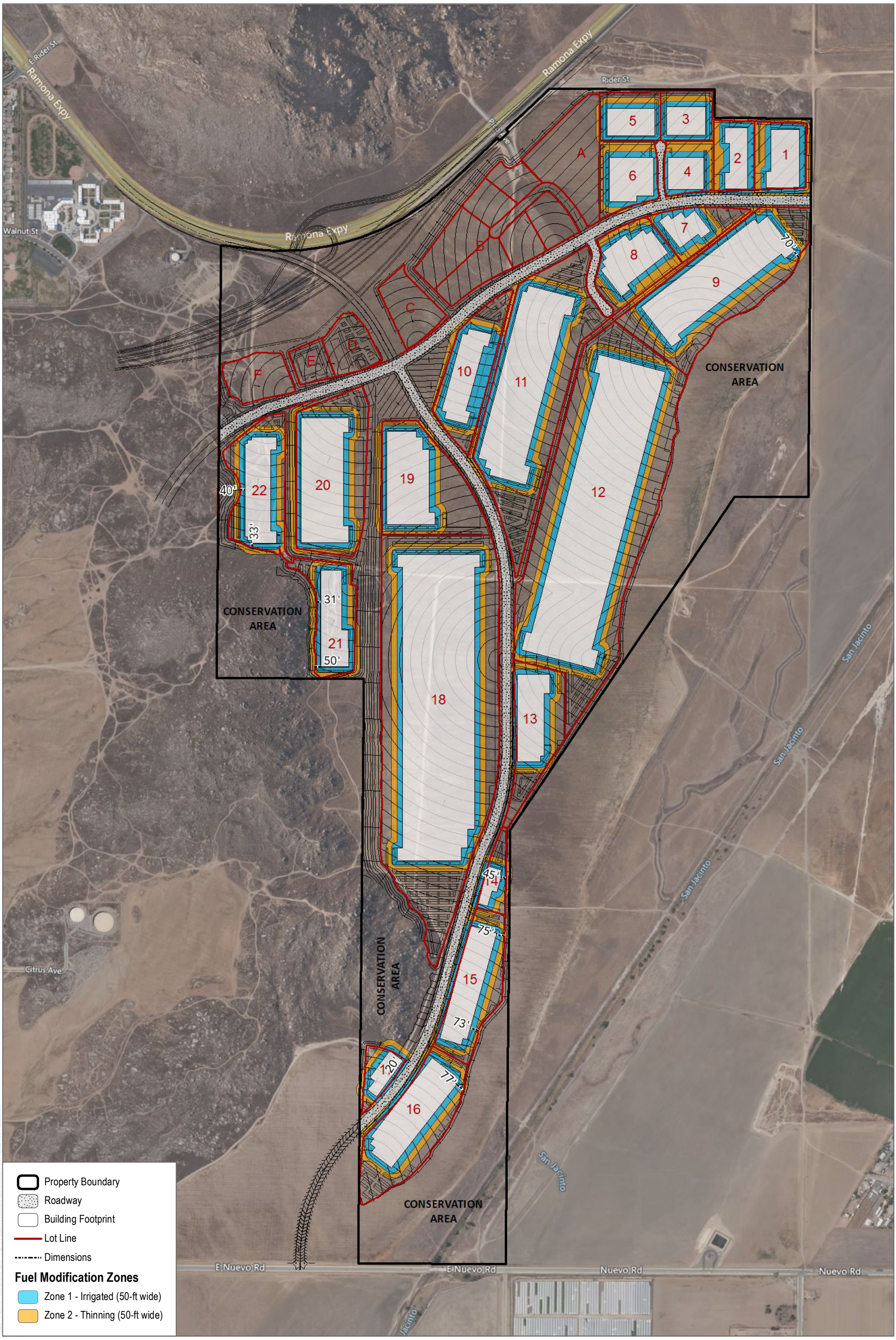
1. All structures will be built with a Class A roof assembly, including a Class A roof covering. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.
2. Where the roof profile allows a space between the roof covering and roof decking,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

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

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

APPENDIX E

Proposed Project Fuel Modification Plan



SOURCE: BING MAPPING SERVICE 2018

DUDEK

0 400 800 Feet

APPENDIX E

Conceptual Fuel Modification Plan

Stoneridge Commerce Center Fire Protection Plan

APPENDIX F

Prohibited Plant List

Botanical Name	Common Name	Comment*
Trees		
Abies species	Fir	F
Agonis juniperina	Juniper Myrtle	F
Casuarina cunninghamiana	River She-Oak	F
Chamaecyparis species (numerous)	False Cypress	F
Cryptomeria japonica	Japanese Cryptomeria	F
Cupressocyparis leylandii	Leyland Cypress	F
Cupressus species *(C. fobesii, C. glabra, C. sempervirens,)*	Cypress (Tecate, Arizona, Italian, others)	F
Eucalyptus species (numerous)	Eucalyptus	F, I
Juniperus species (numerous)	Juniper	F
Lithocarpus densiflorus	Tan Oak	F
Melaleuca species *(M. linariifolia, M. nesophila, M. quinquenervia)*	Melaleuca (Flaxleaf, Pink, Cajeput Tree)	F, I
Picea (numerous)	Spruce	F
Palm species (numerous)	Palm	F, I
Pinus species *(P. brutia, P. canariensis, P. b. eldarica, P. halepensis, P. pinea, P. radiata, numerous others)*	Pine (Calabrian, Canary Island, Mondell, Aleppo, Italian Stone, Monterey)	F
Platycladus orientalis	Oriental arborvitae	F
Pseudotsuga menziesii	Douglas Fir	F
Tamarix species *(T. africana, T. aphylla, T. chinensis, T. parviflora)*	Tamarix (Tamarisk, Athel Tree, Salt Cedar, Tamarisk)	F, I
Taxodium species *(T. ascendens, T. distichum, T. mucronatum)*	Cypress (Pond, Bald, Monarch, Montezuma)	F
Taxus species *(T. baccata, T. brevifolia, T. cuspidata)*	Yew (English, Western, Japanese)	F
Thuja species *(T. occidentalis, T. plicata)*	Arborvitae/Red Cedar	F
Groundcovers, Shrubs & Vines		
Acacia species	Acacia	F, I
Adenostoma fasciculatum	Chamise	F
Adenostoma sparsifolium	Red Shanks	F
Agropyron repens	Quackgrass	F, I
Anthemis cotula	Mayweed	F, I
Arctostaphylos species	Manzanita	F
Arundo donax	Giant Reed	F, I
Artemisia species *(A. abrotanium, A. absinthium, A. californica, A. caucasica, A. dracunculus, A. tridentata, A. pynocephala)*	Sagebrush (Southernwood, Wormwood, California, Silver, True tarragon, Big, Sandhill)	F
Atriplex species (numerous)	Saltbush	F, I
Avena fatua	Wild Oat	F
Baccharis pilularis	Coyote Bush	F
Bambusa species	Bamboo	F, I
Bougainvillea species	Bougainvillea	F, I
Brassica species *(B. campestris, B. nigra, B. rapa)*	Mustard (Field, Black, Yellow)	F, I

Botanical Name	Common Name	Comment*
Bromus rubens	Foxtail, Red brome	F, I
Castanopsis chrysophylla	Giant Chinquapin	F
Cardaria draba	Hoary Cress	I
Cirsium vulgare	Wild Artichoke	F,I
Conyza bonariensis	Horseweed	F
Coprosma pumila	Prostrate Coprosma	F
Cortaderia selloana	Pampas Grass	F, I
Cytisus scoparius	Scotch Broom	F, I
Eriogonum species *(E. fasciculatum)*	Buckwheat (California)	F
Fremontodendron species	Flannel Bush	F
Heterotheca grandiflora	Telegraph Plant	F
Hordeum leporinum	Wild barley	F, I
Juniperus species	Juniper	F
Lactuca serriola	Prickly Lettuce	I
Larrea tridentata	Creosote bush	F
Lolium multiflorum	Ryegrass	F, I
Lonicera japonica	Japanese Honeysuckle	F
Mimulus aurantiacus	Sticky Monkeyflower	F
Miscanthus species	Eulalie Grass	F
Muhlenbergia species	Deer Grass	F
Nicotiana species *(N. bigelovii, N. glauca)*	Tobacco (Indian, Tree)	F, I
Pennisetum setaceum	Fountain Grass	F, I
Perovskia atroplicifolia	Russian Sage	F
Phoradendron species	Mistletoe	F
Pickeringia montana	Chaparral Pea	F
Rhus (R. diversiloba, R. laurina, R. lentii)	Sumac (Poison oak, Laurel, Pink Flowering)	F
Ricinus communis	Castor Bean	F, I
Rhus Lentii	Pink Flowering Sumac	F
Salvia species (numerous)	Sage	F, I
Salsola australis	Russian Thistle	F, I
Solanum Xantii	Purple Nightshade (toxic)	I
Silybum marianum	Milk Thistle	F, I
Thuja species	Arborvitae	F
Urtica urens	Burning Nettle	F

*F = flammable, I = Invasive

Notes:

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