Wildfire Safety Plan

Centennial

MARCH 2025

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ASTM	American Society of Testing and Materials
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CDFW	California Department of Fish and Wildlife
CFC	California Fire Code
CWSP	Construction Wildfire Safety Plan
County	County of Los Angeles
County Fire	Los Angeles County Fire Department
EIR	Certified Environmental Impact Report
FMP	Fire Management Plan
FMZ	Fuel Modification Zone
WSP	Wildfire Safety Plan
FRAP	Fire and Resource Assessment Program
GHG	Greenhouse Gas
HOA	Homeowner's Association
LACBC	Los Angeles County Building Code
LASD	Los Angeles Sheriff Department
NFPA	National Fire Protection Association
OAERP	Operational Area Emergency Response Plan
RMDP	Resource Management and Development Plan
SCE	Southern California Edison
SFM	State Fire Marshall
SRA	State Responsibility Area
VHFHSZ	Very High Fire Hazard Severity Zone
WFEP	Wildland Fire Evacuation Plan
WUI	Wildland/urban interface

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Executive Summary

This Wildfire Safety Plan (WSP) has been prepared for the Centennial Project, which implements the development facilitated by the County approved Centennial Specific Plan within the Centennial Planning Area in the County of Los Angeles (County). The Project incorporates minor changes and refinements to the development of the Centennial Planning Area, as compared to what was evaluated in the County Certified Environmental Impact Report (EIR) hereafter referred to as the Certified EIR.

The Certified EIR analyzed wildfire impacts as part of Section 5.3 Hazards and Fire Safety. The Certified EIR determined that the Project would have a less than significant impact on adopted emergency response plans or emergency evacuation plans based on the location of fire states, a system of improved roads, and fire flows for the Project. The Certified EIR also considered whether the Project would result in significant impacts from wildfire and found that while the Project provided sufficient access, water supply, fuel management, wildfire buffers and home sitting, the potential for a significant wildland fire hazard would still exist and require mitigation. However, with regulatory compliance and incorporation of mitigation measures, the Certified EIR determined the Project would have a less than significant impact.

Climate Resolve Settlement Agreement

On May 15, 2019, Climate Resolve filed a petition commencing litigation in the Los Angeles County Superior Court, challenging the County's approval of the Project and certification of the EIR.

On April 5, 2021, the Los Angeles County Superior Court issued a Court Order upholding the 2019 EIR's assessment of Project impacts in most respects and granting in part Climate Resolve's petition. Following issuance of the Court Order, but prior to final judgment in the Climate Resolve action, the Approved Project proponent and Climate Resolve entered into a Settlement Agreement, which became effective and fully enforceable on November 30, 2021. As a result of the Settlement Agreement, the Climate Resolve lawsuit was dismissed by the Court with prejudice.

The Settlement Agreement addresses the key issues identified in the Court's ruling in the Climate Resolve litigation of impacts related to climate change and wildfire. In addition to GHG reduction measures, the Settlement Agreement requires enhanced wildfire prevention and protection as described below.

Fire Protection Plan (FPP)

The Settlement Agreement requires the Project to develop a Project specific FPP (See Appendix A), which identifies community fire hazard reduction measures including building, design, and fuel management requirements. The Settlement Agreement FPP is not subject to County approval. The FPP will be updated and submitted to the Centennial Monitoring Group CMG for compliance monitoring purposes any time Centennial files a tract map to include new or modified State or LA County fire prevention, protection and response requirements. Any changes to the Project that require updates to the FPP must also be approved by the LACoFD. Prior to filing the first application for a building permit for dwelling units, Centennial is required to create a master Homeowners Association (HOA) to fund the ongoing implementation of the WSP of no more than $500,000 per year. The CMG Board would be responsible for ongoing compliance and review to ensure the WSP policies are implemented, including evaluating evacuation policies every two years after the initial residences are occupied.

Good Neighbor Firewise Fund

The Settlement Agreement also requires the Project to establish a Good Neighbor Firewise Fund of an inflation-adjusted $500,000 annually, which provide grants to need-based applicants to be awarded by the CMG to aid communities with a population of less than 100,000 within 15 miles of the boundaries of Tejon Ranch in order to reduce off-site fire risks, increase fire prevention, protection and response measures and avoid impacts of fires for the Project's residents and neighboring communities. CMG will review applications for the fund and award grants for actions such as but not limited to, updating planning documents, developing a comprehensive retrofit strategy, implementing wildfire risk reduction standards, funding fuel and vegetation management, and performing infrastructure planning.

CMG will provide review for compliance monitoring purposes any time Centennial files a tract map to include new or modified State or LA County fire prevention, protection and response requirements. Prior to filing the first application for a building permit for dwelling units, Centennial is required to create a master Homeowners Association (HOA) to fund the ongoing implementation of the WSP of an inflation-adjusted $500,000 per year. Centennial will provide an Annual Report to CMG regarding compliance with the obligations and requirements of the Settlement Agreement. The CMG Board would be responsible for ongoing compliance and review to ensure the WSP policies are implemented, including evaluating evacuation policies every two years after the initial residences are occupied. Centennial will make the report publicly available within one month after submittal to CMG for their review. Enforcement measures will be required if CMG finds Centennial to be out of compliance.

Summary of Wildfire Safety Plan

The Project Site is located in an unincorporated portion of northwestern Antelope Valley within northern Los Angeles County (Figure 2). The development proposed by the Project within the 12,323-acre Centennial Planning Area includes development of up to 19,333 residential dwelling units, roughly 1,000,000 square feet of commercial uses, roughly 8,800,000 square feet of business parks, schools, institutional areas, recreational areas and parks, roughly 5,624 acres of open space, and an internal circulation road network.

The Centennial Project site is located within State Responsibility Areas with portions of the Project designated as Very High Fire Hazard Severity Zone (VHFHSZ) by the California Department of Forestry and Fire Protection (CAL FIRE) (OSFM, 2024) (Figure 3 Fire Hazard Severity Zones). At the time of the Certified EIR in 2019, the extent of the VHHSZ was mapped at 3,906 acres. Since the approval of the Certified EIR, updated Fire Hazard Severity Zone maps were released in April 2024 and the VHFHSZ has been expanded to 7,089 acres. The VHFHSZ within the Centennial Project site was reduced significantly from the original draft release of the updated Fire Hazard Severity Zone maps during the public comment period due to data inaccuracies that resulted in an overestimation of wildfire hazard at the Project site.

A comparison of Fire Hazard Severity Zones from the Certified EIR and the current maps is provided below in Table 1. As provided in Figure 3, the expansion of the VHFHSZ has largely occurred in the western half of the Project site. Within proposed development areas specifically, 2,283 acres are designated as VHFHSZs, with 3,870 acres designated as High, and 431 acres designated as Moderate.

Table 1. Comparison of Fire Hazard Severity Zones from 2019 and 2024.

Fire Hazard Severity Zones	2019 Mapping	2024 Mapping
Moderate	437 ac.	603 ac.
High	7,980 ac.	4,631 ac.
Very High	3,906 ac.	7,089 ac.

Source: OSFM, 2007, OSFM, 2024

This WSP provides a comprehensive evaluation of the wildfire risks associated with the Project and measures employed by the Project to reduce such risks. The WSP assesses reducing fire risk for the Project, preventing off-site ignitions, and minimizing the demand for fire protection services associated with the Project. To that end, the fire protection detailed in this WSP employs a systematic, project-wide approach that includes redundant layering of measures, including pre-planning, fire prevention, fire protection, passive and active suppression, and related measures proven to reduce fire risk and prevent Project-related ignitions. The fire protection system planned for the Project has proven, through real-life wildfire encroachment examples throughout Southern California, to reduce the fire risk associated with this type of hardened, ignition resistant, and fire aware residential community and commercial development.

The WSP addresses the following overall topics:

- Environmental Setting: Existing Conditions and Fire History – The WSP summarizes the existing environmental setting, climatic and topographic conditions, and the history of fire patterns at the site.
- Regulatory Compliance and Mitigation Measures Applicable to the Project – The WSP details the extensive regulatory requirements that are mandatory upon the Project based on compliance with the 2020 Los Angeles County Fire Code (Title 32) and the 2022 California Fire and Building Codes, as well as the fire protection-related adopted codes in effect at the time of building construction. Accordingly, the WSP evaluates regulatory requirements and mitigation to reduce such risk to less than significant levels by employing risk-reduction measures related to fuel modification, building design and construction, site layout, water supply, evacuation, and other pertinent criteria for fire protection. Further, the WSP recommends additional project design features to further reduce wildfire risks. Applicable regulatory requirements include but are not limited to:
  - State-of-the-art, ignition-resistant construction standards for all new residential, non-residential, and public facility buildings meeting Chapter 7A of the California Building Code (CBC), Title 26 of the County of Los Angeles Building Code (LACBC), and the Los Angeles County Fire Department (County Fire) requirements. These standards require, among many other measures, fire-resistant roofing to resist ignition from embers or building-to-building fires, vent covering and opening limitations to avoid ember intrusion, noncombustible or ignition-resistant exterior walls, ignition-resistant eaves, and porch ceilings, insulated windows and exterior doors, fire-resistant exterior decks and walkways, and ignition-resistant under-flooring and appendages. These standards have proven to substantially reduce the risk of buildings catching fire or spreading fires during a wildfire event.
  - Fuel modification zones around the perimeter of the Project ranging from 100-200 feet to provide defensible space to protect against encroaching fires and minimize the risk of fires from the project moving offsite. The fuel modification zones are based on LA County Fire requirements and confirmed with site-specific modeling. The zones will be implemented by knowledgeable professionals, inspected by third-party inspectors, and maintained in perpetuity by the HOA.

  - Ongoing, funded maintenance, inspections, and enforcement of fuel modification zones and other fire protection features by the HOA or similar organization funded by an assessment or tax on parcels within the Project.
  - Existing and planned firefighting capabilities to ensure a response to fire and medical emergencies.
  - In all structures, additional fire protection systems, including internal fire sprinkler systems.
  - Fire-resistant landscaping requirements.
  - Multiple access routes for fire apparatus and emergency vehicles.
  - Multiple evacuation routes during a wildfire event. *See the Centennial Wildfire Evacuation Technical Report for a detailed description of evacuation routes.*
  - Water capacity, delivery, and availability.
  - Ongoing resident fire safety education and evacuation planning.
- **"Worst Case" Wildfire Risk Modeling to Predict Flame Lengths During Extreme Events and Benefits of Regulatory Compliance and Mitigation Measures** – The WSP completes detailed modeling of "worst-case" fire conditions to determine flame lengths that may impact the site from worst-case scenarios, under both pre-development and post-development conditions (with regulatory compliance and mitigation implemented).
- **LA County Fire Emergency Response Times** – The WSP assesses the impacts of the Project on County Fire's response times based on existing and planned fire stations.
- **Impact Analysis Based on CEQA Significance Criteria** – The WSP evaluates whether the Project would result in a significant environmental impact under CEQA, including impacts related to wildfire encroaching onto the site, the potential for the Project to exacerbate fire risks by increasing ignition sources, and evacuation planning.

The potential exists for wildfires to encroach on the site, as demonstrated by the history of wildfires in the area. Based on an analysis of fire history data, specifically, the average interval between wildfires within 1 mile of the Project Site's boundaries was calculated to be four years.

Site-specific modeling was completed for this WSP by using Flammap and BehavePlus software in accordance with standard industry practice for evaluating fire behavior variables and objectively predicting flame lengths, fire intensity, and fire spread rates under a "worst-case" wildfire event (e.g., a wildfire during a strong wind Santa Ana event). The modeling evaluates both existing conditions and post-development conditions with fuel modification zones in place (assuming a 100-200-foot fuel modification zone in accordance with applicable standards). The modeling demonstrates the fuel modification zone's reduced flame length and intensity.

- ***Centennial Post-development Fire Behavior:*** The 20-foot (grass-shrub) and tall flames predicted during pre-development extreme weather conditions are reduced to less than 11 feet tall at the outer edges and less than 4.0 feet within the planned development (i.e., within irrigated "Zone A" of the fuel modification zone). Fuel model assignments for all other areas remained the same as those classified for the existing condition.

Based on the predicted flame lengths and intensities following implementation of the fuel modification zones, encroaching wildfires would not present a significant risk of directly intruding into the Project even during extreme events (e.g., strong Santa Ana winds). Even if windblown embers were to fly over the fuel modification zones, the ignition-resistant buildings and fire-resistant landscaping would minimize the likelihood of any fires starting onsite, and even if isolated fires occurred, they would be unlikely to spread quickly or be of high intensity given the limited

fuel sources. As described above, new communities with buildings built to the latest fire code standards have proven extremely resistant to burning even during extreme fire events.

The Project is unlikely to exacerbate fire risks to surrounding areas. The ignition-resistant buildings and fire-resistant landscaping are unlikely to initiate a fire that would spread to surrounding areas, particularly because the fuel modification zones would limit the ability of any fire to move offsite. Because onsite fires are unlikely to occur and, even if so, would likely be low-intensity fires due to lack of fuel sources, the Project is unlikely to produce embers that would fly across the fuel modification zones to surrounding areas.

To assess the Project's potential to influence wildfire risk to surrounding areas, a focused Off-site Ignition Assessment was conducted. Following the comprehensive research, development, and application of the off-site risk assessment method, it was concluded that the Centennial Specific Plan Project presented a Moderate Off-site Ignition Risk to the adjacent land uses and communities in the region.

Adequate emergency response for the Project is achieved when considering planned onsite fire stations and existing LA County Fire stations and apparatus in the near vicinity of the Project site. Based on calculated increases in calls for an emergency response associated with the Project, the estimated LA County Fire response times would be consistent with LA County Fire's goals for suburban uses.

The Project is consistent with regional evacuation guidelines. As an additional Project Design Feature, the Project also includes a project-specific evacuation plan under a separate cover and described in Section 6 of the WSP (Dudek 2023).

As detailed below, the WSP evaluates the Project's potential to result in significant impacts based on the CEQA Appendix G questions. The WSP evaluates the Project's potential to increase human-caused or related ignitions and considers the historical causes of wildfires in the area and Southern California as well as potential ignition sources presented by the type of proposed land uses. The WSP also considers whether these risks are addressed through the Project's compliance with regulatory requirements and mitigation measures, including fuel modification zones, hardened homes, robust resident education, public outreach, and fire safety monitoring, amongst others described in detail herein. The modifications associated with the Project do not result in any reduction of fire protection measures or fire resiliency. The Project includes enhanced fire protection measures as compared to what was considered in the Certified EIR wildfire analysis.

The WSP concludes that there are no new significant impacts associated with the Project with the implementation of regulatory compliance measures and project design features. The WSP also concludes that the Project does not result in a new significant impact related to increasing or exacerbating wildfire impacts on surrounding areas. Although the Project is sufficiently mitigated by the identified regulatory compliance measures and mitigation measures, the WSP also determines that Tejon Ranch's historic and ongoing agricultural and grazing operations have the additional benefit of further reducing wildfire risks to the Project and surrounding areas, thereby providing additional environmental benefits with respect to wildfire prevention.

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1 Introduction

This Wildfire Safety Plan (WSP) has been prepared by Dudek and is specifically applicable to the Centennial Specific Plan (Project) in Los Angeles County (County). This WSP is intended to guide the design, construction, and maintenance of Project improvements in compliance with the Centennial Specific Plan (Specific Plan), applicable fire codes, and the various fire safety mitigation measures described in the Mitigation Monitoring and Reporting Program (MMRP) approved for the Project by the County (collectively, the Fire Safety Requirements, all of which are described in detail in the attached Exhibit A). This WSP address fuel modification, fire protection related infrastructure (water supply, hydrants, primary and second ingress/egress roads, and emergency response) and structural fire protection concepts for the Project. This WSP also addresses how the Project's Fire Safety Requirements will be monitored and enforced over time, as well as the how the Project's master developer will educate Project residents about their obligations to maintain a fire-safe home. The goal of this WSP is to provide standards to facilitate development of the Project as a "fire hardened" community that will protect Project residents and visitors, as well as the environment, by minimizing and mitigating fire threats on the Project site and reducing Project demands on local fire protection services.

The goals of this WSP are to provide standards that will protect Project residents and visitors by minimizing and mitigating fire issues potentially created by the Project and to reduce the demands the Project may have on the local fire protection delivery system. This WSP addresses fire behavior modeling, fuel modification, fire protection related infrastructure (water supply, hydrants, primary and secondary ingress/egress roads, on-site firefighter access to attached residential and commercial buildings and resorts, and emergency response), and structural fire protection concepts for the development. It is based upon the Project's varying topography, proposed types of land uses and potential wildfire risks. It also addresses how fuel modification for protection of structures will be implemented on site and how they will be maintained on an ongoing basis. The dual benefit of building a fire hardened community is that the same features that protect the community from wildfire also play a significant role in protecting wildlands from Project-related fires and minimize the potential for fire escaping the site into the wildlands.

As part of the assessment, this WSP includes an evaluation of, among other site factors, the property location, topography, combustible vegetation (fuel types), climatic conditions, and the area's fire history. This WSP addresses water supply, access, structural ignitability, ignition-resistive building features, fire protection systems and equipment, potential impacts on existing emergency services, defensible space, and vegetation management. It also identifies and prioritizes areas for potentially hazardous fuel reduction treatments and recommends the types and methods of treatment to protect the community and essential infrastructure while minimizing the potential for off-site ignitions. This WSP also recommends measures that property owners and the Homeowner's Association (HOA) will take to reduce the probability of structure and vegetation ignitions throughout the area.

The Centennial Project is located within the boundaries of the Los Angeles County Fire Department in the unincorporated portion of the County. This WSP addresses County Fire's response capabilities and response travel time within the Project Area.

The following tasks were performed to complete this WSP:

- Gather site-specific climate, terrain, and fuel data.
- Process and analyze the data using the latest geographical information system (GIS) technology.

- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment.
- Analyze and guide the design of the proposed infrastructure.
- Analyze the existing emergency response capabilities.
- Assess the risk associated with the Project.
- Collect site photographs and map fuel conditions using aerial images. Field observations were used to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this WSP. Refer to Appendix B for site photographs of existing site conditions.
- Research and evaluate vegetation fire ignition sources.
- Evaluate nearby firefighting and emergency medical resources.

Prepare this WSP detailing how fire risk would be minimized through a system of fuel modification, structural ignition resistance enhancements, and fire protection delivery system upgrades.

1.1 Intent

The intent of this WSP is to provide Wildfire Safety Planning guidance and requirements for reducing fire risk for the Project, preventing off-site ignitions, and minimizing the demand for fire protection services associated with the Project. To that end, the fire protection "system" detailed in this WSP includes redundant layering of measures, including pre-planning, fire prevention, fire protection, passive and active suppression, and related measures proven to reduce fire risk and prevent Project-related ignitions. The fire protection system planned for the Project has been proven, through real-life wildfire encroachment examples throughout Southern California, to reduce the fire risk associated with this type of hardened, ignition resistant, and fire aware residential community and commercial development.

The following points highlight key Project characteristics identified and addressed in this WSP:

- Includes large acreages of natural vegetation in a wildland-urban interface setting
- Includes historical occurrence and potential risk of future wildfire
- Project residences, commercial, and other buildings will be constructed according to latest ignition-resistant codes and with temporary on-site relocation as an optional alternative to off-site relocation for some areas/buildings.

When wildfire threatens the Project, relocation of residents, guests, visitors, and staff to appropriate on-site or off-site areas will be the primary and preferred option and will be implemented when situations enable adequate time and low risk for the relocation process to be completed. As an alternative and duplicative safety layer, and based on the modeled lower intensity wildfire behavior and spotting characteristics on the Project site and surrounding areas, the community will include a temporary on-site relocation option for designated structures for the possibility that off-site relocation from the site is not possible or not considered the safest approach for some or all of its residents.

Fire protection for new developments in the Wildland Urban Interface (WUI) especially those including temporary on-site relocation designation, must utilize a "systems approach" consisting of the components of fuel modification

and maintenance, ignition-resistant structures, water supply, fire protection systems, access (ingress/egress) and emergency response. To that end, this Project will include:

- Substantial on-site firefighting capability (three new fire stations, upgrades to existing fire station) – specifications to be determined as part of separate negotiation, ensuring fast response to fire and medical emergencies. A potential fourth station will be built if the LACoFD deems it necessary given the response times of the three previously constructed stations.
- Customized fuel modification zones providing defensible space based on fire behavior modeling results and experienced Wildfire Safety Planning professionals.
- Ignition-resistant construction meeting FAHJ requirements and providing temporary on-site relocation capability for some structures.
- Fire protection systems – internal fire sprinkler systems in all structures including residential, commercial, retail, resort and other public facilities per the applicable code
- Dedicated fire apparatus and emergency vehicle access via code compliant roads
- Water capacity, delivery and availability meeting local code requirements
- Ongoing, funded maintenance and inspections of fuel modification zones and other fire protection features.

The following sections address on- and off-site risk assessment, fire behavior modeling, and required fire protection features for the Centennial Specific Plan Project.

1.2 Project Summary

1.2.1 Location

The Project site consists of approximately 12,323 acres (or approximately 19.3 square miles) and is located in the northwestern portion of the Antelope Valley in an unincorporated portion of the County (Figure 1). It is located in the vicinity of Quail Lake and is contiguous to the southern boundary of Kern County (Figure 2). The western boundary of the Project site is approximately 1 mile east of Interstate 5 (I-5). State Route 138 (SR-138) traverses the southern portion of Project site in an east-west direction and forms its southern boundary west of Quail Lake. The site is immediately south of the divergence in the California Aqueduct into its East and West Branches. The West Branch of the Aqueduct runs in a north–south direction and generally bisects the Project site. The east branch runs along the northern boundary of the Project site. The Project site's eastern boundary is 300th Street West. The Project extends for approximately 6 miles between its western boundary (west of Quail Lake) and its eastern boundary at 300th Street West. Elevations range from approximately 3,000 feet above mean sea level (amsl) on the floor of Antelope Valley in the northeastern portion of the Project site to approximately 4,250 feet amsl in the southwestern portion of the Project site.

The immediate vicinity of the Project site is generally bound by the Tehachapi Mountains to the north; the Antelope Valley is to the east; the northern edges of the Liebre and San Gabriel Mountains (Angeles National Forest) are approximately 1 mile to the south; privately owned vacant land is immediately adjacent to the Project site to the west; and the Los Padres National Forest is approximately seven miles to the west. The Project site is approximately 35 miles north of the City of Santa Clarita in the County; approximately 50 miles south of the City of Bakersfield in Kern County via State Route 99 (SR-99) and I-5; and approximately 36 and 43 miles west of the cities of Lancaster

and Palmdale, respectively, in the County via SR-138. The community of Gorman in the County is adjacent to the I-5 approximately four miles north of the I-5/SR-138 junction.

Fire Hazard Severity Zone classification on the Centennial Specific Plan Project site is mapped as Very High, High, and Moderate. A graphical portrayal of the zone classifications for the Project site are presented in Figure 3.

1.2.2 Current Land Use

Existing land uses surrounding the Centennial Specific Plan Project site vary from open water (Quail Lake) and the California aqueduct to open range land. The vast majority of the Project site is an active cattle ranch dominated by open space supporting livestock grazing. Lands are disturbed by the grazing operation but remain in a largely managed condition. Other current land uses include roadways and limited associated infrastructure throughout the area. Land uses in the vicinity of the property include primarily agriculture and open space.

1.2.3 Project Description

The Project will be a large-scale community, resulting in roughly 54% of the site converted to urbanized uses while approximately 46% of the site is either left undisturbed or will be active recreation open areas. The Project would develop many on-site infrastructure and utility improvements to support the various housing, business, and school structures. In summary, the proposed 12,323-acre Project area would include the following land uses at build out:

- Up to 19,333 residential units
- 1,034,550 square feet of commercial
- 7,363,818 square feet business park
- 1,568,160 square feet institutional/Civic uses on 110 acres
- 146 acres for schools
- 75 acres of commercial recreation
- 163 acres of parks
- 5,624 acres of open space
- 327 acres for streets
- 191 acres for utilities

With regard to wildfire risk on the Project site, an important component is the planned wildland urban interface nature of this community. Planned development resembles a clustered deign with continuous edges between development areas and undeveloped vegetation. Large expanses of open space in the extreme northwest and southeast as well as in the far western portions of the project include wildland fuels. These open space areas represent potential exposed interfaces to the wildland with the remainder of the interior project areas represented by built and maintained landscape. In addition to these perimeter open space areas, minor and major greenways are planned for integration within the Centennial communities. In most cases, these interior greenways will be fully disturbed and graded during construction and then reseeded and will include managed landscapes presenting minimal wildfire hazard. Nonetheless, the structures planned adjacent to these areas are providing fuel modification, interior sprinklers and ignition resistant construction that is appropriate for the types of wildfires that may occur in these areas. Other large expanses of open space in the extreme northwest and southeast as well as in the far western portions of the project include wildland fuels. These open space areas represent potential

exposed interfaces to the wildland with the remainder of the interior project areas represented by built and maintained landscape.

The proposed land use improvements previously described will be completed according to the 2022 California Fire Code and Building Codes (as adopted by the County, per Title 32) as well as the 2021 International Fire Code, or current fire code at the time of construction, and will therefore include ignition-resistive construction, interior sprinklers, structure set-backs, and required fire flow, along with a designated fuel modification area which varies throughout the Project based on modeled fire intensity and site features such as vegetation and topography, amongst others as described further in this WSP. The following descriptions provide additional detail regarding the proposed land uses.

Residential

Residential units will be provided within land use categories ranging from very low to very high residential. As such, densities will range from as low as 2 dwelling units per acre to as high as 50 dwelling units per acre. There will be detached as well as attached units. Regardless of the density type, all development will resemble a master-planned clustered form.

Public Uses

The Centennial Specific Plan Project public uses include recreation areas, parks, golf courses, library, and hospital, amongst others.

Schools

Seven public school sites will be constructed within the project. Five of the school sites will be designated K–8, one K- 5 and there will be one high schools.

Public Safety Sites

The Centennial Specific Plan Project also includes proposed public facilities locations including three fire stations, with an option for a fourth if determined necessary by LACoFD,uand a temporary sheriff sub-station open day one of the project that will be upgraded to a full sheriff station as the community builds out. Details related to final location, funding, phasing, specific fire station facility components, equipment, and staffing will be determined with LACoFD direction.

Project Open Space

The largest component of open space in the overall Centennial Specific Plan Project area is comprised of the areas outside the individual residential lots. The development concept is described in detail in the Centennial Specific Plan.

Additionally, proposed off-site improvements include:

- Widening SR 138, one of the primary access roads to the Project site
- Providing connections to existing off-site utility systems

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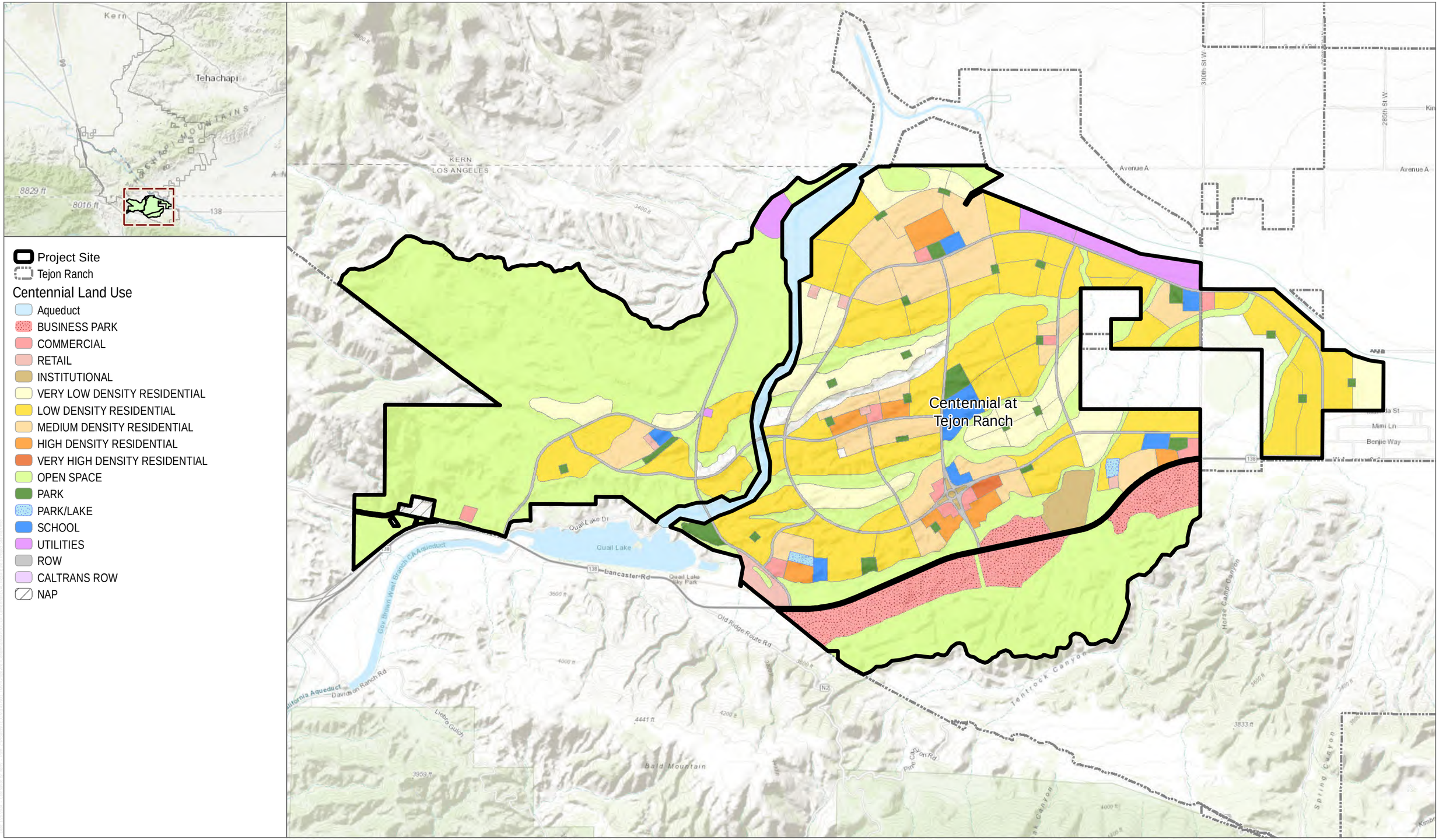

SOURCE: BASEMAP-ESRI MAPPING SERVICE 2023; LAND USE-TEJON RANCH 2023

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0 1,950 3,900 Feet

FIGURE 1

Centennial Project Site Plan

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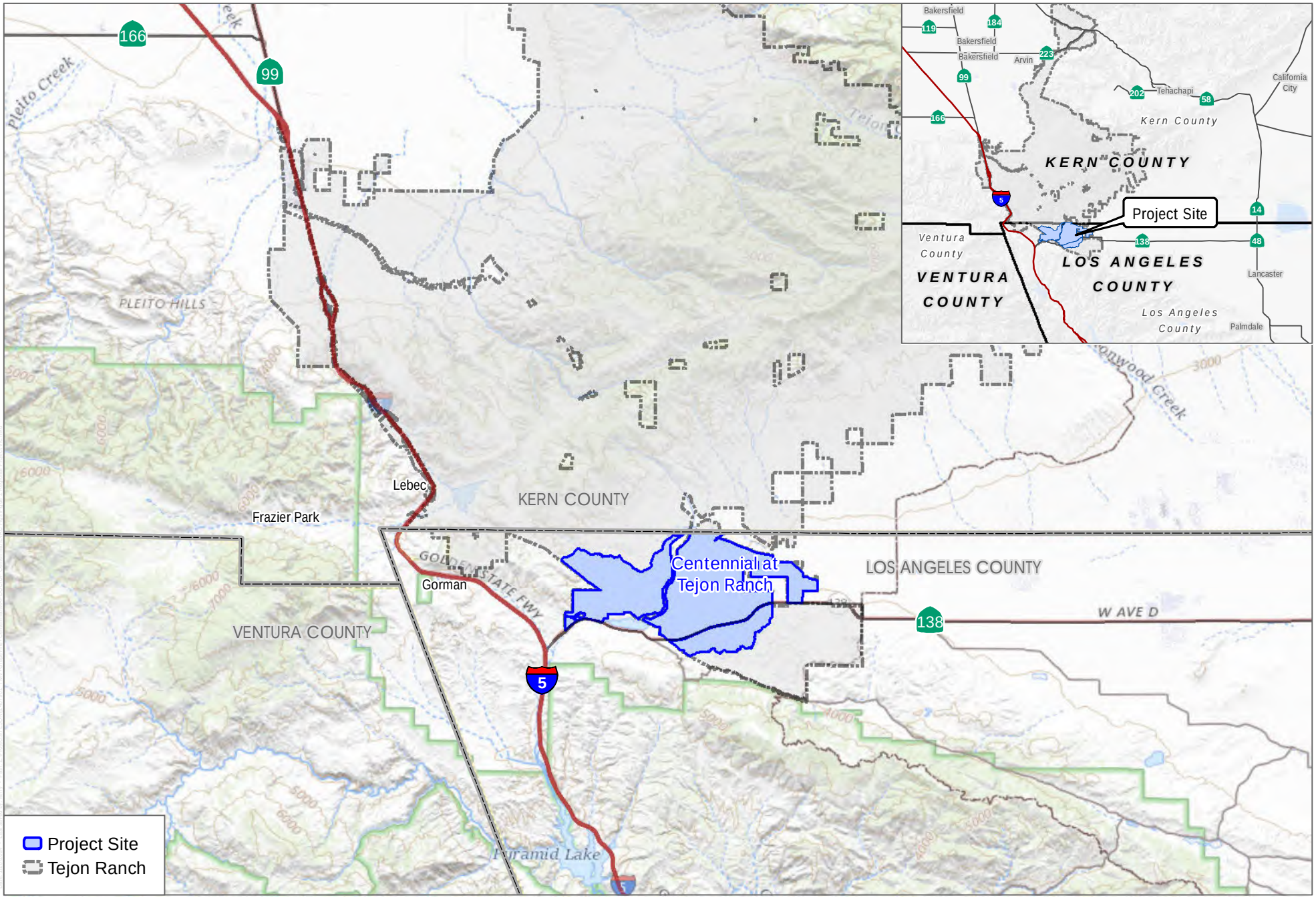

SOURCE: AERIAL-NAIP 2020

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FIGURE 2

Regional Project Vicinity

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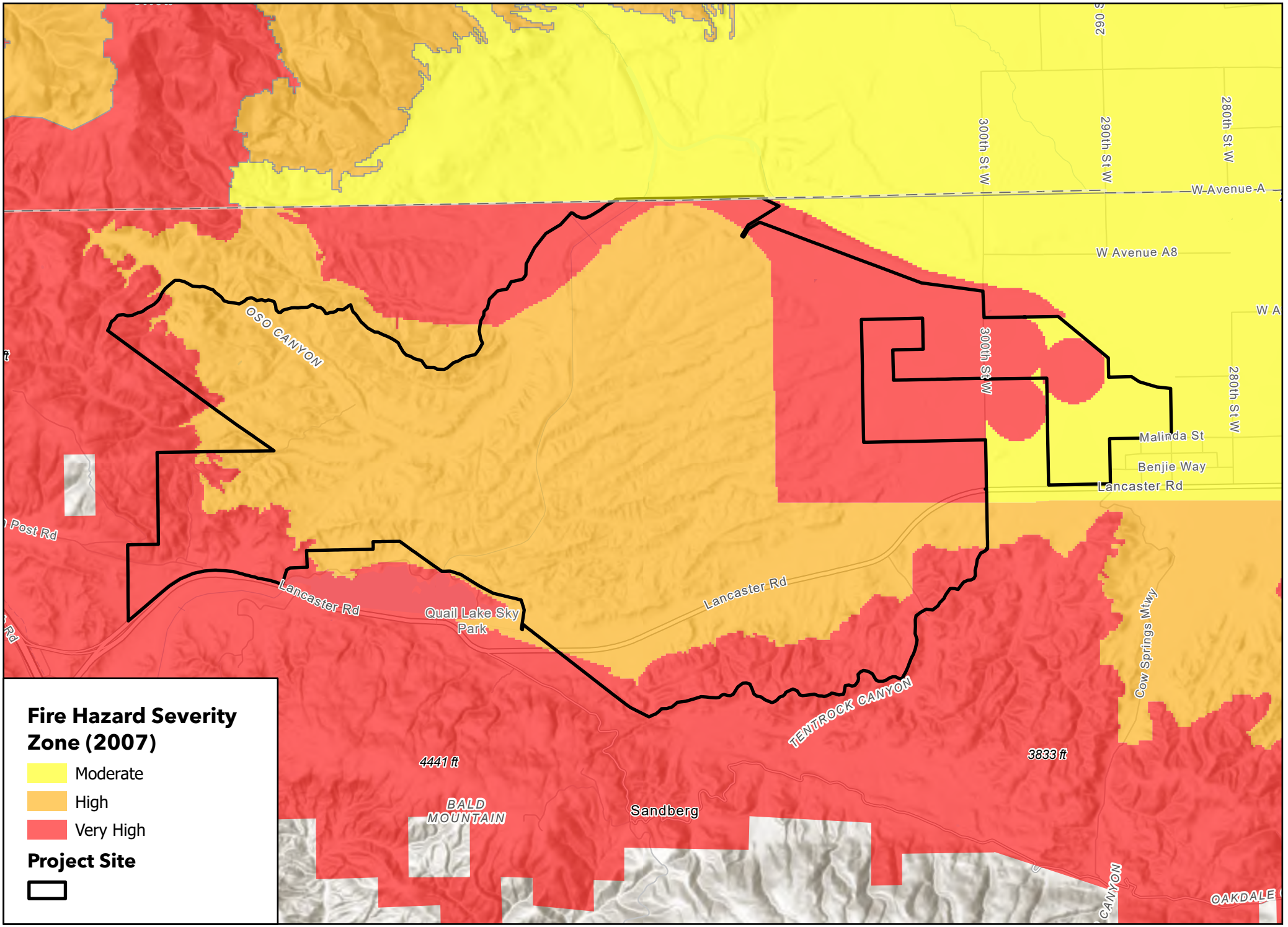

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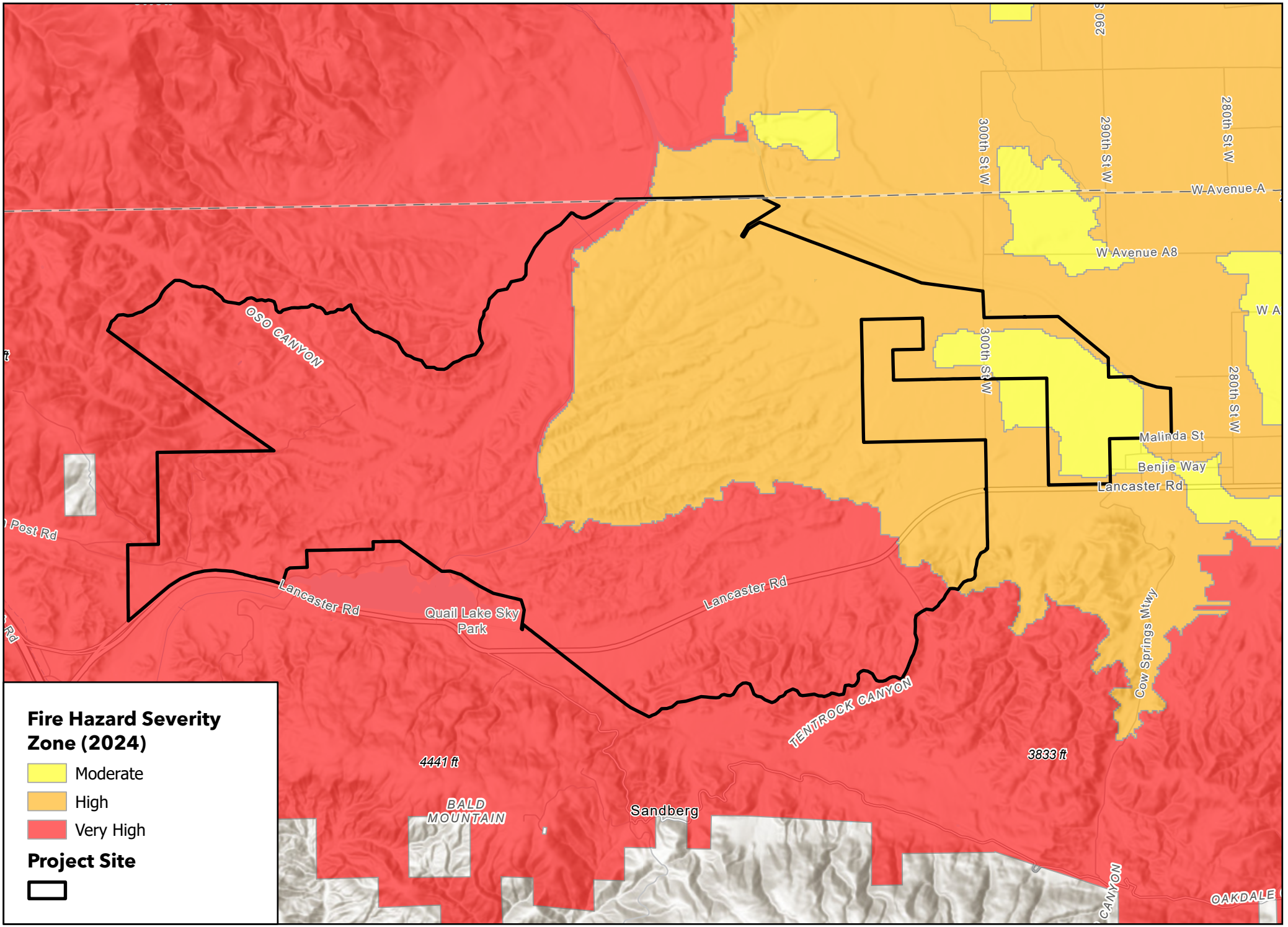
Source: OSFM, 2007



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0 0.5 1 2 Miles

Source: OSFM, 2024

FIGURE 3

Fire Hazard Severity Zones (2024)

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2 Existing Setting: Project Study Area Conditions, Risk Factors, and Fire History

Fire environments are dynamic systems and include many types of environmental factors. Fires can occur in any environment where conditions are conducive to ignition and fire movement. Areas of naturally vegetated open space like that found on the Project site are typically comprised of conditions that can 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. Understanding these existing conditions is necessary to understand the potential for fire within and around the Project.

2.1 Field Assessment

Field assessments of the Project site were conducted by the Dudek team between 2009 and 2023 in order to document existing site conditions and determine potential actions for addressing the protection of the structures proposed for the site. Assessments of the area's topography, natural vegetation and fuel loading, available setback areas, and general susceptibility to wildfire formed the basis of the site risk assessment. Completed field tasks include:

- Vegetation measurements and mapping refinements
- Fuel load analysis
- Topographic features documentation
- Regional land uses, existing communities, potential vulnerabilities
- Photograph documentation
- Confirmation/verification of hazard assumptions
- Access/egress documentation.

Project site photographs were collected and fuel conditions were mapped using 200-scale aerial images and Bonterra vegetation data (Bonterra 2009). Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the recommendations detailed in this WSP. Study Area photographs were collected (Appendix B), and fuel conditions were mapped using aerial images. Field observations augmented existing Study Area data in generating the fire behavior models and formulating the requirements provided in this WSP.

2.2 Study Area 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 a fire environment are topography, vegetation (fuels), and climate. The state of

each of these components and their interactions with each other determines the potential characteristics and behavior of a fire at any given moment. It is important to note that wildland fire may transition to urban fire if structures are receptive to ignition. Inversely, it is possible for structural fires to transition into wildland fires in extreme cases. This is more likely to occur when multiple structures are burning simultaneously, particularly in areas with close proximity to receptive wildland fuels. Structure ignition depends on a variety of factors and can be prevented/minimized 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 to the site is necessary to understand the potential for fire within and around the Project site. The following sections discuss the characteristics of the Project area on a regional scale. Evaluating conditions at this macro-scale provides a better understanding of the regional fire environment, which represents the fuel bed for wildfires that may ignite in the vicinity of, and burn toward, the Project's planned and maintained fire buffers, landscapes, and ignition-resistant structures.

2.2.1 Climate

The Project site is situated at moderate elevations between the Tehachapi Mountains to the north and the Liebre Mountains/Angeles National Forest to the south. The climate of this region is influenced by both the arid continental climate to the east and the moister Mediterranean climate to the west; therefore, the region is described as having a hot-to-cold and semi-arid to sub-humid climate. The average annual precipitation in the Project area is 8.51 inches, based on an analysis of Western Regional Climate Center (WRCC) data for the area. Temperatures in the Project area average low of 55.4°F in January to an average high of 98.9°F in July. Precipitation typically occurs between December and March with average rainfall of 8.51 inches (Western Regional Climate Center, 2021).

From a regional perspective, the fire risk in Southern California can be divided into three distinct "seasons" (Nichols et al. 2011, Baltar et al 2014). The first season, the most active season and covering the summer months, extends from late May to late September. This is followed by an intense fall season characterized by fewer but larger fires. This season begins in late September and continues until early November. The remaining months, November to late May cover the mostly dormant, winter season. Mensing et al. (1999) and Keeley and Zedler (2009) found that large fires in the region consistently occur at the end of wet periods and the beginning of droughts. Typically, the highest fire danger in southern California coincides with Santa Ana winds. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis near the end of fire season during late summer and early fall. They are dry, warm winds that flow from the higher desert elevations in the east through the mountain passes and canyons. As they converge through the canyons, their velocities increase. Consequently, peak velocities are highest at the mouths of canyons and dissipate as they spread across valley floors. Localized wind patterns on the Project site are strongly affected by both regional and local topography. As observed throughout Los Angeles County, the Project Site is occasionally subject to strong Santa Ana wind events.

2.2.1.1 Climate Change

A rapidly warming climate is expected to impact California and the Western U.S. from both direct and indirect effects. Since 2006, the State has monitored and created climate change assessments to assess the impacts and risks of climate change. Based on California's Fourth Climate Change Assessment, published in 2019, the current average annual maximum daily temperature is projected to increase between 5.6 and 8.8 degrees by 2100 (State of California, 2019a). The rising temperature is expected to result in increased heat waves in cities by 2050. The increased temperature and increased probability of heat waves that will impact electricity demand, especially in

inland and Southern California. Climate change is also predicted to, directly and indirectly, increase the risk associated with public health resulting in earlier deaths and increased illnesses. Currently, there is not a strong consensus on how California as a whole will be impacted by changes in precipitation. The general trend indicates that the northern part of California will become wetter while the southern portion of California will become drier (State of California, 2019a). However, water supply from snowpack is projected to decline by at least 2/3 by 2100 due to less precipitation falling as snow; with water shortages occurring by 2050. Further, over 3,000 miles of highways are projected to be exposed to temporary flooding because of increased 100-year storm events (State of California, 2021).

A major factor in climate change is greenhouse gas (GHG) emissions and wildfires can contribute to emissions as well. The California Air Quality Resource Board in 2020 completed a public draft assessment of the GHG and carbon impacts of wildfire and forest management activities (CARB, 2020a). The report is a result of SB 901 which required CARB to assess and report the GHG emissions associated with wildfire and forest management activities. Wildfire CO_2 emissions vary annually with annual emissions ranging from 1 million metric tons (MMT) of CO_2 in 2010 to 39 MMT of CO_2 in 2018 with an overall average CO_2 emission of 14 MMT from 2000-to 2019. Fires in forests and woodlands were the largest contributors to wildfire-caused emissions due to higher fuel loads than in areas dominated by shrubs and grasses. While in 2017, forest and shrublands had roughly equal areas of burned acres, the fires in the forest created more than double the emissions. The 2020 fire season resulted in multiple large fires in forest areas and created record-high emissions with over 106 MMT of CO_2 (CARB, 2020b).

Because wildfires can contribute to climate change via GHG emissions and be affected by climate change, the Fourth Climate Assessment also examined how climate change is expected to impact wildfires across the State. Fire frequency and intensity are expected to be impacted by the rapidly changing climate; however, as wildfires are affected by multiple complex drivers the projections range from modest to large increases in wildfire regimes. The area burned by wildfire has been found to increase parallel to the increasing air temperatures. The average area burned may increase by 77% by 2100, if emissions continue to rise. The statewide maximum burn area is projected to rise by 178% and extreme wildfires are predicted to occur 50% more often by the end of the century. However, model projections regarding wildfire intensity, spread, and duration are limited. The changes to temperature, loss of snowpack, and earlier snowmelt are expected to result in dryer “dry” seasons and result in more susceptible forests. Wildfires are occurring at higher elevations and this trend is expected to be exacerbated by climate change. Late Santa Ana winds will continue to be most frequent in December and January. However, there is a lack of consensus on how Santa Ana wind-driven wildfires will change. Additional research is needed to better understand the effect of climate change on extreme wind events and wildfires (State of California, 2019a).

Wildfire simulations found that forested areas, especially the Sierra Nevada, are projected to have the greatest increases in burned areas under extreme weather (State of California, 2018). The burned area is likely to increase in conjunction with warming temperatures and has a stronger effect on montane forests in the northern two-thirds of the State. The increased burned areas were also found to be consistent with current experiences and trends already exhibited in the State and the western U.S. Impacts to tree mortality as a result of fine fuels encroaching on forest canopy areas were only expected to have a small increase from 1-7% in the near future and within the systems natural variability. It was also found that depending on vegetation type and fuel amount the impact from climate viability changed demonstrating great spatial diversity in wildfire response to climate change (State of California, 2018).

The Fourth Climate Assessment also prepared assessments based on regions to capture region-specific effects of climate change (State of California, 2019b). The Los Angeles Region includes all of Ventura, Los Angeles, and

Orange Counties as well as the urbanized areas of San Bernardino and Riverside Counties. This region has a highly variable topography ranging from coastal plains to mountain ranges to desert areas. In the Los Angeles region, average maximum temperatures are projected to increase around 4-5 degrees by 2050 and 5-8 degrees by 2100. As a result, the number of extremely hot days is also expected to increase across the region. By the late century, the hottest day of the year is predicted to be up to 10° F hotter for most locations across the region. Precipitation is projected to only exhibit small changes in average precipitation amounts. However, extreme precipitation events, both wet and dry, are expected to increase. Areas are projected to experience a 25-30% rise in the wettest day of the year by the end of the century. As a result, the atmospheric river events are expected to see an increase in frequency and severity (State of California, 2019b).

Within southern California, Santa Ana winds are a unique climatic feature. These winds result in strong northeasterly downslope offshore winds that can be a catalyst for wildfire within the region. Currently, Santa Ana winds are most frequent in December and the strongest in January. These events have significant interannual variability and there have been no significant trends yet regarding a decline in their intensity, duration, and frequency. How climate change may impact future Santa Ana wind events is uncertain and inconclusive. Some studies have exhibited the wind events increasing while others have shown them to decrease with climate change.

Wildfires in the Project area are influenced by the Mediterranean climate, Santa Ana winds, drought, type and spatial distribution of vegetation, topography, large WUI interfaces, fire suppression, and human activities within the Los Angeles region. Nearly 80% of all wildfires currently occur in the summer and fall with a quarto of those fires happening under Santa Ana wind conditions. However, there remains significant uncertainty over how climate change will affect fire frequency and intensity in the region. Some future projections indicate that wildfires in the Los Angeles area will increase in burned are by the mid-21st century with the burned area increasing 60% for Santa Ana-based fires and 75% for non-Santa Ana-based fires. However, other climate projections using different statistical models found the average area burned to be much lower and that the annual area burned by the mid-century to increase by over 2000 hectares. Further, similar yet slight lower increases in wildfire areas burned were also projected to occur by the late 21st century as continued warming could cause an overall fuel decline in the region. These discrepancies highlight that there while wildfires are projected to increase in the Los Angeles Region there is still a large uncertainty about how exactly climate change will affect fires in this region and to what degree will wildfire frequency change (State of California, 2019b).

The effect climate change will have on future fire regimes is not unilateral, especially in Southern California (Keeley & Syphard, 2016). Future fire regimes are not only changing in response to climate change but also in response to ignitions, with human ignitions complicating the role of climate change in driving wildfires. In Southern, California humans account for 95% of fires and have altered the timing of wildfires by increasing the probability of ignitions during Santa Ana wind events. However, there are no studies to date that link fire-hardened, master-planned communities with new ignitions. Instead, modern master-planned communities have been shown to be resistant to wildfire, even providing refuge during wildfires. While research has indicated that climate change will affect montane forests lower elevation landscapes, like the Los Angeles Region are not strongly climate limited as in these regions the primary driver of wildfire is human-caused ignitions. The regional analysis demonstrates that in Southern California climate drivers are eclipsed by human ignition drivers and increased population on the landscape-altering future climate regimes (Keeley & Syphard, 2016).

2.2.2 Topography

The Project site is located in the transition zone between the southern edge of the Tehachapi Mountains and the northern edge of the Liebre Mountains. Elevations on the site range from approximately 3,000 to 4,300 feet amsl (Lebec and La Liebre Ranch USGS 7.5-minute quadrangles). Of note is Oso Canyon that bisects the central portion of the property along a north-south axis ultimately draining in a northerly direction toward the Alamo Power Plant and the East Branch of the California Aqueduct. Oso Canyon is the primary drainage feature on site and affects the site's overall drainage pattern, which trends from the higher elevations in the northwest and southeast toward the northeast. Immediately south of the property is Quail Lake which is associated with the California Aqueduct that also bisects the property and is aligned roughly parallel with Oso Canyon but situated to the east.

Slopes on the Project site range from relatively flat (0% slope) up to nearly 95% slope (approximately 45 degrees). Steeper slopes are associated with the portions of the property that are situated on the flanks of the Tehachapi and Liebre Mountains in the west and southeast portions of the property. Site wide topography is illustrated in Figure 4. As presented below in Table 2, planned development areas are not proposed within the site's steeper areas. Roughly 80% of proposed development will occur in areas with existing slopes of less than 15%.

Table 2. Slopes Within the Centennial Project Site.

Slope Percent	Acreage Within Project Site	Acreage Within Proposed Development Areas
0-5%	3488	2292
>5-15%	4471	2772
>15-30	2700	1193
>30-50%	1409	242
>50%	237	<1

Source: LANDFIRE, 2024

Finally, the geologic formations and associated soils on site, discussed in detail in the Project's Environmental Impact Report (EIR), have influenced the occurrence and distribution of vegetation in the project area. Vegetation plays an important role in the site's overall wildfire risk and intensity and is defined in large part by climate.

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower spread down-slope. Terrain that forms a funneling effect, such as chimneys, chutes, or saddles on the landscape can result in especially intense fire behavior, including faster spread and higher intensity. Conversely, flat terrain tends to have little effect on fire spread, resulting in fires that are driven by vegetation and wind. Topographic features that may present a fire spread facilitator are the slope and canyon alignments, which may serve to funnel or channel winds, thus increasing their velocity and potential for influencing wildfire behavior.

2.2.3 Vegetation (Fuels)

In addition to weather and topography, vegetation (or fuel) plays a major role in affecting fire behavior and shaping the fire hazard potential on the Centennial Project site. Vegetation on the Centennial property is dominated primarily by both native and non-native grassland which represent nearly 76% of the site's vegetative cover. Mixed oak woodland inhabits nearly 12% of the site and is situated both on the north-facing slope of the Liebre Mountains in the southeast portion of the property as well as in the higher elevations in the western portion of the property. Scrub

vegetation types, scattered throughout the site, represent nearly 8% of the site's vegetative cover. While this fuel type can burn intensely under strong, dry wind patterns, it does not produce the high fire intensity and fast-spreading wildland fires found with chaparral fuel types, which cover less than 1% of the site. The remaining cover on site (less than 4%) consists of disturbed or un-vegetated areas (roads, aqueduct, etc.), riparian scrub, and riparian woodland habitats.

Table 3 provides details of the Centennial vegetation types and their overall representation on site (Bonterra 2009) and also indicates the fuel model used for fire behavior modeling and analysis corresponding to each vegetation type. In all, there are 45 individual vegetation types on site. For the purposes of evaluating fuel type coverage on site, these vegetation types have been grouped into similar fuel characteristic groupings based on fuel model type, resulting in a total of 11 different fuel models, of which two are classified as non-burnable. On-site vegetation is important relative to wildfire as some vegetation, such as scrub, chaparral, and grassland habitats are highly flammable while other vegetation, such as riparian communities or forest understory, are less flammable due to their higher plant moisture content, compact structure, and available shading from overstory tree canopies. The influence vegetation has on fire behavior is immense and understanding vegetation dynamics is important for developing an effective fuel modification plan. The map in Figure 5 presents the vegetation/fuel distribution for the Centennial Project site.

Vegetation surrounding the Project site is also primarily native and non-native grasslands, mixed oak woodland, and scrub vegetation types. After development of the Project site, the fuel load for the Project area will be significantly reduced and the construction of buffers between Project structures and open space will further reduce the overall fire risk for the Centennial community. Further, fire risk associated with the surrounding forest lands is minimal due to the proximity of these vegetation communities to the Project site.

Post-development vegetation composition proximate to the Centennial footprint is expected to be significantly different than current conditions. Following build-out, irrigated landscape vegetation associated with fuel modification zones (FMZ) A and B specifically are expected to cover the immediate area surrounding the Project Site, extending 100 horizontal feet from each of the structures. Consistent with LACoFD requirements, native and naturalized vegetation occurring within FMZ Zone C is not expected to be irrigated, although overall fuel volumes will be reduced by removing dead and dying plants, non-natives, highly flammable species, and thinning the remaining plants so they would not readily facilitate the spread of fire on an ongoing basis. The provided FMZ areas will be maintained in order to comply with LA County Fire Fuel Modification Plan guidelines.

Table 3. Centennial Project Site Vegetation Types.

Vegetation Type*	Acreage on the Project site**	Corresponding Fuel Model (FlamMap)
Agricultural	417.3	98
Alkali Meadow	3.66	98
Alluvial Scrub	5.56	SCAL18
Baltic Rush	21.48	98
Bladderpod Scrub	0.67	SCAL18
Bush Lupine Scrub Dominated	1.80	SCAL18
California Buckwheat Scrub Dominated	21.92	SCAL18
California Juniper/California Buckwheat Scrub	4.70	6
Chamise/Bigberry Manzanita Chaparral	40.10	SH7

Table 3. Centennial Project Site Vegetation Types.

Vegetation Type*	Acreage on the Project site**	Corresponding Fuel Model (FlamMap)
Coastal and Valley Freshwater Marsh	2.46	98
Coffeeberry Scrub	11.95	SH7
Cottonwood Woodland	0.88	TL2
Developed/Disturbed	184.68	NB1
Goldenbush Scrub Dominated	16.06	SCAL18
Grassland (Undifferentiated)	6,099.9	GR2
Great Basin Scrubs	360.85	GS2
Mixed Oak Woodland	1,371.63	TL6
Native Perennial/California Annual Grassland	3,076.54	GR2
Open Water/Developed	6.88	98
Ornamental	0.12	SH2
Rabbitbrush Scrub Dominated	443.10	GS2
Riparian Herb	54.38	GR3
Rush Riparian Grassland	48.98	GR3
Seeps and Ephemeral Ponds	8.05	98
Southern Arroyo Willow Riparian	8.57	TL2
Southern Cottonwood Willow Woodland	3.96	TL2
Southern Willow Scrub	14.14	TL2
Unvegetated Wash	25.87	98
Valley Oak Riparian Woodland	12.08	GR2
Wand Buckwheat Scrub Dominated	6.07	SCAL18
Willow Riparian Forest	15.05	TL2
Willow Riparian Woodland	10.18	TL2
Wright's Buckwheat Scrub Dominated	16.51	SCAL18
Yucca Scrub Dominated	33.20	SH2
Total:	**12,376**	

2.2.3.1 Vegetation Dynamics

Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (leaf size, branching patterns), and overall fuel loading. For example, the native shrublands that compose the coastal scrub community on the Project sites are a high potential hazard based on such criteria.

Existing vegetation distribution throughout the Project Site varies by location and topography. Areas, where the proposed development is located, are primarily disturbed, or covered with non-native grasses, while the adjacent slopes support coastal scrub cover. The importance of vegetative cover in fire suppression efforts is its role in affecting fire behavior. For example, fire burning in grasslands may have shorter flame lengths than those burning in coastal scrub; however, fire in grasslands, due to its flashy (easily ignited when dry) nature, often spreads more rapidly than fire in other vegetation types.

As described, vegetation plays a significant role in fire behavior. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes affect plant community succession. A succession of plant communities, most notably the gradual conversion of shrublands to grasslands with high-frequency fires and grasslands to shrublands with fire exclusion, is highly dependent on the fire regime. Biomass and associated fuel loading will increase over time, assuming that disturbance or fuel reduction efforts are not diligently implemented.

Wildfire disturbances can also have dramatic impacts on plants and plant composition. Heat shock, accumulation of post-fire charred wood, and change in photoperiods due to removal of shrub canopies may all stimulate seed germination. The post-fire response for most species is vegetative reproduction and stimulation of flowering and fruiting. The combustion of aboveground biomass alters seedbeds and temporarily eliminates competition for moisture, nutrients, heat, and light. Species that can rapidly take advantage of the available resources will flourish. 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 FMZs on the Project Site. FMZs are landscape areas that minimize fire spread progressively through various restrictions, treatments, and maintenance. FMZs provide a buffer between off-site fuels and the urbanized landscapes that have the dual benefit of protecting communities while also protecting habitats by minimizing the potential for project-related ignitions.

2.2.3.2 Historic and Ongoing Grazing Program

Tejon Ranch remains unfragmented and has been carefully managed with livestock and cattle grazing for nearly one hundred sixty years by pre-statehood vaqueros till today by modern-day cowboys and has committed to doing so in the future. Actively grazed landscapes, including those of portions of the ranch within the Antelope Valley of Los Angeles County, assure sustainability and limit the severity of wildfire because grassland fuel loads are reduced. Tejon Ranch has maintained a database since 2013 providing annual Residual Dry Matter (RDM) records from locations across the ranch. RDM refers to the unused forage at the end of the grazing season (fall) and provides and approximation of the residual fuel load (Ratcliff et al., 2022). At the end of the grazing period where the occurrence of extreme fire weather (Santa Ana wind conditions) is most likely, the average RDM the Centennial Project site equates to roughly 467 pounds per acre. Flame lengths have been found to be reduced to under 8 feet when RDM is managed to under 1,225 pounds per acre (Ratcliff et al., 2022). The sustainable grazing operation employed at Tejon Ranch effectively reduces the grass fuels on an ongoing basis which reduces the potential for ignitions and for rapid fire spread. Following buildout of Centennial, Tejon Ranch has committed to maintaining grazing management within the Project's open spaces. Tejon Ranch's commitment to ongoing grazing management at Centennial facilitates the historic land use and stewardship of the area while also maintaining and reducing the vegetative fuels. Because of the variability of the historic grazing practices, this WSP considers the grazing program as an additional environmental benefit but, conservatively, this WSP does not rely upon those benefits when determining the Project's potential impacts under CEQA.

2.2.5 Historic Wildland Fires

Fire history data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. Fire history data can be used to show whether large fires have occurred in the area of the Project site, which indicates whether they may be possible in the future. Fire history for the Project site and surrounding areas was analyzed through records from CAL FIRE in their Fire and Resource Assessment Program database and the Integrated Reporting of Wildland-Fire Information (IRWIN) database. The

Project site and the surrounding vicinity have been subject to wildfires, primarily within the direct vicinity of, but also some fires occurring within, the Project boundaries.

According to the Fire and Resource Assessment Program (FRAP) most recent database, 23 wildland fires have occurred on or within 1 mile of the Project site since 1800, with 11 wildland fires burning on site at an average fire return interval of roughly 11 years (Figure 6). The most recent recorded fire burning in the vicinity (within 1 mile) of the Project site (i.e., excluding an unrecorded 2024 fire) was the Gorman Fire, which occurred in May of 2007 and burned west of the property and west of Interstate (I) 5. Limited wildfire history at the Project site is believed to be largely due to the site's terrain, managed fuels, barriers to wildland fire spread, quick wildfire detection and response, the removal of fine fuels by cattle grazing and a lower risk for human-caused ignitions as compared to off-site urbanized areas. Off-site wildland fire occurrence is more common, particularly south of the Project site in the Liebre Mountains. However, wildfires encroaching onto the Project site from the south rarely enter the interior of the site due to the position of SR-138 and its use as a fire break. Wildfires that have previously burned within the Project site have been limited in size with an average area of 284 acres.

According to the IRWIN database, there have been 196 reported wildfire ignitions within 5 miles of the Project since 2014. As presented in Figure 7, regional wildfire ignition locations documented in the IRWIN database are strongly associated with major roadways including I-5, State Route (SR) 138, and Pine Canyon Road, with most ignitions occurring along I-5 to the southwest of the Project site.

Other than the southern portion of the property, relatively few documented fires have burned within the interior portion of the Project site. Table 4 summarizes the fire history on and near the Project site.

Table 4. Fire History within Five Miles of the Project by Decade

Year	Number of Fires	Average Size of Fire (acres)
1912–1920	12	516
1921–1930	15	1,578
1931–1940	1	117
1941–1950	2	5,049
1951–1960	2	507
1961–1970	4	12,418
1971–1980	1	3,969
1981–1990	6	2,330
1991–2000	7	498
2001–2010	17	1,709
2011–2020	18	1,777
2021–Present	6	175
Total	**91**	**Average Fire Size: 1,915**

Source: FRAP, 2023

While not yet recorded in the public fire history database, other notable wildfires within the region have occurred in 2024. Most notably, the Post Fire ignited on June 15, 2024, near Gorman Post Road in Gorman, California located roughly 6 miles northwest of the Project site. Fueled by strong winds from the northeast and long-range spotting, the fire spread rapidly to the south, eventually growing to 15,563 acres. Firefighters suggested that fire spread was

exacerbated by two back-to-back wet winters which resulted in dense vegetation growth. Two structures were destroyed in the Post Fire, resulting in one civilian injury. The fire was declared fully contained on June 26, 2024. While the Post Fire spread quickly south, it did not cross Interstate-5 or threaten the Project site.

The White Fire ignited on July 13, 2024, roughly 11 miles south of Tehachapi near Twin Lakes. The fire was caused by lightning and eventually spread to 5,646 acres roughly 16 miles northeast of the Project site. The fire was limited to the steeper terrain of the Tehachapi Mountains and did not spread to the Antelope Valley or the Project site.

To date, fire has played a limited role, second to livestock grazing, in shaping and maintaining the plant communities found on the Project site. As indicated in Figure 6, the majority of burns taking place on Centennial occur in the southern and eastern portion of the property, south of Highway 138 adjacent to larger expanses of open space in the Liebre Mountains and the Angeles National Forest. On site, this area is characterized primarily by mixed oak woodland and grassland. Based on an analysis of fire perimeter data, Highway 138 appears to have been used several times as a fuel break to prevent fires burning onto much of the Project site from the south. Other than the southern portion of the property, relatively few documented fires have burned within the interior portion of the Project site. The lack of significant historical fire activity on the majority of the Project site is likely attributed in part to the removal of fine fuels by cattle grazing and a lower risk for human-caused ignitions than for more urbanized areas off-site. Table 4 summarizes the fire history on and near the Project site.

It is important to note that the fire spread patterns on the property would be significantly interrupted once the Centennial Project site is built out given the separation of continuous fuels through development patterns across the Project site.

2.3 Existing Fire Hazard

Based on the existing conditions, the likelihood of wildfire in the Project area is significant, but the type of wildfire that would be experienced is a grass-fueled wildfire that presents lower risk to an ignition resistant master planned community. The current conditions as they relate to topography, climate, land use, and vegetation have the potential to facilitate wildfire ignitions and spread. Additionally, as described above in Section 2.2.5 Historic Wildland Fires, the area has been subject to wildfires with an average return interval of four years. Further, it is expected the wildfires will continue to burn within the Project's vicinity once it is completed.

The Project site's potential wildfire hazard is mapped by CAL FIRE as primarily moderate and high with the western portion of the site mapped as very high fire hazard severity zone. Since the approval of the Certified EIR, CAL FIRE has updated the Fire Hazard Severity Zone maps for the State Responsibility Area (SRA). Fire Hazard Severity Zones depict wildfire hazard based on wildfire intensity and likelihood, in addition to firebrand hazard for non-wildland areas. During the public comment period, questions were raised concerning the justification of CAL FIRE's proposed Very High Fire Hazard Severity Zone designations within the Centennial Project site. Following public comment and a site tour of the Centennial site, CAL FIRE reduced the extent of the Very High Fire Hazard Severity Zone within the Project site. Within proposed development areas specifically, 2,283 acres are designated as VHFHSZs, with 3,870 acres designated as High, and 431 acres designated as Moderate. Following Project build-out, it is likely that the extent of the VHFHSZ will be reduced to account reduced wildfire hazard as a result of permanent landscape conversions from urban development, and an increase areas classified as non-wildlands.

Table 5. Fire Hazard Severity Zone Classifications at the Centennial Project Site.

Fire Hazard Severity Zone	Project Site Acres	Development Area Acres
Moderate	601	431
High	4,629	3.870
Very High	7,089	2,283

Source: OSFM, 2024

While the Project site exists partially within a Very High Fire Hazard Severity Zone, it is important to emphasize that this designation is in no way intended to prevent development in hazardous fire areas. Uses of Fire Hazard Severity Zone maps, as determined by the Office of the State Fire Marshall, are summarized below.

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

While CAL FIRE's Fire Hazard Severity Zone map is utilized as a tool for quantifying the likelihood of severe wildfire behavior, it does not allow for an accurate portrayal of community risks as it does not consider vital attributes of community wildfire resiliency including but not limited to:

- Home Construction Materials and Methods (roofing material, siding material, vent style, etc.)
- Defensible Space and Fuel Modification
- Urban Fuels/Vegetation
- Community Structure (Intermix or Interface)
- Emergency Response Capacity
- Early Wildfire Detection Potential
- Evacuation Capacity

In California's 2019-2020 regular legislative session, Senate Bill 474 titled *Very high fire hazard severity zone: state responsibility area: development prohibition,* was proposed. The bill intended to prohibit the creation or approval of new development within SRA defined Very High Fire Hazard Severity Zones. The Bill was not approved as it did not align with the intended use of Fire Hazard Severity Zones in addition to the fact that many existing communities are in their entirety within a Very High Fire Hazard Severity Zone. Evidence suggests that new-development can be built safely within Very High Fire Hazard Severity Zones if communities are built in compliance with the latest codes and regulations that been proven effective in mitigating wildfire risks.

Master-planned communities built to modern ignition resistant standards provide passive fire protection that is highly successful at minimizing damage and loss of structures (CBIA, 2022). The State Fire Marshal's statistics demonstrate that homes built to California Building Code Chapter 7A standards effectively reduce fire risks to

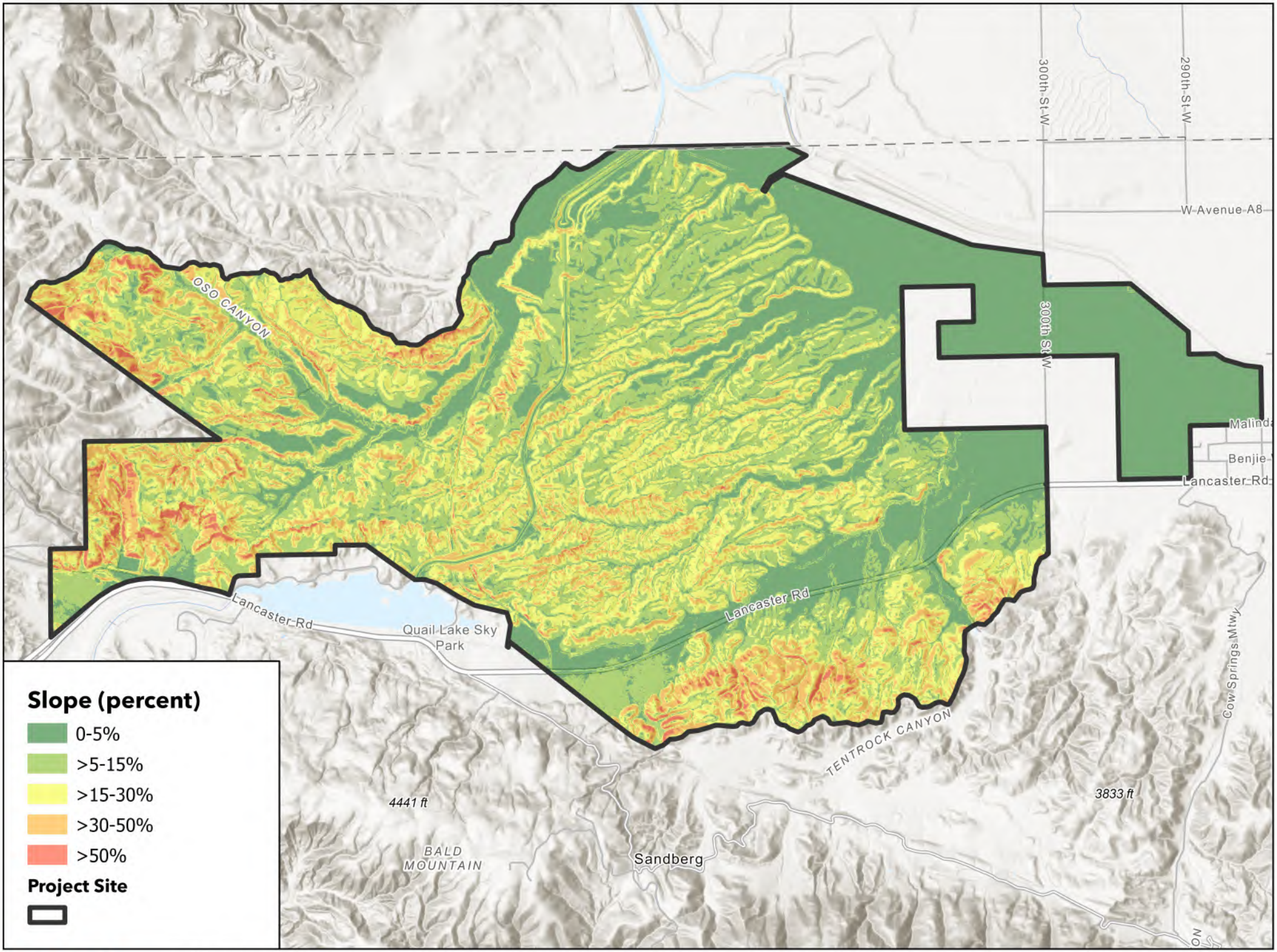
homes built in the wildland urban interface (WUI) and fire hazard severity zones (CBIA, 2022). Remarkably, when those homes are built as part of a properly planned and mitigated master-planned community, like Centennial, the risk of significant structural loss is extremely low (FEMA, 2023). Despite the headlines in recent years about the loss of homes to California wildfires, it has gone substantially unreported that no master-planned community built after the adoption of California Building Code Chapter 7A has suffered extensive structural losses as evidenced in the OSFM Property Loss Data.

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

- Fire-hardened homes built to the latest Chapter 7A standards
- Community-wide fuel breaks, fire-resistant landscaping, and green belting
- Active cattle grazing on undeveloped lands to reduce and manage flashy fuels
- Perpetual funding, maintenance and enforcement through an HOA
- Appropriate and reliable fire access and evacuation routes
- Adequate water supplies (studied pursuant to SB 610)
- Residential fire sprinklers
- Undergrounded project utilities
- Community design and siting to minimize fire risks (e.g., slope setbacks)
- Code compliant emergency response times.

On average, for the nine worst property-loss fires dating back to 2017, only approximately 1% of the homes and apartments destroyed, damaged, or affected were new dwellings (built after 1/1/10) even though new dwellings make up roughly 7% of the state's total housing stock (CBIA, 2022).

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



DUDEK

Source: USGS, 2023

FIGURE 4

Terrain

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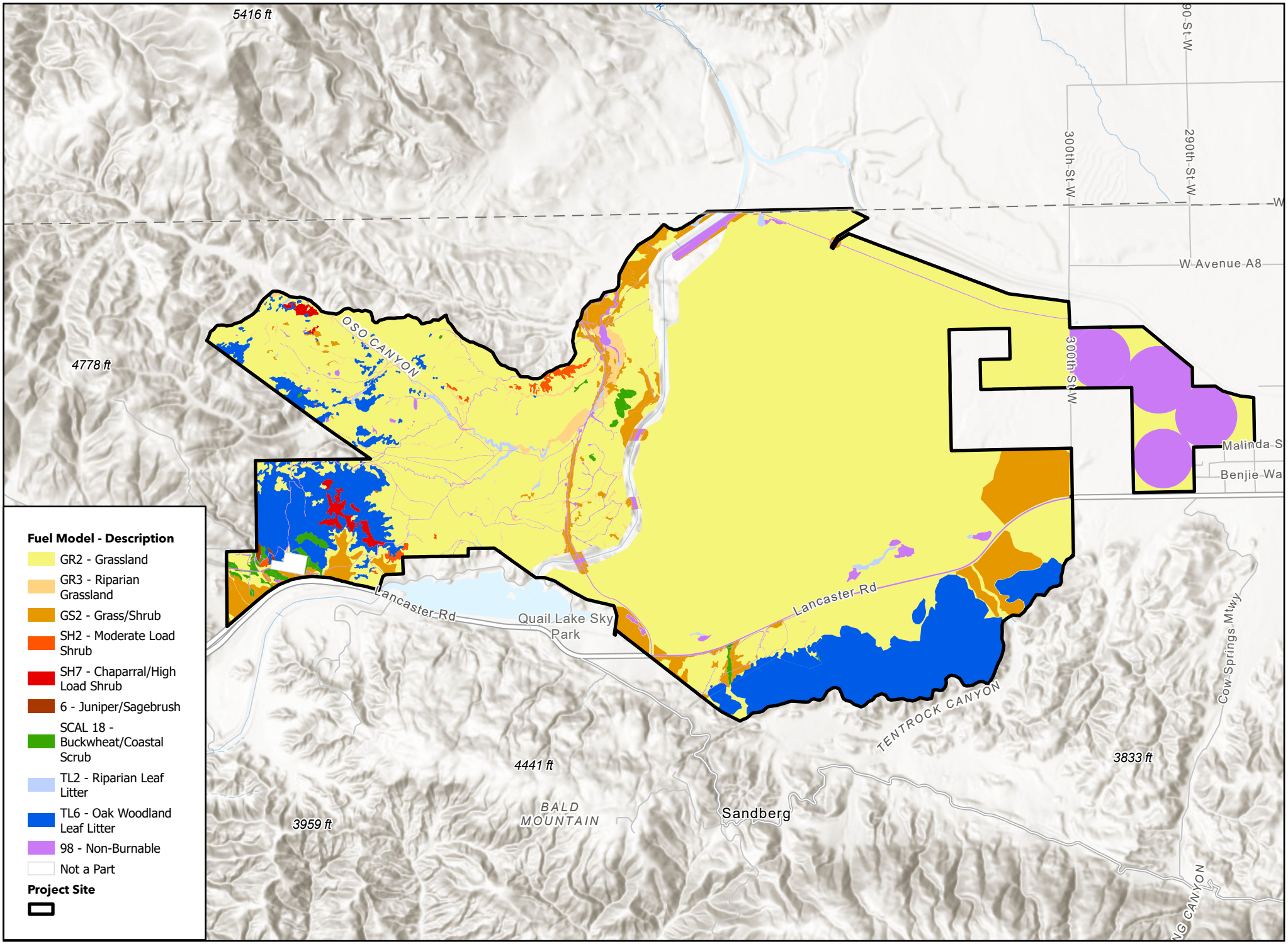

DUDEK

Source: BonTerra, 2009

N

0 0.5 1 2 Miles

FIGURE 5

Vegetation - Fuel Models

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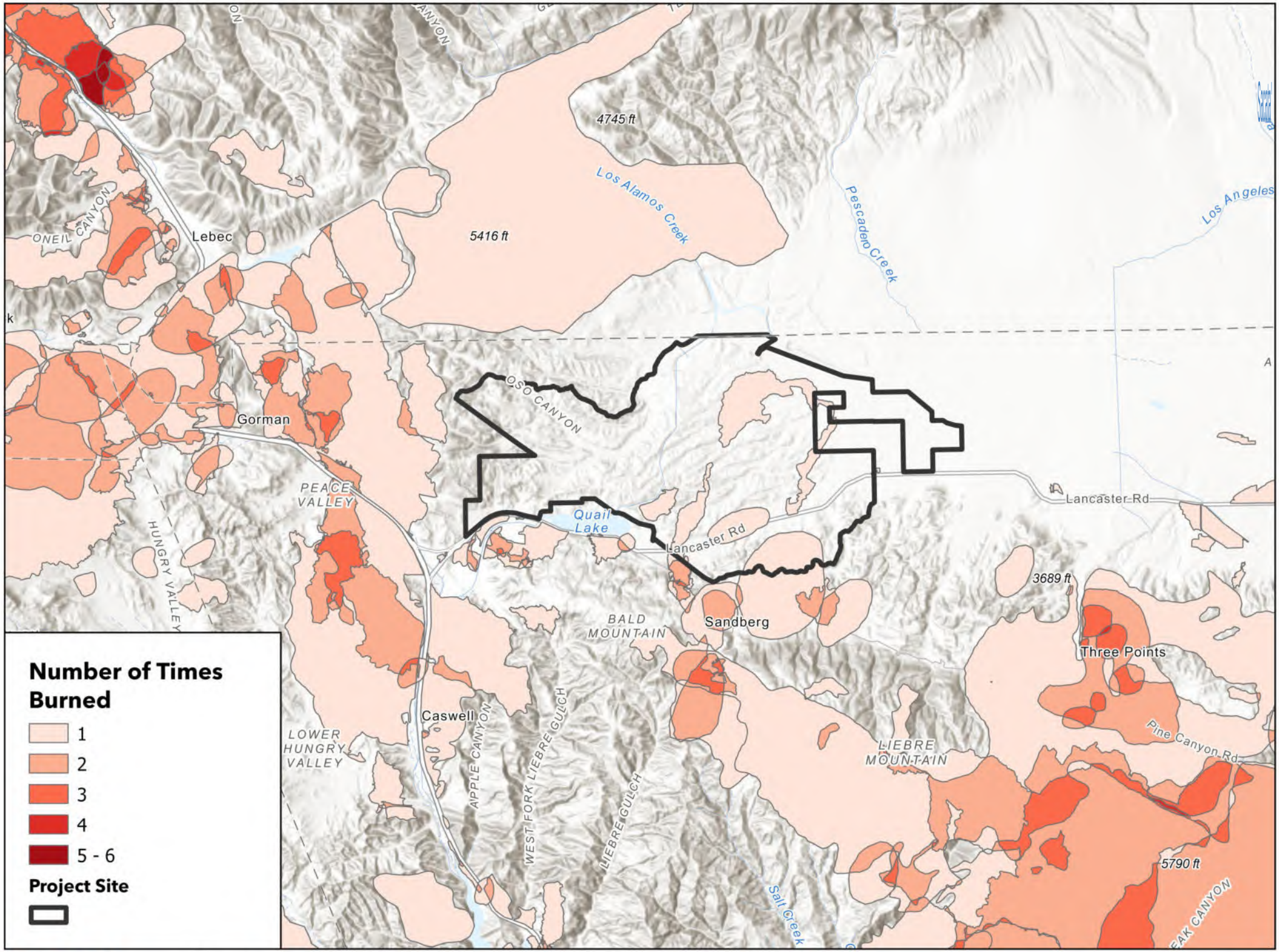

DUDEK

Source: FRAP, 2024

FIGURE 6
Wildfire History

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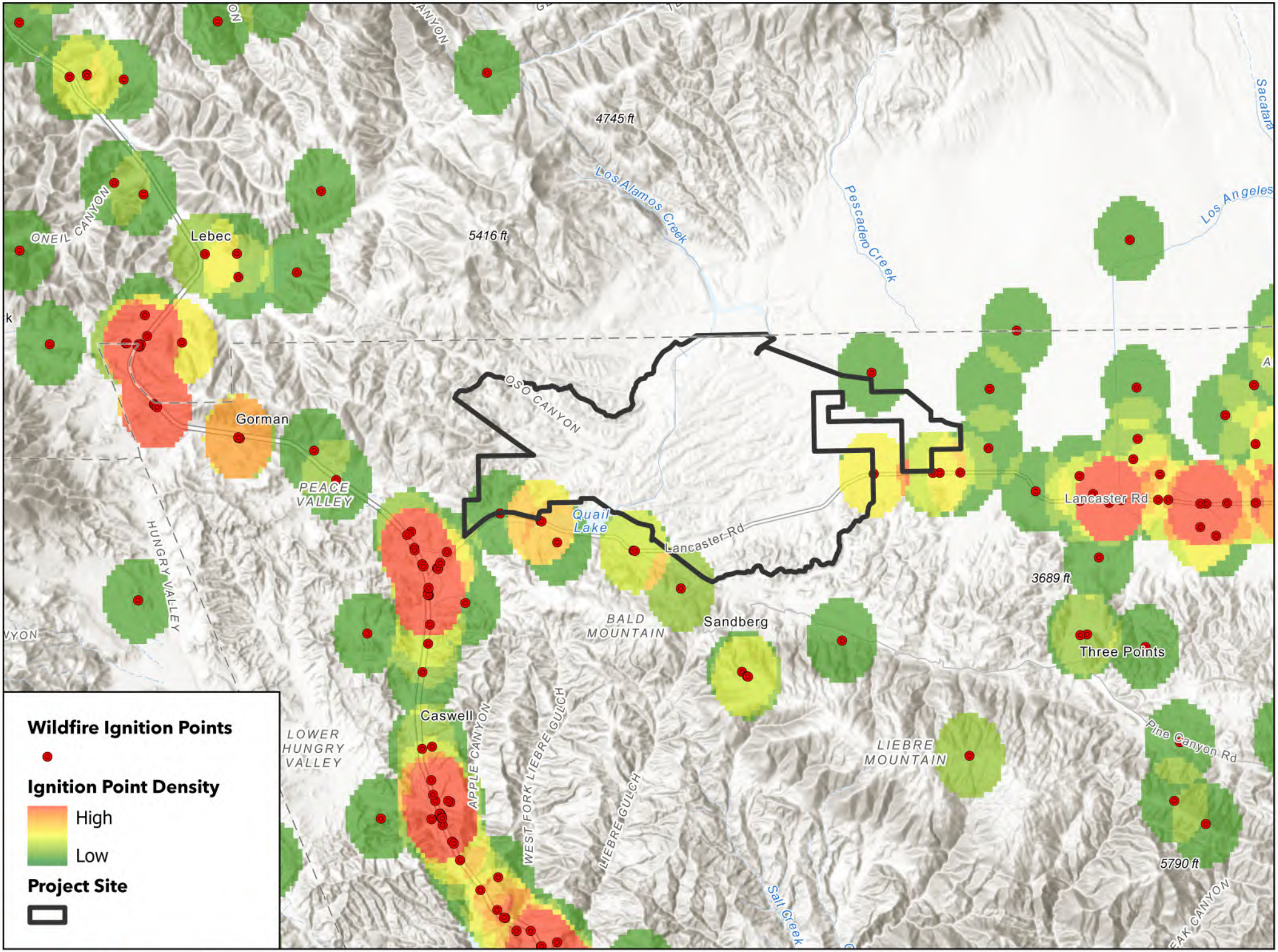

DUDEK

Source: IRWIN, 2023

FIGURE 7

Vegetation Fire Ignitions (2014-2022)

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3 Fire Safety Requirements – Regulatory Requirements and Recommended Project Design Features

3.1 Applicable Codes/Existing Regulations

This WSP demonstrates that the Project would comply with applicable portions of Title 32 of the Los Angeles County Code, as amended, which adopts by reference the 2022 edition of the California Fire Code (CFC). Title 32 is hereafter referred to as the Los Angeles County Fire Code (2020 or current edition) or "Fire Code". The Project also shall comply with Chapter 7A of the 2022 California Building Code (CBC),the 2022 California Residential Code, Section R237; and the 2019 Edition of the International Fire Code as adopted by the County. The Project would also be subject to the provisions of section 4291 of the Public Resources Code regarding brush clearance standards around structures and the Los Angeles County Fire Department guidelines for Fuel Modification Plans. The Project is required to comply with all future code updates as development proceeds.

Chapter 7-A of the CBC addresses exterior structural ignition resistance and ember penetration into homes, a leading cause of structure loss from wildfires (California Building Standards Commission 2019). Thus, code compliance is an important component of the requirements of this WSP, given the Project's wildland-urban interface (WUI) location that is partially within an area statutorily designated as a State Responsibility Area (SRA) Very High Fire Hazard Severity Zone (VHFHSZ) by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2007). Fire hazard designations are based on topography, vegetation, and weather, among other factors with more hazardous sites, including steep terrain, unmaintained fuels/vegetation, and WUI locations. Projects situated in VHFHSZ require fire hazard analysis and the application of fire protection measures to create defensible communities within these WUI locations.

As described in this WSP, the Project would meet applicable code requirements for building in these higher fire hazard areas through the application of site-specific fire protection measures. These codes have been developed through decades of wildfire structure save and loss evaluations to determine why buildings were lost to fire or why they survived. 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 2019 California Building Code (Chapter 7-A, Section 701A Scope, Purpose, and Application) (California Building Standards Commission 2019).

3.1.1 California Attorney General's Office Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act

The California Office of the Attorney General issued (October 2022) guidance (Guidance) outlining best practices for analyzing and mitigating wildfire impacts of development projects under the California Environmental Quality Act (CEQA). The Guidance does not impose additional legal requirements on local governments, nor does it alter any applicable laws or regulations. Instead, the Guidance is intended to help local governments' evaluation and

approval considerations for development projects in fire-prone areas, and to help project design in a way that minimizes wildfire ignition and incorporates emergency access and evacuation measures. The following provides an overview of the Guidance and relevant elements of the Project. A discussion of the Guidance regarding evacuations measures is addressed in the Centennial Wildfire Evacuation Technical Report (Dudek 2024).

Attorney General Guidance for Analyzing Project's Impacts on Wildfire Risks

Baseline Conditions

The Guidance states that an EIR's discussion of existing environmental (baseline) conditions should include information about open space areas and habitats within the project area that may be fire prone, a discussion of fire history and fuels on the project site and a description of existing available water supplies for firefighting. This WSP provides details regarding each of these baseline conditions, including a description of on-site open space habitat areas, analysis of the off-site open spaces, a detailed assessment of fire history within 5 miles of the Project, and confirmation that the Project will be provided water necessary for firefighting.

Modeling

The Guidance encourages modeling fire scenarios to "quantify" increased wildfire risks resulting from a project adding more people to wildfire prone areas and assessing risks. This WSP models fire scenarios under extreme weather conditions utilizing various modeling approaches fire behavior model to estimate fire intensity, flame lengths, spread rates, wildfire progression, and burn probability. The models confirm that the Project's provided defensible space buffers and walls are sufficient to slow wildfire spread and keep it from impacting the site. These same results, coupled with the fire protection features detailed in this WSP are shown to perform a dual role of 1) minimizing the potential for fire starts on site, 2) providing suppression capabilities both within structures and by nearby firefighting resources to quickly control ignitions that do occur, 3) creating and maintaining wide fuel modification buffers that reduce fire intensity and slow fire spread – all of which minimize the likelihood of a Project fire spreading off-site into open space areas. Likewise, neighboring developed areas and their provided protections required by LACoFD perform a similar function during wildfires in the Project area.

Qualitative Assessment

The Guidance indicates that an EIR qualitatively assess relevant variables on the risk of wildfire, including:

Project Density – Project density influences how likely a fire is to start or spread and how likely it is that occupants will be in danger. The Guidance states that "Fire spread and structure loss is more likely to occur in low- to intermediate-density developments." The Project master-planned community clusters development on areas long planned for residential and commercial uses, converting the developed area to ignition resistant landscapes with no inclusion of unmaintained vegetation within the converted footprint. The nearest open space vegetation is separated from the site's ignition resistive structures by code compliant fuel modification zones. The buildings and development footprint are clustered and present one, defensible interface, unlike lower density intermix development which incorporates fuels within and around buildings and multiple building interfaces, a condition that is significantly harder to defend and creates multiple exposures when compared with the Centennial Project's clustered, master planned community condition.

Location in the Landscape – Where a project's structures are placed in the landscape relative to fire environment features (vegetation, topographical features, and wind alignments) also influences wildfire risk. The Project is on

relatively flat terrain downslope of higher elevation hillslopes. The nearest open space vegetation is separated from the site's ignition resistive structures code compliant fuel modification zones. Fuels in the Project area are not conducive of extreme fire intensity and terrain. Overall site topography varies but generally does not include extreme steep slopes, with development areas located away from the site's stepper slopes. Topography has been comprehensively evaluated and confirmed that even under the extreme weather conditions that have been recorded in the area, the provided defensible space and ignition resistant structures are appropriately designed to minimize the potential for structure ignitions.

Water Supply and Infrastructure – Water supply and infrastructure to address firefighting within the project site are relevant to evaluating wildfire risk. The Project water supplier prepared a detailed Water Supply Assessment under SB 610 that confirms that it has capacity needed for domestic and firefighting needs. As indicated in the WSP, the Project will provide internal waterlines supplying sufficient fire flows and pressure to meet the demands for required on-site fire hydrants and interior fire sprinkler systems for all structures to meet LACoFD requirements.

Mitigating Wildfire Risk – Potential Measures

The Guidance identifies potential project design features that may reduce a project's wildfire risk impacts, such as:

- ***Avoiding and minimizing low-density development patterns or "leapfrog-type" developments with undeveloped wildland between developed areas.*** The Project relies on a clustering design to increase density and open space areas.
- ***Decreasing a project's "edge" or wildland interface area and creating buffer zones and defensible space measures within and adjacent to the project.*** The Project involves a clustered design and complies with the requirements found to protect communities within fire hazard severity zones. The Project would provide FMZ to reduce the potential for wildfire encroachment. The FMZ will be maintained over the life of the project through the Project's HOA.
- ***Undergrounding power lines.*** The Project's power lines will be undergrounded, eliminating the potential for electrical transmission line-caused fires on the site.
- ***Upgrading building materials and installation techniques to increase a structure's resistance to heat, flames and embers (i.e. "fire hardening") and requiring fire-hardened communication facilities to the project site.*** The Project buildings will be designed in conformance with the latest ignition-resistant building design measures California Building Code Chapter 7-A and [list other relevant code measures]. As discussed in this WSP, structures constructed to current Fire Code standards and located within a master-planned community have proven to be highly resistant to ignition during a wildfire. Communication infrastructure including telephone and internet will be provided via underground or protected above ground conduits.
- ***Requiring adequate water supplies during a wildfire.*** The Project water supplier prepared a detailed Water Supply Assessment under SB 610 that confirms that it has capacity needed for domestic and firefighting needs. The Project provides connections from internal waterlines to significant water main lines that will supply sufficient fire flows and pressure to meet the demands for required onsite fire hydrants and interior fire sprinkler systems for all structures. Water supply must meet a 2-hour fire flow requirement of 2,500 gpm, which must be over and above the daily maximum water requirements for this development. Water utilities will be connected prior to any construction. In addition, the Project includes multiple onsite water source locations for aerial firefighting resources including Quail Lake and the California Aqueduct.

- ***Parking limitations to ensure access roads are not clogged with parked vehicles.*** The Project provides for parking restrictions and an HOA to enforce parking restrictions. Fire apparatus access roads are not obstructed by designated parking areas and where parking is prohibited, signage and/or curb marking will be provided.
- ***Placement of development close to adequate emergency services, existing or planned ingress/egress, and designated evacuation routes.*** The Project is located adjacent to regional transportation networks (ex. Interstate-5 and State Route 138) with multiple points of access. The Project is within an acceptable distance when considering the three onsite fire stations (with an optional fourth if determined necessary by LACoFD) with fast response to all planned structures. In addition, Centennial will provide an on-site Sherriff's substation. The Project provides new surface streets and connects to existing streets and is near major highway/freeway corridors, facilitating emergency vehicle ingress.

As described above and consistent with the Guidance, this WSP, the Evacuation Plan, and the EIR provide an in-depth analysis of the Project's potential wildfire impacts. For a more detailed assessment of the Project's potential wildfire impacts and conformation with the AG guidance, see the SEIR Fire Chapter.

3.2 Defensible Space and Vegetation Management Regulatory Requirements

3.2.1 Fuel Modification Zones

An important component of a fire protection system for the Project Site is the provision of fire-resistant landscapes and vegetation buffers. Fuel modification zones (FMZ) are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs not only help protect new communities and structures from external wildfire risks, but FMZs also reduce the risk of fire originating from such new communities or structures and spreading to surrounding natural resources/habitat areas (Braziunas et al., 2021; Cochrane et al., 2012; Price et al., 2021).[1] FMZs thereby provide a duel benefit of buffering communities and structures from encroaching wildfires while separating the new community and structures (and potential introduction of new ignition sources associated with the new community) from surrounding open space, fuel sources, or habitat areas (Bhandary & Muller, 2009; Braziunas et al., 2021; Cochrane et al., 2012; Fox et al., 2018). Research has also indicated that the likelihood of ignitions occurring in a given location is significantly influenced by the existing vegetation/fuel available (Elia et al., 2019). In addition to protecting structures, fuel treatments, and defensible space, when utilized in conjunction with place-based fire-hardened design also act as a buffer for natural areas and surrounding communities (Safford et al., 2009a; Scott et al., 2016).

The Project will be exposed to naturally-vegetated open space to the north, south and west of the Project site, as well as agricultural lands to the east. Based on the post-development modeled extreme weather flame lengths for the Project Site, average wildfire flame lengths in the un-maintained fuel beds are projected to be 11- 20 feet high in grasslands and shrub fuels adjacent Development Footprints. The most severe wildfire flame lengths in the Project site under extreme fire weather are projected to be approximately 47 feet in limited areas of chapparal vegetation types exceeding 40% slope. However, these areas are not located in close proximity to development

[1] Historically, CAL FIRE originated as a conservation agency implemented brush management, like fuel modification and fire breaks to protect natural resource areas from fires originating in developed areas, such as the Ponderosa Way a 800 mile fire break in the Sierra Nevada Mountain Range (CAL Fire, Thorton, 1995; Gafni 2021).

areas. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining "defensible space" distances for providing firefighters with room to work and minimizing structure ignition. Implementing defensible space can reduce the likelihood of structural ignition and support landscape-level risk reduction (Mockrin et al., 2020; Warziniack et al., 2019). Defensible space also serves to decrease the chance of spot fires and allows firefighters to operate around the home (Price et al., 2021). Based on the modeled extreme weather flame lengths for the Project site, the most severe wildfire flame lengths under extreme fire weather are projected to be roughly 24 feet in development areas. For the Centennial Project site, the FMZ widths between the naturally vegetated open space areas and all combustible structures are proposed to be 100-200 feet, approximately 5--10 times the modeled flame lengths based on the fuel type represented adjacent to the Development Footprint. A 20-foot to 50-foot wide roadside FMZ along each side of the roads adjacent to the open space shall be required as well.

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

3.2.1.1 State Responsibility Areas Fuel Modification Zone Standards

An FMZ is a strip of land where combustible vegetation has been removed and/or and partially or totally replaced with more adequately spaced, drought-tolerant, low-fuel-volume plants in order to provide a reasonable level of protection to structures from wildland fire. The purpose of this section is to document SRA standards and make them available for reference. The State Fire Code Section 4906 as adopted by LA County requires defensible space to be maintained around all buildings and structures in all unincorporated land designated by the State Board of Forestry and Fire Protection as SRA per PRC 4290 and "SRA Fire Safe Regulations" California Code of Regulations, Title 14, Division 1.5, Chapter 7, Subchapter 2, Section 1270. However, as the Project is within Los Angeles County and the County will be reviewing the Project, a fuel modification plan shall be submitted and have preliminary approval prior to any subdivision of land; or, have final approval prior to the issuance of a permit for any permanent structure used for habitation; where, such structure or subdivision is located within areas designated as a Fire Hazard Severity Zone within State Responsibility Areas (Los Angeles County Fire Code Title 32, Section 4908.1). As designated by PRC 4291 a fuel modification zone typically consists of at least 100 feet, measured in a horizontal plane, from the exterior façade of all structures towards the undeveloped areas. According to LACoFD's Fuel Modification Unit, a typical landscape/fuel modification installation consists of a 30-foot-wide Zone A (including a 5-foot Ember resistant zone), a 70-foot-wide Zone B, and a 100-foot wide Zone C for a total of 200 feet width. As described above, the Project-specific FMZ delineation with FMZ between 100 and 200 feet, based on actual fire threat and will be consistent with County requirements in most cases, and will include off-site FMZ in some areas, as presented in the Fuel Modification Exhibit. Areas with proposed FMZs less than 200 feet in width will require the approval of LACoFD. A Fuel Modification Plan shall be reviewed and approved by the Forestry Division of the LACoFD for consistency with defensible space and fire safety guidelines.

A Fuel Modification Plan shall be reviewed and approved by the Forestry Division of the LA County Fire Department for consistency with defensible space and fire safety guidelines on behalf of the State.

To ensure long-term identification and maintenance, a fuel modification area shall be identified by a permanent zone marker meeting the approval of LA County Fire. All markers will be located along the perimeter of the fuel modification area at a minimum of 500 feet apart or at any direction change of the fuel modification zone boundary. FMZs will be maintained on at least an annual basis or more often as needed to maintain the fuel modification buffer function.

An on-site inspection will be conducted by staff of the Forestry Division of the LA County Fire upon completion of landscape installation before a certificate of occupancy is granted by the County's building code official.

Zone 0 – Ember Resistant Zone (ERZ) – 0 to 5 feet from the structure

The ERZ, per PRC 4291, is designed to keep fire or embers from igniting materials that can spread to structures. It includes the area under and around all attached decks and requires more stringent wildfire fuel reduction. In 2020, the concept of the ERZ was added to PRC 4291 to designate a more intense fuel reduction area immediately adjacent to homes and/or structures to reduce the likelihood of ember-based home ignition. However, the requirement for an ERZ under PRC 4291 will not take effect until officially adopted by the Office of the State Fire Marshall. Although not currently required, CALFIRE's website recommends the following guidance for the ERZ, and in anticipation of the regulation going into effect, the ERZ has been included in the Project. Per PRC 4291, the ERZ is measured from building, structures, decks, etc. outward 5 feet (horizontal distance) and includes the following:

1. Hardscape, such as gravel, pavers, concrete, and other non-combustible materials are permitted within this zone.
2. The use of combustible bark or mulch is prohibited.
3. This zone shall be free of all dead and dying weeds, grass, plant, shrubs, trees, branches, and vegetative debris.
4. Plants should be limited to low growing, nonwoody, and be irrigated and maintained.
5. Combustible items within this zone, including on decks, should be limited.
6. Any firewood or lumber should be relocated within Zone B.
7. Fencing, gates, and arbors attached to homes or structures should be made with non-combustible materials.
8. Garbage and recycling containers should not be kept within this zone.
9. Create separation between trees, shrubs, and items that could catch fire, such as patio furniture, wood piles, swing sets, etc.

Zone A – minimum 30 feet from the structure

Zone A is an irrigated, limited planting area measured from the outermost edge of the structure or appendage outward to 30 feet (horizontal distance), or the property line for perimeter lots adjacent to native vegetation.

1. Zone A should be planted with plants from Appendix B: Acceptable Plant List by Fuel Modification Zone 2. Plant selection for Zone A should consist of small herbaceous or succulent plants less than two to three feet in height or regularly irrigated and mowed lawns.
2. Plants identified as "Target" or undesirable plants (See Appendix C: Fuel Modification Zone Undesirable Plant List) by LA County Fire shall not be planted within Zone A.
3. Trees should be spaced to allow a minimum 10-foot canopy clearance at full maturity to the structure.
4. Inorganic mulches, such as gravel, shall be used within 10 inches of the structure.
5. A 5-foot wide pathway shall be provided around and abutting any structures for firefighter access.

Zone B – from the outer edge of Zone A up to 100 feet from the structure

Zone B is the area (maybe irrigated or not irrigated) measured horizontally from the outer edge of Zone A to 100 feet from the structure or property line, whichever is first.

1. Zone B can be planted with a slightly higher plant density than Zone A as long as the landscape does not create any horizontal or vertical fuel ladders (e.g., fuel that can spread fire from the ground to trees).
6. **Exception:** Screen plantings are permissible if used to hide unsightly views. However, hedging is discouraged as it promotes the accumulation of dead litter inside the live hedge.
7. Trees found in Appendix C can be planted if they are Zone B appropriate and the tree canopies at maturity are not continuous.
8. Plants identified as "Target" or undesirable plants (See Appendix C) by LA County Fire shall not be planted within Zone B.
9. Avoid planting woody plant species taller than 3 feet in height at maturity directly underneath any tree canopy
10. Zone B may not be landscaped, but it is still subject to brush clearance standards (https://www.fire.lacounty.gov/forestry-division/fire-hazard-reduction-programs/)

Zone C - Native Brush Thinning Zone

100 feet from the outer edge of Zone B. Irrigation systems are not required if the zone entirely consists of native plants.

1. Vegetation may consist of existing native plants, adequately spaced ornamental shrubs, trees, or both.
2. In all cases, the overall characteristics of the landscape provide adequate defensible space in a fire environment.

[2] (County Fire 2021)

3. Plants in Zone C shall be spaced appropriately, and existing native vegetation shall be managed by thinning and removal of species constituting fire risks such as but not limited to chamise, sage, sagebrush, and buckwheat.
4. Annual grasses and weeds shall not exceed a height of 3 inches.
5. General spacing for existing native shrubs or groups is 15 feet between canopies. Native plants may be thinned by reducing the amounts as the distance from the development increases.
6. General spacing for existing native trees or groups of trees is 30-feet between canopies. This may be increased or decreased depending on the slope, arrangement of trees, and the species of the trees.

Zone C is considered a thinning zone. When provided, either by conditions of development, voluntary by the property owner, or required by the LACoFD, this zone is more of a progressive thinning zone to lessen the spread of fire as it approaches the primary FMZ adjacent to structures. The amount of fuel reduction and removal should take into consideration the type and density of fuels, aspect, topography, weather patterns, and fire history.

3.2.1.2 Annual Fuel Modification Maintenance

Required by LACoFD Fuel Modification Zone Guidelines, all fuel modification area vegetation management within the FMZs shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined by the LACoFD.

The individual homeowners shall be responsible for all fuel modification vegetation management on their lots in compliance with this plan and the LACoFD requirements. The Project's HOA shall be responsible for all fuel modification vegetation management for all common areas of the Project site, including roadsides clearance and fuel modification zones. The Project's HOA will assure private homeowner lots comply with this plan initially and on an ongoing basis. Chapter 7A requirements for ongoing maintenance of fire resistive building materials and fire sprinkler systems will be included in the CC&R's and Deed encumbrances for each lot. Additionally, the Project's HOA shall be responsible for ensuring long-term funding and ongoing compliance with all provisions of this WSP, including vegetation planting, fuel modification on the perimeter, and maintenance requirements on all common areas and roadsides.

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

Centennial HOA:

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

Resident/Homeowner:

- Shall maintain the vegetation on individual property lots.

3.3 Other Centennial Vegetation Management Requirements

3.3.1 Code Exceeding Annual Fuel Modification Inspection

To confirm that the Project's FMZs and landscape areas are being maintained according to this WSPs and the LACoFD's fuel modification guidelines, the Project HOA would obtain an FMZ inspection and report from a qualified LACoFD-approved 3rd party inspector in May/June of each year certifying that vegetation management activities throughout the Project site have been performed. If the FMZ areas are not compliant, the Project's HOA will have a specified period to correct any noted issues so that a re-inspection can occur and certification can be achieved. Annual inspection fees are subject to the current Fire Department Fee Schedule.

3.3.2 Roadway Fuel Modification Zones

As required under the Los Angeles County Fire Code Section 503.2.1, fire engine apparatus roads will be maintained with a minimum 20-foot wide roadway that is clear to the sky. An exemption allows for a minimum vertical clearance of 13 feet 6 inches may be allowed for protected tree species adjacent to access roads. Any applicable tree-trimming permit from the appropriate agency is required. All flammable vegetation or other combustible growth shall be removed on each side of fire access roads and driveways for a minimum of 10 feet (Title 32 Section 325.10), however, the Centennial Specific Plan Project site will provide a code exceeding 20 feet roadside FMZ. The clearance of 30 feet does not apply to single specimen trees, ornamental shrubbery, or cultivated ground cover, such as grass, ivy, succulents, or similar plants used as ground cover, provided that they do not form a means of readily transmitting fire.

Roadside fuel modification for the Centennial Specific Plan Project consists of mowing grasses to less than four inches in height and/or maintaining ornamental landscapes, including trees, clear of dead and dying plant materials. Roadside fuel modification shall be maintained by the Project's HOA.

3.3.3 Stormwater Basins

Fire-safe vegetation management will be performed within the basins on a yearly basis in accordance with the following guidelines.

1. Groundcovers or shrubs included in the basin shall be low-growing with a maximum height at maturity of 36 inches. Single tree specimens or groupings of two to three trees per grouping of fire-resistive trees or tree form shrubs may exceed this limitation if they are located to reduce the chance of transmitting fire from vegetation to habitable structures and if the vertical distance between the lowest branches of the large, trees or tree form shrubs and the tops of adjacent plants are three times the height of the adjacent plants to reduce the spread of fire through ladder fueling.
2. All trees shall be planted and maintained at a minimum of 10 feet from the tree's mature drip line to any combustible structure.
3. The water detention basin area will be maintained to brush management Zone A standards.
4. Grasses must be maintained/mowed to 6 inches in height.
5. The water quality basins will not be re-vegetated with plant species that are found in Appendix C.

6. This area shall be maintained annually free of dying and dead vegetation.

3.3.4 Parks and Open Space

Vegetation Management is recommended within parks and open space areas in compliance with the guidelines in this plan.

- Flammable vegetation must be removed.
- Grasses must be maintained/mowed to 4 inches.
- Types and spacing of trees, plants and shrubs, must comply with the criteria in this plan.
- Areas shall be maintained free of down and dead vegetation.
- Flammable vegetation and flammable trees shall be removed and prohibited.
- Trees shall be properly limbed and spaced and shall not be of a prohibited type (identified in this plan).
- No species from the County Prohibited Plant List.

3.3.5 Vacant Lots and Parcels

- Vacant Lots will not be required to implement Vegetation management strategies until construction begins. However, perimeter Vegetation Management Zones must be implemented prior to commencement of construction utilizing combustible materials.
- Prior to issuance of a permit for any construction, grading, digging, installation of fences, the outermost 30 feet of the lot is to be maintained as a Vegetation Management Zone.
- Existing flammable vegetation shall be reduced by 60% on vacant lots upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuels shall be removed and trees/shrubs shall be properly limbed, pruned and spaced per this plan.
- The remainder of the Vegetation Management Zones required for the particular lot shall be installed and maintained prior to combustible materials being brought onto any lot under construction.

3.3.6 Environmentally Sensitive Areas/Riparian Areas

In environmentally sensitive areas that contain sensitive habitat, cultural sites, riparian areas, biological buffer areas, detention basins, etc, permission will be needed from the County, and the appropriate resource agencies (California Department of Fish and Game, U.S. Fish and Wildlife Service, Army Corps of Engineers) prior to any vegetation management activities within those areas.

Further, as required by the Certified EIR, in order to ensure that no direct impacts to Significant Ecological Area (SEA) 17 occur, brush clearance zones shall be contained within the current Project impact boundary and no overlap with the adjacent SEA 17 shall occur. Vegetation management for fire abatement purposes is not authorized in SEA areas. An Implementation Plan, including fire risk abatement measures (including but not limited to vegetation management) required to comply with State and LA County fire prevention and response legal requirements, shall be submitted as part of the tentative tract map for portions of the Project site that border an SEA or mitigation preserve area. The Plan shall include: (a) a summary of applicable State and LA County fire risk abatement requirements; (b) a prohibition on the use of vegetation clearance within SEA 17 or mitigation preserve areas. The

Plan shall be submitted to the County for approval with the first tentative map, and shall be updated to include new or State or LA County fire risk abatement requirements as part of each subsequent tentative tract map submittal (Mitigation Measure MM 7-21).

3.3.7 Private Lots

None of the plant materials listed in the County's prohibited plant list shall be planted on private lots that are exposed to the WUI. Centennial will provide that list and other recommendations to all buyers in a private property owners' guide to fire safe vegetation management on private lots. Deed restrictions will be recorded against private lots including any portion of the fuel modification zones on the private lot, including approved plant palettes, and prohibitions regarding combustible structures, including fencing and other accessory structures. Deed restrictions shall run with the land and be conveyed to any subsequent owner of the private lot. In addition the Project's Covenants, Conditions and Restrictions (CC&Rs) shall include a reference to the WSP to ensure compliance with the WSP. Owners of private lots shall be notified in the Project's CC&Rs and property disclosures that they are prohibited from conducting any vegetation management activities outside their private property.

3.3.8 Landscaping Plan

As required by the Certified EIR, the Project Applicant/Developer shall develop a Landscaping Plan for review and approval by the County Biologist. The Landscaping Plan shall be (1) prepared by a qualified biologist, (2) submitted to the County for approval with each tentative map, (3) provided to builders, (4) provided to future project occupants as described in the Specific Plan, and (5) include a plant palette composed of non-invasive species that are adapted to the conditions found on the Project site and do not require high irrigation rates. The Landscaping Plan shall also include a list of invasive plant species prohibited from being planted on the Project site. In addition, retail sales of these invasive plan species will be prohibited at any businesses (nurseries) located within the Project site. Landscape plans shall encourage planting of local natives typical of native vegetation within ten miles of the Project site (Mitigation Measure MM 7-13). Additionally, as required by the Project's Specific Plan, a Community Forester (licensed arborist or licensed with the Department of Forestry and/or fire warden) shall oversee implementation of the long-term landscape plan within developed areas.

The Project's Specific Plan also details the Project's plant pallet, which was prepared in accordance with the LACFD's Fuel Modification Plan Guidelines and requires the use of fire-retardant plants in fuel modification zones. Additionally, the Project's Specific Plan requires landscaping in the plan's Open Space Zone to be dominated by native and/or drought tolerant trees, shrubs, and ground cover, taking into consideration fuel modification requirements, such as using plants that are fire resistant.

The Project's Green Development Program (Appendix E) and Hillside Design Guidelines (Appendix F) of the Specific Plan requires the Project to implement fire-safe landscaping techniques to reduce fire risks to biological resources and human safety in the fuel modification zones, and landscaping in a manner that, among other things, increases fire protection, respectively.

3.3.9 Trails

The following vegetation/fuel treatment standards are applicable to the Project's trails (applicable within 10 feet of the outside edge of the path surface, on both sides). Treatment or maintenance of vegetation on each side, as follows:

- Remove dead, down, dying, diseased, and hazard trees.
- Pruning (limbing) of live branches within six (6) to eight (8) feet above ground level, but no more than one-third (1/3) the live crown, for all trees in a Fuel Modification Area.
- Trimming and/or thinning of shrubs to eliminate ladder fuels.
- Cutting of annual grasses to within 3" of ground level.
- Debris and trimmings produced by thinning and pruning shall be removed, except for larger woody debris that may be chipped and left for weed and erosion control.

3.3.10 Special Fuel Management Issues

On the Project site, tree planting in the fuel modification zones and along roadways is acceptable, as long as they meet the following restrictions as described below and in the County's Fire Code and the LACoFD's Guide to Defensible Space and Fuel Modification Zones spacing requirements:

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

3.3.10.1 Specific Landscaping Requirements

- The following requirements are provided for HOA-maintained fuel modification zones. All landscaping shall be maintained by the HOA.
- Plants used in the fuel modification areas or landscapes will include drought-tolerant, fire resistive trees, shrubs, and groundcovers. The planting list and spacing will be reviewed and approved by LACoFD, included on submitted landscape plans. The plantings will be consistent with LACoFD's Suggested Plant Reference Guide (refer to Appendix C). The intent of the suggested plant reference guide is to provide examples of plants that are less prone to ignite or spread flames to other vegetation and combustible structures during a wildfire. Additional Plants can be added to the landscape plant material palette with the approval from LACoFD.

3.3.10.2 Pre-Construction Requirements

- Perimeter fuel modification areas must be implemented and approved by the LACoFD prior to combustible materials being brought on site.
- Existing flammable vegetation shall be reduced by 50% on vacant lots upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuel shall be removed, and trees/shrubs shall be properly limbed, pruned, and spaced per this plan.

3.3.11 Undesirable 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 FMZ Undesirable Plant List (refer to Appendix C) are unacceptable from a fire safety standpoint and will not be planted or allowed to establish opportunistically within FMZs or landscaped areas.

3.3.12 Construction Phase Vegetation Management

Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for the Project area shall be performed pursuant to this WSP and LACoFD requirements on all building locations prior to the start of work and prior to any import of combustible construction materials. Fuel modification zones with characteristics in accordance with, or more extensive than provided in section 3.2.2.1, shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible Materials will not be brought on site without prior fire department approval.

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

- All new power lines shall be underground for fire safety during high wind conditions or during fires on a right-of-way that can expose aboveground power lines. Temporary construction power lines may be allowed in areas that have been cleared of combustible vegetation.
- Caution must be used not to cause erosion or ground (including slope) instability or water runoff due to vegetation removal, vegetation management, maintenance, landscaping, or irrigation.

3.3.13 Funding Towards Off-site Wildfire Mitigation Projects

Climate Resolve and Centennial have mutually agreed to make certain additional commitments to fund wildfire prevention, protection, and response activities within the Project, and to fund grants to improve wildfire prevention, protection, and response activities in nearby communities. This may include funding for offsite vegetation management projects including roadside fuels reduction, fuel breaks, and community defensible space projects.

3.4 Fire Apparatus Access Regulatory and Project Specific Requirements

3.4.1 Access

Primary Ingress/Access Routes

The Project would involve the construction of new structures, roadways, and would generate new trips to and from the Project site. Project site access, including road widths and connectivity, will be consistent with the then current County roadway standards (Title 21) and the CFC Section 503. Additionally, an adequate water supply and approved paved access roadways shall be installed prior to any combustibles being brought on site and will include:

- The Centennial Specific Plan Project site's primary access would be from multiple locations along Hwy 138 and a comprehensive internal circulation system. As discussed in the Project's Specific Plan, Project improvements to Highway 138 will help further reduce fire risk and provide better emergency egress. The road system will be developed to be consistent with the County's roadway standards (Title 21) and the 2022 CFC, Section 503.
- Roadways and/or driveways will provide fire department access within 150 feet of all portions of the exterior walls of the first floor of each structure in accordance with the LA County Fire Code Section (503.1.1).
- Per the Project's Specific Plan, classifications and street cross-sections were developed in partnership with the Department of Regional Planning, as well the County of LA's Public Works and Fire Departments: modifications to theses cross-sections require approval from Public Works and LACFD.
- Access roads shall be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction.
- The developer will provide information illustrating the new roads, in a format acceptable to the LACoFD for updating of Fire Department response maps in accordance with the LA County Fire Code Section (106.2.1).
- As required by the Certified EIR, the Project Applicant/Developer shall prepare a Traffic Control Plan in accordance with the California Manual on Uniform Traffic Control Devices (MUTCD). The Traffic Control Plan shall be reviewed and approved by the California Department of Transportation (Caltrans), and all construction activities in the public right-of-way shall comply with the approved Traffic Control Plan to the satisfaction of Caltrans. Documentation of Caltrans approval shall be provided to the County for any Tentative Map involving construction within State Route 138 right-of-way (MM 3-8).

3.4.2 Road Width and Circulation

- Fire apparatus roads shall have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance clear to the sky to allow aerial ladder truck operation (LACoFC 503.2.1).
  - Exception: A minimum vertical clearance of 13 feet 6 inches may be allowed for protected tree species adjacent to access roads. Any applicable tree-trimming permit from the appropriate agency is required.
- In accordance with LA County Fire Code Section (503), typical, interior Project roads will comply with all fire apparatus access road standards; all interior fire access roadways where a fire hydrant is located shall be

constructed to a minimum unobstructed road width of 26 feet, exclusive of shoulders and shall be improved with aggregate cement or asphalt paving materials (LACoFC 403.2.1.2.1). The interior residential access roads will be designed to accommodate a minimum of a 75,000-pound (lb.) fire apparatus load (LACoFC 503.2.3).

- Interior circulation streets include all roadways that are considered common or primary roadways for traffic flow through the site and fire department access serving all proposed residential and commercial structures. Any dead-end streets serving new buildings or dwellings that are longer than 150 feet shall have approved provisions for fire apparatus turnaround in accordance with LA County Fire Code Section (LACoFC 503.2.5).
- 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.
- As stated in the Project's Specific Plan, the curb-to-curb width of each private driveway and fire lane will be approved by the Los Angeles County Fire Department and Department of Public Works.
- Roads with a median or center divider will have a minimum 20 feet unobstructed width on both sides of the center median or divider.
- Cul-de-sacs and fire apparatus turnarounds will meet requirements and LA County Fire cul-de-sac length restrictions (County Code Section 21.24.190) as follows:
  - 500 feet in length, when serving land zoned for industrial or commercial use.
  - 700 feet in length, when serving land zoned for residential uses having a density of more than four dwelling units per net acre.
  - 1,000 feet in length, when serving land zoned for residential uses having a density of four or fewer dwelling units per net acre.

3.4.3 Gates

Gates on private roads are permitted but subject to Fire Code requirements and standards. 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. In addition, the gates would comply with AB 2911 which requires additional standards for comprehensive sire, and risk reduction requires roads to be unobstructed if being relied on for secondary access. As such, if gates are installed along the secondary access road then whit will be supplied with backup power and open upon the approach of a vehicle whether via pressor sensors or infrared sensors. In addition, should a gate be installed along the secondary access road it shall also comply with the minimum requirements set forth in this section per Title 32 Section 503.6 and CFC Section 503.6. Any gates within the Project site will be:

- Minimum 20 feet wide of clearance for one-way traffic when fully open at the entrance.
- Gates shall be swinging or sliding type.
- Construction of gates shall be of materials that allow manual operation by one person.
- Gates shall be maintained in operative condition at all times and replaced/repaired when defective.
- Electric gates shall be listed in accordance with UL 325

- Gates intended for automatic operation shall be designed, constructed, and installed in accordance with American Society for Testing and Materials (ASTM) F2200.
- Minimum of two feet wider than road width at the 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).

3.4.4 Grade

The Project complies with the Los Angeles County grade requirements (LACoFC 503.2.7). Fire apparatus access roads shall not exceed 15 percent in grade. Exception: For a fire access road serving no more than two single-family dwellings, grades shall not exceed 20 percent when approved by the fire code official.

3.4.5 Premises Identification

Identification of roads and structures will comply with LA County Fire Code Section (505) as follows:

- All residential structures shall be identified by street address. Numbers shall be 4 inches in height, 1/2 - inch stroke, and located 6 to 8 feet above grade. Addresses on multi-residential buildings shall be 6 inches high with 1/2-inch stroke. 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.
- Streets will have street names posted on non-combustible street signposts. Letters/numbers will be per County standards.
- As required by the Project's Specific Plan, no sign shall be installed, relocated, or maintained so as to prevent free ingress to or egress from any door, window, or fire escape. No sign of any kind shall be attached to a standpipe or fire escape, except those signs as required by other codes or ordinances.

3.5 Structural Ignition Resistance Regulatory Requirements

In WUI areas, homes can be considered fuel as well as an ignition point for wildfires. The WUI fire problem centered around the issue of wildland fire causing structural ignitions; therefore, the best mitigation is to reduce the likelihood of building ignition occurring. (Zhou, 2013). Structural characteristics play a large role in whether or not a building burns, which is important in WUI environments as ill-prepared structures may also serve as fuel (Gorte, 2011). Preventing the ignition of structures can result in the reduction of fire spread in surrounding WUI areas (Maranghides & Mell, 2012). The benefit of structure-based mitigation is that it not only lowers the onsite risk but also lowers the risk of wildfire across a landscape (Mockrin et al., 2020).

The proposed structures within the Project will be built utilizing the most current construction methods designed to mitigate wildfire exposure, required by LA County Fire, at the time of construction, while also reducing the likelihood for structure fires to spread into offsite areas. Construction methods intended to mitigate wildfire exposure will

comply with the wildfire protection building construction requirements contained in the Los Angeles County Building Code and the 2022 CBC including the following:

1. California Building Code, Chapter 7A
2. Los Angeles County Building Code, Chapter 7A
3. Los Angeles County Residential Code, Section R327
4. Los Angeles County Referenced Standards Code, Chapter 12-7A

Construction practices respond to the requirements of the LA County Fire Code Title 32 and the Los Angeles County Building Code (Title 26, Chapter 7A), "Construction Methods for Exterior Wildfire Exposure." These requirements include the ignition resistant requirements found in Chapter 12-7A of the Los Angeles County Referenced Standards Code. A key component to addressing the wildfire problem is to address the structural ignition. (Zhou, 2013). Addressing structural ignition potential is an effective mitigation strategy for preventing wildfires and increasing WUI ignition resistance (Zhou, 2013). Research has found that structural characteristics, especially roofing, play a significant role in reducing a structure's vulnerability to fire and the likelihood of burning (Gorte, 2011; Knapp et al., 2021; Kolden & Henson, 2019; Manzello et al., 2011; Syphard et al., 2017; Zhou, 2013). Further, reducing a structure's likelihood of ignitions reduces the risk for the individual homeowners and the risk associated with fire spreading to other homes or wildland areas (Mockrin et al., 2020).

The 7A Materials and Construction Methods for Exterior Wildfire Exposure (CBC) chapter detail the ignition resistant requirements for the following key components of building safely in wildland-urban interface and fire hazard severity zones. Each of the critical exterior building features summarized below has been addressed within Chapter 7A to minimize the potential for structural ignition from wildfire exposure as well as from airborne embers. In addition, these requirements reduce the likelihood of structural fires spreading into offsite areas.

3.5.1 Roofing Assemblies

Roofing shall comply with Chapter 7A and Chapter 15 of the CBC. Roof assemblies shall be a Class A rating in accordance with ASTM E108 or UL790. Where the roof allows a space between the roof covering and roof decking the space shall be constructed to prevent the intrusion of embers, or is installed over a combustible deck, be fire stopped with a 72-ln cap sheet meeting the ASTM D3909 Standard Specification for "Asphalt Rolled Roofing Surfaces with Mineral Granules", shall be installed over the roof deck. Bird stops are to be used at the eaves, and hip and ridge caps will be mudded in to prevent the intrusion of embers. Roof valley flashing shall be no less than 0.019 inches No. 26 gauge galvanized sheet corrosion-resistant metal installed over no less than one layer of minimum 72 lb. mineral surfaced nonperforated cap sheet compliant with ASTM D3909, at least 36 inches wide running the full length of the valley. Gutters shall be provided with means to prevent the accumulation of embers.

Wood shake shingles and wood shakes are prohibited in any Fire Hazard Severity Zone regardless of classification per LACBC Section 705A.2.

3.5.2 Vents and Openings

Any vent openings, enclosed eaves soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation shall comply with Section 1203 and Section 706A.1 through 706A.3 of the CBC and Section 706A of the LACBC. All vents and openings shall be fully covered with

Wildland Flame and Emer Resistant vents approved and listed by the California State Fire Marshal or WUI vents listed in ASTM E2886. This also applies to any gable ends, ridge ends, crawl spaces, foundations, and all other cents that mount onto a vertical wall. Vents shall not be installed on the underside of eaves or cornices unless they are WUI vents as described above.

3.5.3 Exterior Wall Covering

Exteriors walls shall comply with Section 707A.3 of the CBC and be either noncombustible or ignition-resistant. This applies to exterior wall coverings, exterior wall assembly, exposed undersides or eaves or soffits, undersides of porch ceilings, the underside of floor projections, and exterior underfloor areas.

3.5.4 Open Roof Eaves

Any exposed roof deck material on the underside of open roof eaves shall either be noncombustible, ignition resistant, one layer of 5/8 inch thick Type X gypsum, or 1-hour fire resistive exterior wall assembly designed for exteriors fire exposure using gypsum panel and sheeting in accordance with CBC Section 707A.4.

3.5.5 Closed Roof Eaves and Soffits

Enclosed eaves and soffits shall comply with CBC Section 707A.5. The exposed underside of enclosed eaves or soffits shall be protected by either noncombustible material, ignition-resistant material, one layer of 5/8 inch Type X gypsum sheeting, 1-hour fire restive exteriors wall assembly, assemblies that meet the performance criteria in Section 707A.10 or assemble that meet the performance criteria in State Fire Marshall (SFM) Standard 12-7A-3.

3.5.6 Floor Projections and Underfloor Protection

The underside of floor projections must comply with Section 707A.7 of the CBC. The exposed underside of a cantilevered floor projection, where a floor assembly extends over an exterior wall, must be protected by noncombustible materials, ignition-resistant materials, one layer of 5/8 in Type X gypsum, 1-hour fire resistive exterior wall assembly that meets the criteria in Section 707A.10, or meets performance criteria in SFM Standard 12-7A-3. The underfloor area of an elevated or overhanging building shall be enclosed in accordance with CBC Section 707A.8.

3.5.7 Underfloor Appendices

When required by LA County Fire, the underside of overhanging appendages shall be enclosed per CBC Section 707A.9. Or the underside of the exposed underfloor shall consist of noncombustible material, ignition-resistant material, one layer of 5/8 inch Type X gypsum, 1-hour fire resistive exterior wall assembly, or meets the performance criteria in SFM Standard 12-7A-3 or ASTM E2957.

3.5.8 Windows, Skylights, and Doors

Assemblies shall meet one of the following requirements:

- Be constructed of multiplane glazing with a minimum of one tempered pane meeting the requirements of Section 2406 Safety Glazing.
- Be constructed of glass block units.
- Have a fire-resistive rating of no less than 20 minutes per National Fire Protection Association (NFPA) 257.
- Be tested to meet the performance requirements of SFM Standard 12-7A-2.

Skylights shall be protected by a non-combustible mesh screen with openings of no more than 1/8 inches. Wall assemblies behind structural glass veneers shall comply with Section 707A.3 of the CBC.

3.5.9 Exterior Doors

Exterior doors shall be constructed as follows:

- Noncombustible material
- Ignition-resistant construction
- A solid wood core that has stiles and rails no less than 1 3/8-inch-thick and panels no less than 1 ¼ inch thick.
- Fire-resistance rating of no less than 20 minutes per NFPA 252
- Surface or cladding that meets the performance criteria of CBC Section 707A.3.1 when tested per ASTM E2707 or SFM Standard 12-7A-1.

Garage doors shall resist the intrusion of embers by preventing gaps between doors and roof openings at the top, bottom, and sides of doors. Gaps cannot exceed 1/8 inch and shall be controlled by either weather stripping that meets ASTM D638 and ASTM G155, weather stripping shall also have a V-2 or better flammability rating, be constructed so that doors overlap onto jams and headers, or the garage door jams and headers are covered with metal flashing.

3.5.10 Decking

Any deck, porch, balcony, or stairs within 10 feet of a building shall comply with CBC Section 709A. The walking surface shall either comply with Section 709A.4 when tested per ASTM E2632 and ASTM E2726, ignition-resistant material, material that meets the criteria of SMF Standard 12-7A-4 and SFM Standard 12-7A-5, noncombustible material, any material that meets SFM Standard 12-7A-4A when attaches to exterior walls that are noncombustible or ignition-resistant or any material that meets Section 709A.5 and is attached to an exterior wall that is noncombustible or ignition-resistant.

3.5.11 Accessory Structures

Accessory structures are applied to buildings covered by LACBC Section 710A.3, Exception 1 as well as any building that requires a permit including but not limited to trellises, arbors, patio covers, gazebos, and similar structures

within less than 3 feet of the building or otherwise determined by LA County Fire. Buildings that are less than 120 square feet in floor area and are more than 30 feet but less than 50 feet from structures shall be noncombustible or ignition-resistant per CBC Section 704A.2. No requirements shall apply to an accessory building or miscellaneous structures when located at least 50 feet from an applicable building. Applicable accessory buildings and attached miscellaneous structures, or detached miscellaneous structures that are installed at a distance of fewer than 3 feet from an applicable building, shall comply with LACBC Section 710A. Structures that meet the requirements of an accessory or miscellaneous structures shall be noncombustible or ignition resistant per CBC Section 704A.2.

3.6 Fire Protection Systems Regulatory Requirements

3.6.1 Water Supply

The Golden Valley Municipal Water District (GVMWD), or other public utility district (PUD), would be the water purveyor to provide domestic water supplies and fire flows to the Specific Plan area. Approval from the California Public Utility Commission would be required prior to construction improvements to the water system. New water infrastructure would be required to provide service to the Project site. The water needs of Centennial will be met through various water resource management strategies and secure water sources throughout the buildout of the Project. The water plan includes multiple sources of potable water such as groundwater, State Water Project (SWP), independent purchased water by Tejon Ranch, return flows, recycled water, and banked water. Consistent with Government Code Section 66473.7, each proposed subdivision will have an available water supply that meets or exceeds Project demand under normal, single-dry, and multiple-dry year scenarios. This Water Service Plan will provide a flexible, reliable water supply throughout Project development without adversely affecting other local groundwater users or other users of critical SWP resources.

The Project will be consistent with County Title 20, Section 20.16.060 for fire flow and fire hydrant requirements within a VHFHSZ. These internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required onsite fire hydrants and interior fire sprinkler systems for all structures. Water supply must meet a 2-hour fire flow requirement of 2,500 gpm with 20-psi residual pressure, which must be over and above the daily maximum water requirements for this development. Water utilities will be connected prior to any construction. Further, the Project area has several large water sources that can support firefighting efforts, such as Quail Lake, the California Aqueduct, and the Tehachapi Afterbay.

The minimum fire flow may be adjusted as determined by the fire chief or fire marshal based on local conditions, exposure, and/or congestion, and construction of buildings. Building permits shall be accompanied by evidence indicating to LA County Fire a reliable water supply and a certificate from County fire that there is sufficient water supply for fire protection. The water supply for the Project shall be consistent with approved types of water supply such as reservoirs, pressure tanks, elevated tanks, water mains, or other fixed systems capable of providing required fire flow per Title 32 Section 507.2. Any water tanks and associated structures shall be installed and maintained in accordance with NFPA 22 and County Fire.

Within the internal roadways, additional 12-inch water supply lines will provide the main water supply to commercial and domestic services to each structure and common landscape area. These internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required onsite fire hydrants and interior fire sprinkler systems for all structures.

In addition, LA County Fire helicopters can obtain water for dropping on wildland fires from Quail Lake, the DWR afterbay located just north of the Project, or from the California Aqueduct which passes through the Project site.

The Project would meet all water and water pressure requirements for fire flow.

3.6.2 Hydrants

Fire Hydrants shall be located along fire access roadways as determined by LACoFD Fire Chief or Fire Marshal and current fire code requirements to meet operational needs. The required fire hydrant spacing will be 600 feet apart for single-family residential as required in LA County Fire Code Section (C105.2).

Fire Hydrants will be consistent with applicable County Design Standards. Hydrants will have one 2.5-inch outlet and one 4- inch outlet and be of bronze construction per the LA County Fire Code. Reflective blue dot hydrant markers shall be installed in the street to indicate location of the hydrant (LACoFC 507.5.7). Crash posts will be provided where needed in on-site areas where vehicles could strike fire hydrants or fire department connections (CFC 507.5.6). Prior to issuance of building permits, the appropriate number of fire hydrants and their specific locations will be approved by LACoFD.

3.6.3 Automatic Fire Sprinkler Systems

All structures in the Project, of any occupancy type, in accordance with LA County Fire and National Fire Protection Association (NFPA) Standards 13, 13R, and 13D will include automatic sprinklers. This is crucial in preventing off-site impacts as embers can also be generated by a structure fire and can be blown over the fuel modification into native fuels. Automatic sprinklers can isolate a fire to the point of origin, limit its ability to spread to the rest of the building, and even extinguish a fire before the responding firefighters arrive, thus damping the likelihood of ember production (NFPA, 2021). As proven through ember production research, wildfire severity greatly impacts the degree of which embers are produced (Zhou, 2015). Automatic sprinklers have an extremely high success rate in controlling or suppressing the severity of interior structure fires (NFPA, 2021). This also reduces impacts on fire response capacity as the automatic sprinklers will allow firefighters to focus on reducing additional ignitions beyond the point of origin. These factors all contribute to mitigate structural fire severity and shorter burn periods which combine to reduce ember production from structural fires. The Project is inclusive of both protection measures including components to resist ignitions from wildland fuels, and the built environment.

3.6.4 Residential Hazard Detectors

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

3.6.5 Ban on Wood-Burning Fireplaces

As required by the Project's EIR and the Specific Plan's General Development Standards, the Project's plans and specifications shall prohibit wood-burning fireplaces as required by SCAQMD Rule 445 in single-family residences throughout the entire Project site, including at residences that are 3,000 or more feet above mean sea level at which the SCAQMD prohibition would otherwise not apply.. These requirements shall be posted on the community intranet and shall be clearly described and distributed to home buyers through their home purchase contracts and CC&Rs (Mitigation Measure MM 11-3).

3.7 Pre-Construction Requirements

Per Los Angeles County Fire Code, 4906.2, A fuel modification plan shall be submitted and have preliminary approval prior to any subdivision of land; or, have final approval prior to the issuance of a permit for any permanent structure used for habitation; where, such structure or subdivision is located within areas designated as a Fire Hazard Severity Zone within State Responsibility Areas or Very High Fire Hazard Severity Zone within the Local Responsibility areas, applicable Fire Hazard Zone maps, and Appendix M of the County Fire Code at the time of application. An on-site inspection must be conducted by the personnel of the Forestry Division of the Fire Department and final approval of the fuel modification plan issued by the Forestry Division prior to a certificate of occupancy being granted by the building code official. Construction activities would also comply with Chapter 33 of the CFC, Fire Safety During Construction and Demolition, and with the Project's Construction Wildfire Safety Plan (CWSP).

3.7.1 Construction Fire Prevention Plan

To reduce potential ignition sources due to construction activities, the Project will require that prior to bringing combustible materials to residential or commercial structure buildings, improvements, including utilities, operable hydrants, and access roads with an approved temporary roadway surface, and fuel modification zones, be established. Note that combustible materials related to pre-building construction may be brought onto the site (e.g., forms for cast-in-place concrete or others, as needed). LACoFD will approve site conditions prior to the construction of any structures being undertaken. (See Section 8: Project Specific Recommended Design Features.)

3.8 Regulatory Requirements Applicable to Activities in a Hazardous Fire Area

The Project will comply with LA County Fire requirements for activities per Section 326 Activities in Wildfire Risk Areas of Title 32:

1. Permits shall be required for the following similar activities: recreational activities such as but not limited to rifle ranges, carnivals, public assembly events, fireworks, open burning, stands for cooking, or other activities which could provide an ignition source.
2. The following but not limited to fire protection facilities/conditions shall be required to maintain fire safety during activities:
    a. Adequate water supply
    b. Firebreaks
    c. No smoking signs
    d. Removal of dry grass and weeds along roadways, parking areas, or other areas accessible to the public/participants of the activity
    e. Fire watch or fireguards when the activity is taking place.
    f. Adequate access and parking facilities to prevent congestion, permit adequate egress for evacuation, and permit movement of fire apparatus equipment.
    g. Restriction of activities during periods of high fire hazard weather conditions
    h. Fencing

i. Other conditions, limitations, or provisions to maintain reasonable fire safety.

3. Any portion of public or private land in a wildfire risk area may be closed to the public by the fire code official at the request of the owners when in the opinion of the fire official the closure is necessary to prevent fires.
4. Per Section 326, no person shall use or operate in, upon, or within a wildfire risk area any tractors, construction equipment, machinery, or any steam, oil, or gasoline operated stationary or mobile equipment unless said equipment is provided with a qualified device or spark arrestor.
5. Any chimney to a fireplace, incinerator, or heating appliance that uses a solid or liquid fuel within a wildfire risk area shall be maintained with a spark arrestor with heavy wire mesh or other non-combustible material with no more than ½ inch openings.
6. No person shall operate or use an open flame device (torches, butane burners,etc.) within a wildfire risk area.
7. No person except for a public officer shall drive or park a motorcycle, motor scooter, or motor vehicle upon any fire road or firebreak, obstruct the entrance to a fire road or firebreak, or install or maintain radio or television aerials or any other obstruction on a fire road or fire break that is less than 16 feet above said fire road or fire break.

3.9 Examples of Communities Designed Against Wildfire

When communities incorporate the regulatory requirements and mitigation measures like the ones described above, they can offer a safer landscape that is resistant to WUI fire disasters. The 2017 Thomas fire in Santa Barbara County consumed over 1,000 homes predominately during the high wind events in the first few days of the incident (Kolden & Henson, 2019). The unincorporated area of Montecito is classified as VHFHSZ and has significant fire history inclusive of home loss (Kolden & Henson, 2019). Two decades prior to the Thomas Fire, the Montecito Fire Protection District started to address wildfire vulnerability in the community using place-based reduction strategies (Kolden & Henson, 2019). These strategies focused on recurring structural ignition potential, fire-resistant materials, structural modifications, increasing defensible space, fire scaping, and developing a fire protection code (Kolden & Henson, 2019). As a result, when the Thomas Fire, during Sundowner winds, spread to Montecito the area experienced minimal damage and was largely passed over (Kolden & Henson, 2019). By having mitigation not be isolated to wildland areas or just to homes, but implemented on multiple scales, Montecito was able to effectively protect not just the WUI areas, but the entire community.

The Witch Creek fire was one of the most destructive fires in California's history and destroyed thousands of homes in San Diego County (Mutch et al., 2011). However, after the 1990 Paint Fire in Santa Barbara and the 1991 Oakland Hills Tunnel Fire the community-started efforts to become adaptive to a very high fire hazard environment (Mutch et al., 2011). They implemented fire codes, and developed restricted defensible space rules, home hardening measures, and vegetation restrictions; all of which were maintained and enforced by the HOA (Mutch et al., 2011). As a result, when the Witch Creek fire spread to Rancho Santa Fe in the five communities that adopted this approach no homes were lost versus the older communities which were heavily impacted (Mutch et al., 2011).

Additionally, the following communities which feature similar fire protection measures as the Project, have experienced minimal to no fire encroachment as a result of their design:

- Casino Ridge, Yorba Linda[3]
- Serrano Heights, Anaheim Hills[4]
- Cielo, Rancho Santa Fe[5]
- 4S Ranch, San Diego[6]

As described above, the Project site is designed to not only be hardened against fire but designed to prevent fires from occurring and quickly suppressing them when they do occur. The Project takes a multi-scaled approach to fire protection through wildfire education, ignition prevention, fuels management, increased response capacity, and ignition-resistant construction. The dual benefit of creating a development that can prevent a fire is that it offers protection to the surrounding communities and the environment. The requirements and recommendations outlined in the WSP have been designed specifically for the proposed construction in VHFHSZ and HFHSZ and can significantly reduce the potential threat to offsite areas.

3 (Orange County Fire Authority, 2008)
4 (FEMA, n.d.)
5 (Mutch et al., 2011)
6 (Audencial, 2016)

4 Wildfire Behavior Modeling

4.1 Fire Behavior Modeling – Flame Length, Fireline Intensity, and Rate of Spread

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

To evaluate potential flame lengths and fire line intensities, FlamMap (Finney 2004) fire behavior modeling software was utilized that incorporates site-specific fuel, topography, and weather data. FlamMap fire behavior calculations are based on the algorithms included in the BehavePlus 3.0.2 fire behavior modeling program (Andrews, Bevins, and Seli 2004) and are performed in GIS-based interface which provides graphical outputs of fire behavior modeling results. These outputs were utilized to graphically portray the anticipated pre-development fire behavior for the Project site.

4.1.1 Fire Behavior Modeling Analysis

Field data collection and fire behavior modeling was completed by Dudek to document the predicted type and intensity of fire that would be expected on this site given characteristic site features such as topography, vegetation, and weather. The fire behavior modeling is conducted based on the existing conditions. Understanding the anticipated fire behavior on the site pre-construction provides insight into how to best address the risk that the open space areas that will remain in post-development conditions present. Naturally, the areas that are converted to urban landscapes will result in a reduced fire risk and reduced fire intensity. Areas subject to hardscape and irrigated landscaping post-development can be expected to have flame lengths and intensity well below areas on the periphery of the community, the wildland urban interface.

Fire behavior modeling conducted on this site includes a high level of detail and analysis which results in reasonably accurate representations of how wildfire may move through available fuels on Centennial. 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 movement of a fire will likely never be fully predictable, especially considering the variations in weather and the limits of weather forecasting. Nevertheless, practiced and experienced expert judgment, coupled with a validated fire behavior modeling system, results in useful and accurate fire prevention planning information (Rothermel 1983).

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

Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. Vegetation is comprised of living and dead fuel. The type and quantity will depend upon the soil, climate, geographic features, disturbance regimes, and the fire history of the site. The major fuel groups of grass, shrub, trees, and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels and is affected by weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

The seven principal 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 in FlamMap 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 (SCAL models) 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 FlamMap modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

- 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.

Table 6 provides a description of 11 fuel models observed on the Project site and that were subsequently used in the FlamMap analysis for this Project:

Table 6. Site Fuel Model Characteristics

Fuel Model	Description	Tons/acre; Btu/lb	Fuel Bed Depth (Feet)
6	Dormant Brush, Hardwood Slash	6 tons/acre; 8,000 Btu/lb	2.5
GR2	Low Load, Dry Climate Grass	1.1 tons/acre; 8,000 Btu/lb	1.0
GR3	Low Load, Very Coarse, Humid Climate Grass	2 tons/acre; 8,000 Btu/lb	2.0
GS2	Moderate Load, Dry climate grass/shrub	2.6 tons/acre; 8,000Btu/lb	1.5
SCAL18	Sage/Buckwheat	9.7 tons/acre; 9,200 Btu/lb	3.0
SH2	Moderate Load Dry Climate Shrub	8.4 tons/acre; 8,000 Btu/lb	1.0
SH7	Very high load dry scrub	14.4 tons/acre; 8,000 Btu/lb	6.0
TL2	Low Load Broadleaf Litter	5.9 tons/acre; 8,000 Btu/lb	0.2
TL6	Moderate Load Broadleaf Litter	4.8 tons/acre; 8,000 Btu/lb	0.3
98	Open water	N/A	N/A
NB1	Urban/developed	N/A	N/A

4.1.1.1 FlamMap Fire Modelling Inputs

Dudek utilized FlamMap software to graphically depict fire behavior modeling results for the Project site. FlamMap utilizes the same fire spread equations built into the BehavePlus software package but allows for a geographical presentation of fire behavior outputs as it applies the calculations to each pixel in an associated Geographic Information Systems (GIS) landscape. Both summer weather conditions (50th percentile) and more extreme fall weather conditions (95th percentile) were modeled.

FlamMap software requires a minimum of five separate input files that represent field conditions on the Project site, including elevation, slope, aspect, fuel model, and canopy cover. Each of these files was created as a raster GIS file using ArcGIS 9.3 software, exported as an ASCII grid file, then utilized in creating a FARSITE (Finney 1998) Landscape file that served as the base for the FlamMap runs. The resolution of each grid file and associated ASCII file that was used in the models described herein is 10 feet, based on an existing digital elevation model (DEM) for the site provided by Bonterra. In addition to the Landscape file, wind and weather data are incorporated into the FlamMap model. Output files chosen for each of the modeling runs included flame length (feet), rate of spread (feet/minute), and fireline intensity (Btu/feet/second).

The following provides a description of the input variables used in processing the FlamMap models. In addition, data sources are cited and any assumptions made during the modeling process are described.

Weather. For the purposes of understanding site weather conditions, Dudek evaluated data from two local Remote Automated Weather Stations (RAWS) located in the vicinity of the Project site. As of the date of this report, no RAWS are located on the Centennial property. The following summarizes the location and available data ranges for the two stations:

- Chuchupate RAWS
  - Latitude: 34.8064

  - Longitude: -119.0128
  - Elevation: 5,250 feet
  - Data years: 1961 to 2008
- Poppy Park RAWS
  - Latitude: 34.73250
  - Longitude: -118.38333
  - Elevation: 2,760 feet
  - Data years: 1995 to 2008.

Utilizing the FireFamily Plus v. 4.0.0 (FireFamily Plus 2007) software package, data from both RAWS were analyzed by developing a Special Interest Group (SIG). The SIG is a composite of weather station data that is analyzed concurrently. In this case, the SIG weighted data from each RAWS equally and was analyzed to determine 50th and 95th percentile wind and fuel moisture conditions for inclusion in the fire behavior modeling efforts conducted for the Project site. Fuel moisture information was analyzed and incorporated into the Initial Fuel Moisture file used as an input in FlamMap. Wind speed (20-foot) values for the different FlamMap runs were manually entered during the data input phase and were based on two wind scenarios: summer fire (50th percentile) with 7 mph winds, and fall fire (95th percentile) with 47 mph winds (maximum observed RAWS wind speed).

Elevation. Elevation data were derived from the Centennial DEM file, projected in NAD 1983, California State Plane, Zone 5 with units in feet. The resolution of the DEM was 10 feet and elevation on site ranges from 2,988 feet to 4,310 feet. These data were utilized to create an elevation grid file, using units of feet amsl. The elevation data are a necessary input file for FlamMap runs and are necessary for adiabatic (air cooling or heating) adjustment of temperature and humidity and for conversion of fire spread between horizontal and slope distances.

Slope. Using ArcGIS Spatial Analyst tools, a slope grid file was generated from the elevation grid file described previously. Slope measurements utilized values in percent of inclination from horizontal. Slope values on site range from 0% to 95%. The slope input file is necessary for computing slope effects on fire spread and solar radiance.

Aspect. Using ArcGIS Spatial Analyst tools, an aspect grid file was generated from the elevation grid file described previously. The aspect values utilized were azimuth degrees. Aspect values are important in determining the solar exposure of grid cells.

Fuel Model. Vegetation coverage data in the form of a GIS shapefile were used in this analysis to create a fuel model file. Derived from Bonterra's 2009 Vegetation Type classifications included in their vegetation mapping data for the Project site, vegetation types were classified into fuel models as described in Table 6. Vegetation mapping data was utilized in field assessment efforts to classify vegetation cover type with an appropriate fuel model. Specifically, 11 separate fuel models were utilized for the Project site, of which, two were non-combustible classifications (e.g., water, pavement). Once fuel model values were assigned to vegetation types, the vector-based vegetation data file was converted to a grid file for inclusion in FlamMap modeling. Table 6 outlines the fuel model values applied to the different vegetation types found on the Project site.

Canopy Cover. Canopy cover is a required raster file for FlamMap operations. It is necessary for computing shading and wind reduction factors for all fuel models. Canopy cover is measured as the horizontal fraction of the ground that is covered directly overhead by tree canopy. Crown closure refers to the ecological condition of relative tree crown density. Stands can be said to be "closed" to recruitment of canopy trees but still only have 40% or 50%

canopy cover. Coverage units can be categories (0 through 4) or percentage values (0 through 100). For the purposes of this analysis, timber litter fuel models (TL2 and TL6) were classified as category 3 (50% to 75% cover) while the remaining models were considered to have no canopy, due to the lack of any significant tree cover in these areas.

Table 7 summarizes the input variables used in the FlamMap modeling efforts.

Table 7. FlamMap Model Input Variables

Model Variable	50th Percentile Weather	95th Percentile Weather (w/ Max. Wind)
1 h fuel moisture	5%	2%
10 h fuel moisture	6%	3%
100 h fuel moisture	12%	6%
Live herbaceous moisture	60%	30%
Live woody moisture	70%	60%
20 ft wind speed (mph)	7 mph	47 mph (maximum observed Fall wind speed)
Wind direction	Up-slope	Up-slope
Slope steepness	Variable by location, range: 0% to 95%	Variable by location, range: 0% to 95%

4.1.1.2 FlamMap Fire Modelling Outputs

Two output grid files were generated for each of the two FlamMap runs and include representations of flame length (feet) and fireline intensity (Btu/feet/second). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion zone to the average tip of the flames (Andrews, Bevins, and Seli 2004). It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. Fire spread rate represents the speed at which the fire progresses through surface fuels and is another important variable in initial attack and fire suppression efforts. The information in Table 8 presents an interpretation of these fire behavior variables as related to fire suppression efforts.

Table 8. Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 to 8	100 to 500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.

Table 8. Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
8 to 11	500 to 1000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 3.0.2 fire behavior modeling program (Andrews, Bevins, and Seli 2004)

Maps depicting flame length and fireline intensity for the 50th and 95th percentile weather scenarios are included in Figures 8-11. The fire behavior analysis results for the Project site vary depending on fuel type. As FlamMap utilizes site-specific digital terrain data (including slope, vegetation, aspect, and elevation data) slight variations in predicted flame length values can be observed based on fluctuations of these attributes across the landscape. As presented, wildfire behavior in each of the fuel types varies depending on weather conditions.

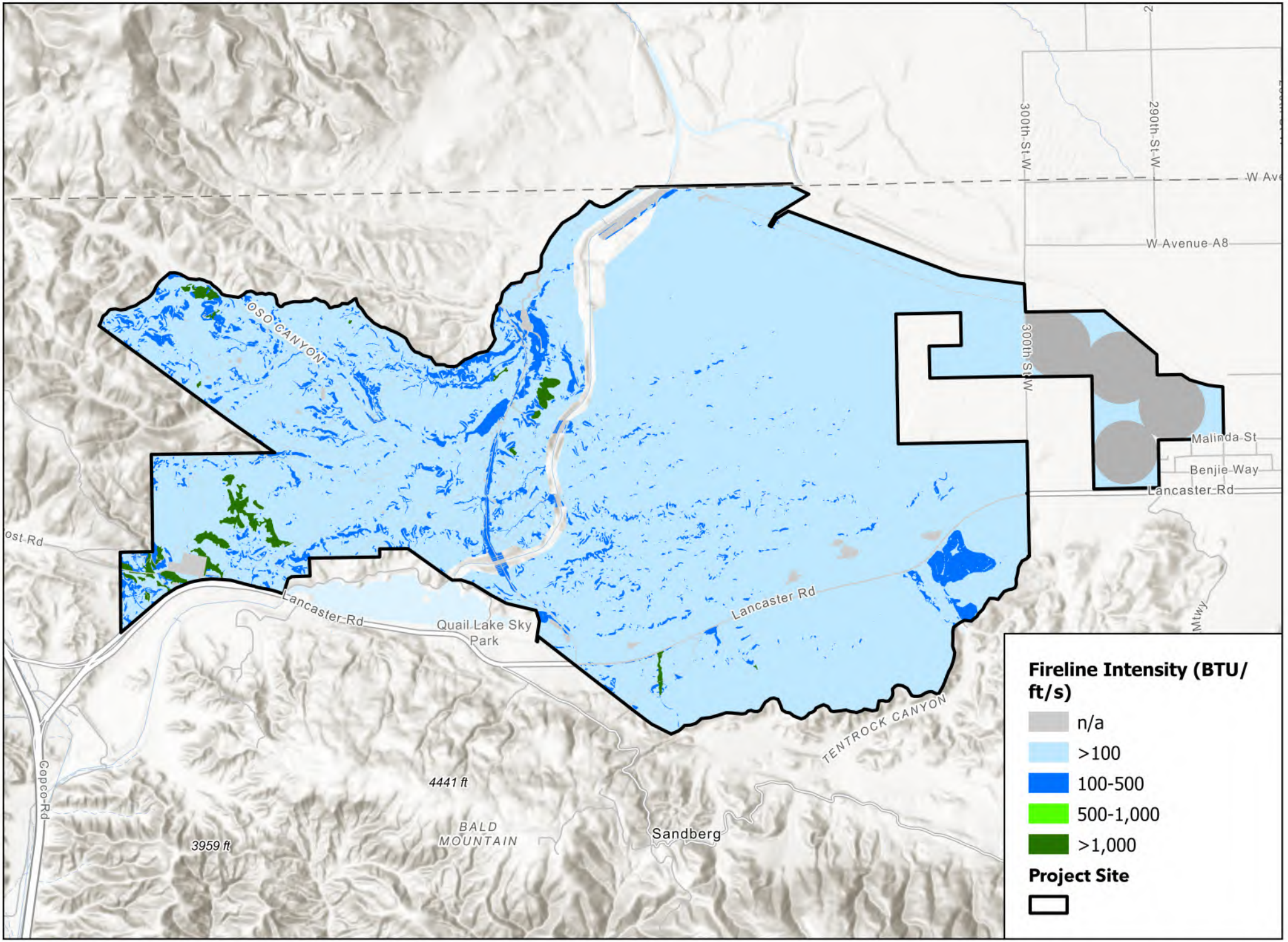

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FIGURE 8
Fireline Intensity - 50th Percentile Weather

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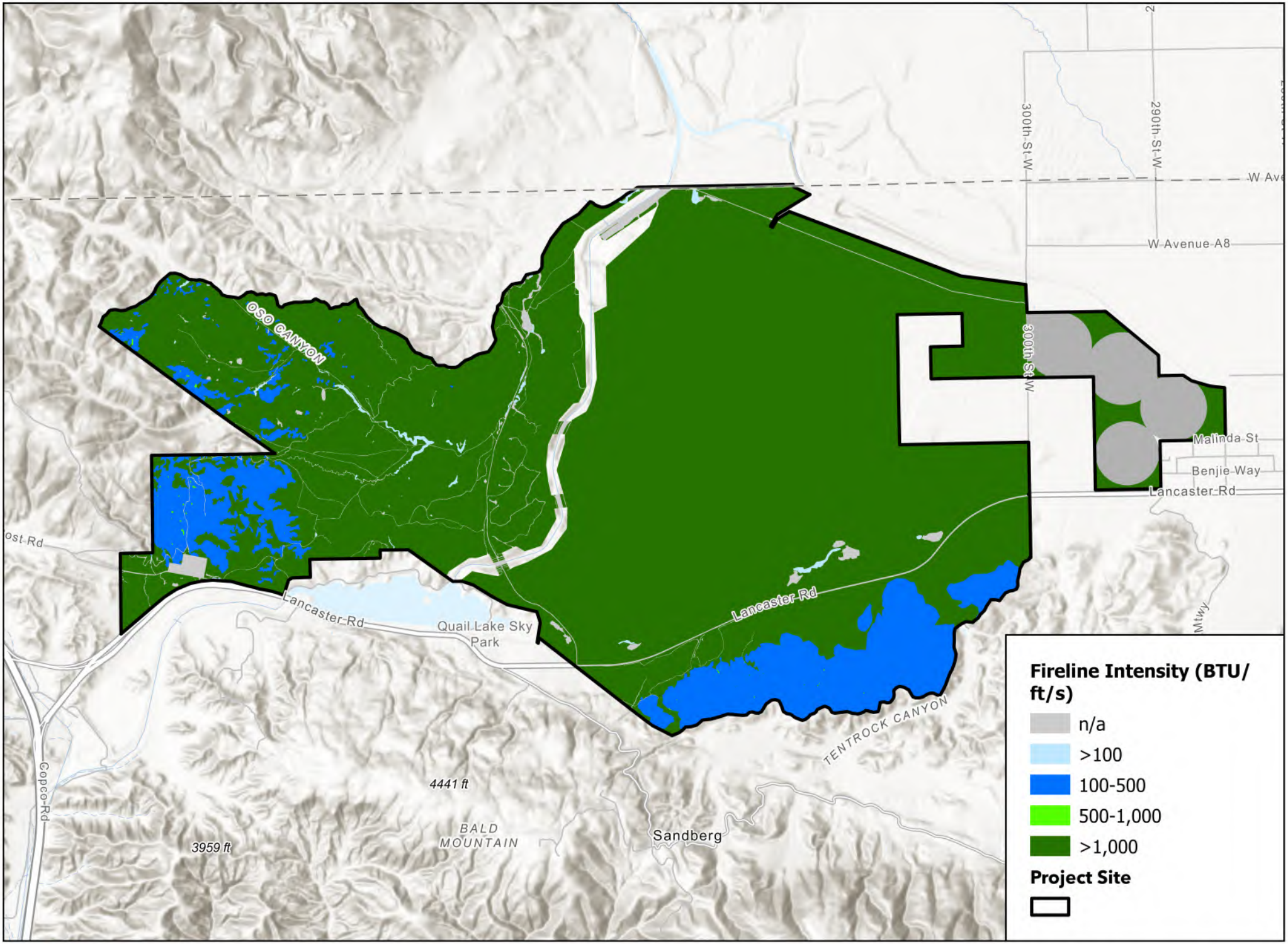

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FIGURE 9

Fireline Intensity - Santa Ana Weather - 47 mph winds

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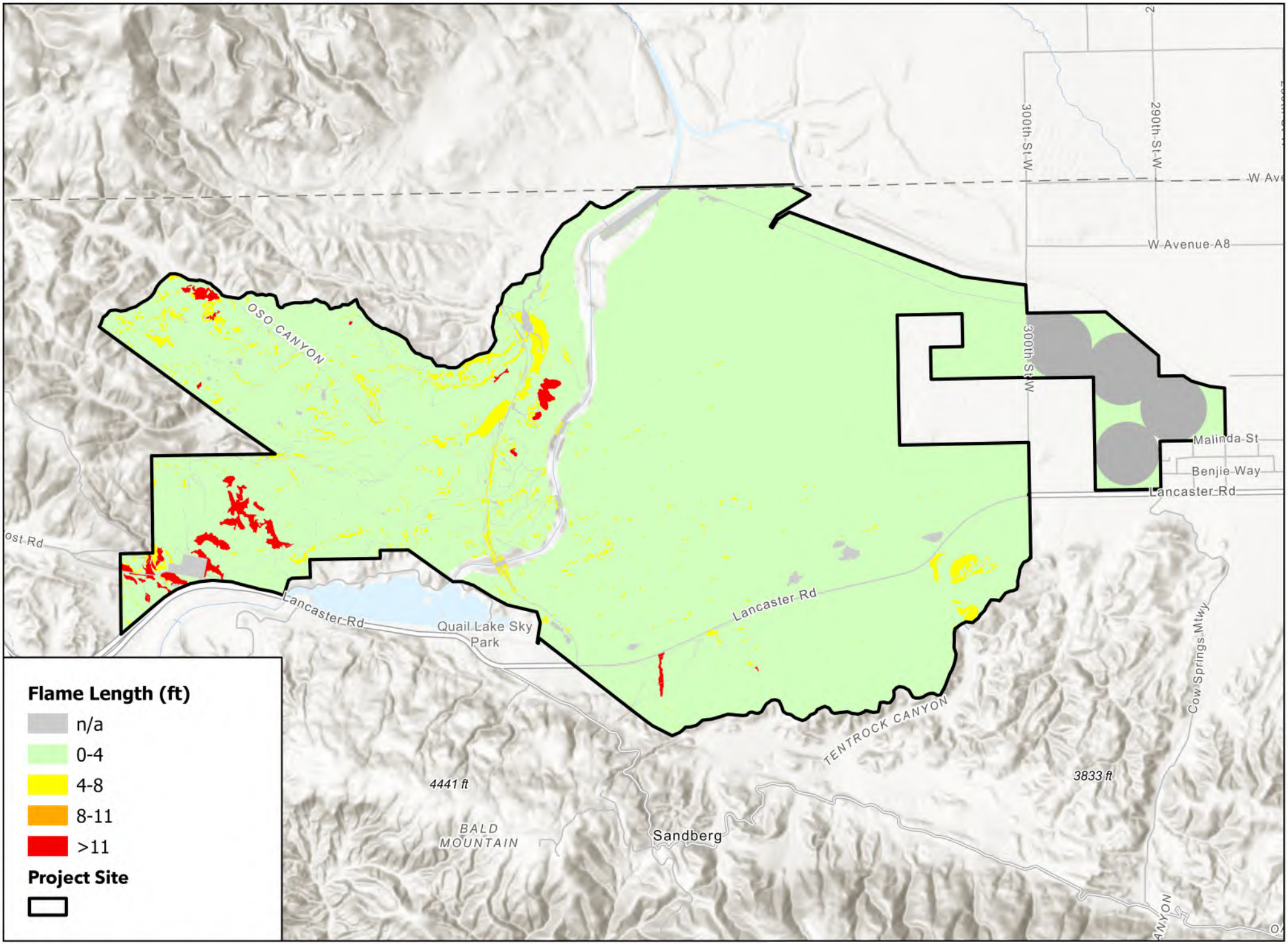

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FIGURE 10

Fireline Intensity - Santa Ana Weather - 47 mph wind

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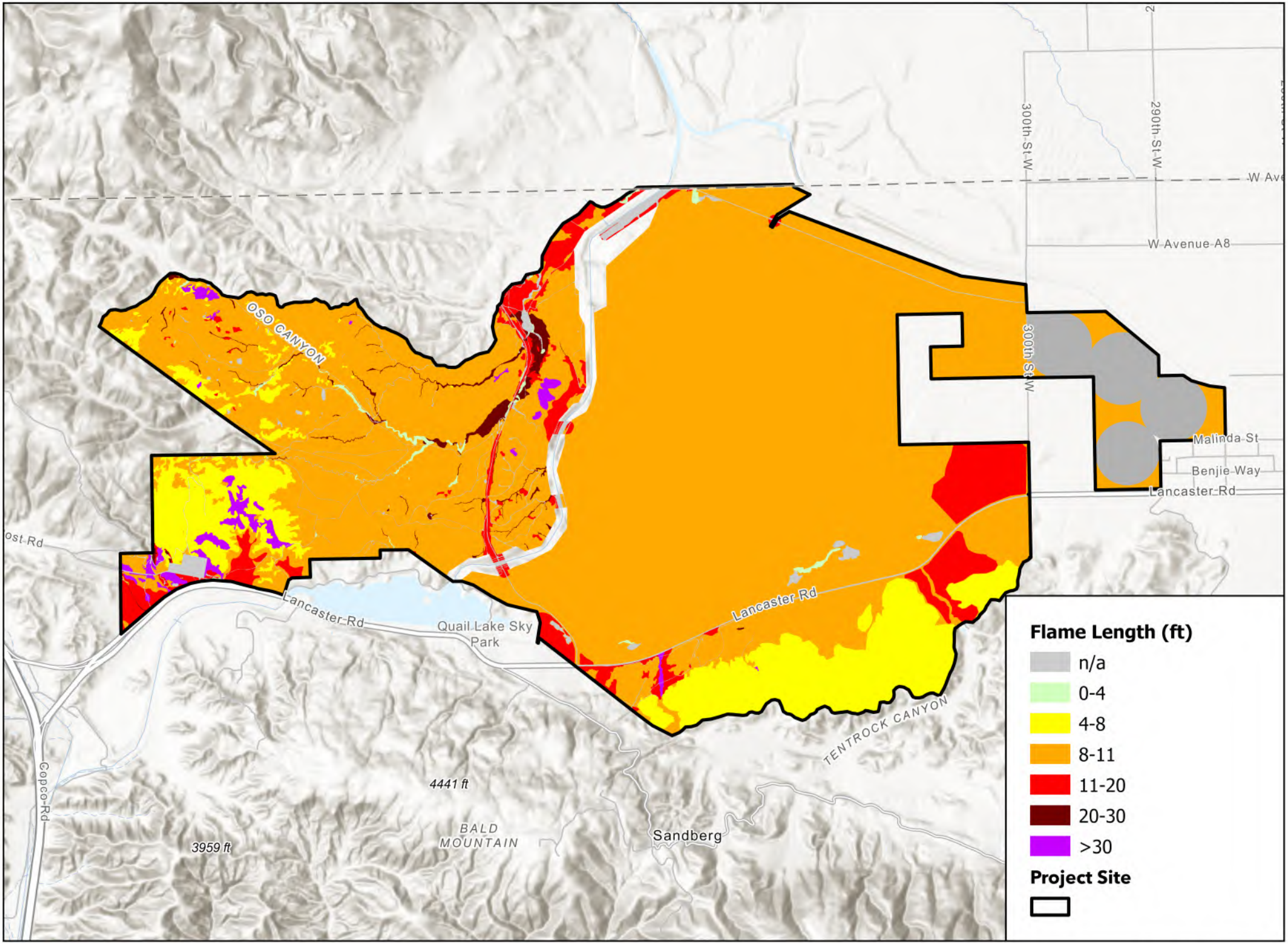

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FIGURE 11

Fireline Intensity - Santa Ana Weather - 47 mph wind

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4.1.1.3 Behave Plus Analysis

An analysis utilizing the BehavePlus software package was conducted to evaluate pre- and post-project flame lengths, intensities, and spread rates within the Project's development edges. These fire scenarios incorporated observed fuel types representing the dominant vegetation and slope gradients in the Project's planned Fuel Modification Zones. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent to the site. Identification of fire scenarios' locations is presented graphically in Figure 12.

Baseline vegetation types (Table 9), 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). For post-development conditions, fuel models were assigned to illustrate post-project fire behavior changes in the Project's planned perimeter Fuel Modification Zones. As depicted in Figure 13 , the vast majority of development areas are located adjacent to low hazard grass fuels. Based on the anticipated pre-and post-project vegetation conditions, six different fuel models were used in the fire behavior modeling effort presented herein.

Table 9. Baseline Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
8	Zone A – irrigated, landscapes	Perimeter fuel modification zone	<3.0 ft.
Gr1	Zone B/Zone C: grasses cut to 6 inches in height	Perimeter fuel modification zone	<0.5 ft.
GR2	Non-native grasslands	Hillsides and open spaces surrounding the sites	<1.0 ft.
Sh1	Zone B: 50% thinning shrubs	Perimeter fuel modification zone	—
GS2	Moderate Load, Dry climate grass/shrub	Hillsides and open spaces surrounding the sites	<1.5 ft.
TL6	Oak woodland lead leaf litter	Select hillsides and open spaces surrounding the sites	<0.3 ft.

The results of baseline fire behavior modeling analysis are presented in Table 10 for pre-project conditions and Table 11 for post-project conditions. Post-project conditions include fuel model characteristics to represent the reduced fuels, high plant moisture, and engineered landscapes that result in reduced flame lengths, spread rates, and fire intensity.

Table 10. BehavePlus Modeling Results – Pre-Project Baseline Conditions for Centennial

Fire Scenarios	Flame Length (feet)	Fireline Intensity (Btu[1]/feet/second)	Spread Rate (mph[2])
Scenario 1: Non-Native Grasslands and, 5-10% slope, 97th Percentile Weather			
Fuel Model GR2	14	1,000 +	4.2
Scenario 2: Moderate Load Grass-shrub vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model GS2	24	1,000 +	6.6
Scenario 3: Oak woodland vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model TL6	12	500-1,000	1.5
Fuel Model GR2	14	1,000 +	4.2
Scenario 4: Non-Native Grasslands and, 5-10% slope, 50th Percentile Weather			
Fuel Model GR2	6	>0-500	0.7
Scenario 5: Moderate Load Grass-shrub vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model GS2	7	>0-500	0.6
Scenario 6: Oak woodland vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model TL6	4	<100	0.1
Fuel Model GR2	6	>0-500	0.7

Notes
1 Btu = British thermal unit(s)
2 mph = miles per hour
3 Spotting distance from a wind-driven surface fire

Table 11. BehavePlus Modeling Results – Post-Project Baseline Conditions for Centennial

Fire Scenarios	Flame Length (feet)	Fireline Intensity (Btu[1]/feet/second)	Spread Rate (mph[2])
Scenario 1: Fuel Modification Zones, Non-Native Grasslands and, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model GR1 (Zone C)	3	<100	0.5
Scenario 2: Fuel Modification Zones, Moderate Load Grass-shrub vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model SH1 (Zone C)	9	>500-1000	1.2
Scenario 3: Fuel Modification Zones, Oak woodland vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model GR1 (Zone C)	3	<100	0.5
Scenario 4: Fuel Modification Zones, Non-Native Grasslands and, 5-10% slope, 50th Percentile Weather			
Fuel Model 8	1	<100	<0.1

Table 11. BehavePlus Modeling Results – Post-Project Baseline Conditions for Centennial

Fire Scenarios	Flame Length (feet)	Fireline Intensity (Btu[1]/feet/second)	Spread Rate (mph[2])
Fuel Model GR1	2	<100	0.2
Scenario 5: Fuel Modification Zones, Moderate Load Grass-shrub vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model 8	1	<100	<0.1
Fuel Model SH1	1	<100	<0.1
Scenario 6: Fuel Modification Zones, Oak woodland vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model 8	1	<100	<0.1
Fuel Model GR1	2	<100	0.2

The results presented in Tables 10 and 11 which are described in further detail below, Section 4.2, Wildfire Behavior Summary, 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.[7]

[7] Please note, 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.

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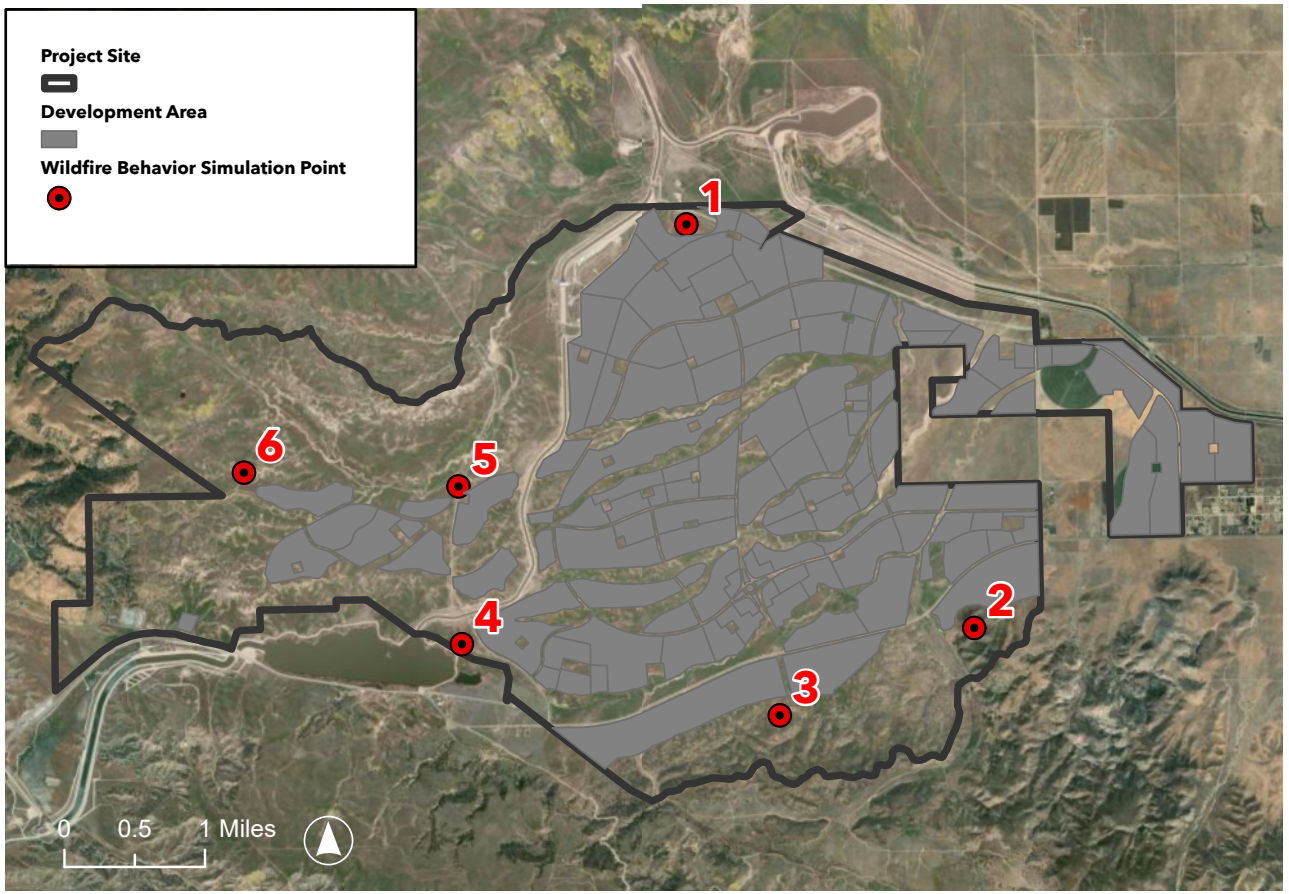

Model Input Variables

Model Variable	50th Percentile Weather	95th Percentile Weather (w/ Max. Wind)
1 h fuel moisture	5%	2%
10 h fuel moisture	6%	3%
100 h fuel moisture	12%	6%
Live herbaceous moisture	60%	30%
Live woody moisture	70%	60%
20 ft wind speed (mph)	7 mph	47 mph (maximum observed Fall wind speed)
Wind direction	Up-slope	Up-slope
Slope steepness	Variable by location	Variable by location

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)
8	Zone A – irrigated, landscapes	Perimeter fuel modification zone	<3.0 ft.
Gr1	Zone B/Zone C: grasses cut to 6 inches in height	Perimeter fuel modification zone	<0.5 ft.
GR2	Non-native grasslands	Hillsides and open spaces surrounding the sites	<1.0 ft.
Sh1	Zone B: 50% thinning shrubs	Perimeter fuel modification zone	
GS2	Moderate Load, Dry climate grass/shrub	Hillsides and open spaces surrounding the sites	<1.5 ft.
TL6	Oak woodland lead leaf litter	Select hillsides and open spaces surrounding the sites	<0.3 ft.

BehavePlus Modeling Results – Pre-Project Baseline Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (Btu[1]/feet/second)	Spread Rate (mph[2])
Scenario 1: Non-Native Grasslands and, 5-10% slope, 97th Percentile Weather			
Fuel Model GR2	14	1,000 +	4.2
Scenario 2: Moderate Load Grass-shrub vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model GS2	24	1,000 +	6.6
Scenario 3: Oak woodland vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model TL6	12	500-1,000	1.5
Fuel Model GR2	14	1,000 +	4.2
Scenario 4: Non-Native Grasslands and, 5-10% slope, 50th Percentile Weather			
Fuel Model GR2	6	>0-500	0.7
Scenario 5: Moderate Load Grass-shrub vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model GS2	7	>0-500	0.6
Scenario 6: Oak woodland vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model TL6	4	<100	0.1
Fuel Model GR2	6	>0-500	0.7

BehavePlus Modeling Results – Post-Project Conditions

Fire Scenarios	Flame Length (feet)	Fireline Intensity (Btu[1]/feet/second)	Spread Rate (mph[2])
Scenario 1: Fuel Modification Zones, Non-Native Grasslands and, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model GR1 (Zone C)	3	<100	0.5
Scenario 2: Fuel Modification Zones, Moderate Load Grass-shrub vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model SH1 (Zone C)	9	>500-1000	1.2
Scenario 3: Fuel Modification Zones, Oak woodland vegetation, 5-10% slope, 97th Percentile Weather			
Fuel Model 8 (Zone B)	3	<100	0.1
Fuel Model GR1 (Zone C)	3	<100	0.5
Scenario 4: Fuel Modification Zones, Non-Native Grasslands and, 5-10% slope, 50th Percentile Weather			
Fuel Model 8 (Zone B)	1	<100	<0.1
Fuel Model GR1 (Zone C)	2	<100	0.2
Scenario 5: Fuel Modification Zones, Moderate Load Grass-shrub vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model 8 (Zone B)	1	<100	<0.1
Fuel Model SH1 (Zone C)	1	<100	<0.1
Scenario 6: Fuel Modification Zones, Oak woodland vegetation, 5-10% slope, 50th Percentile Weather			
Fuel Model 8 (Zone B)	1	<100	<0.1
Fuel Model GR1 (Zone C)	2	<100	0.2

DUDEK

Source: Tejon Ranch, 2023

FIGURE 12

Behave Plus Fire Behavior Analysis

Notes:

1 Btu = British thermal unit(s)

2 mph = miles per hour

3 Spotting distance from a wind-driven surface fire

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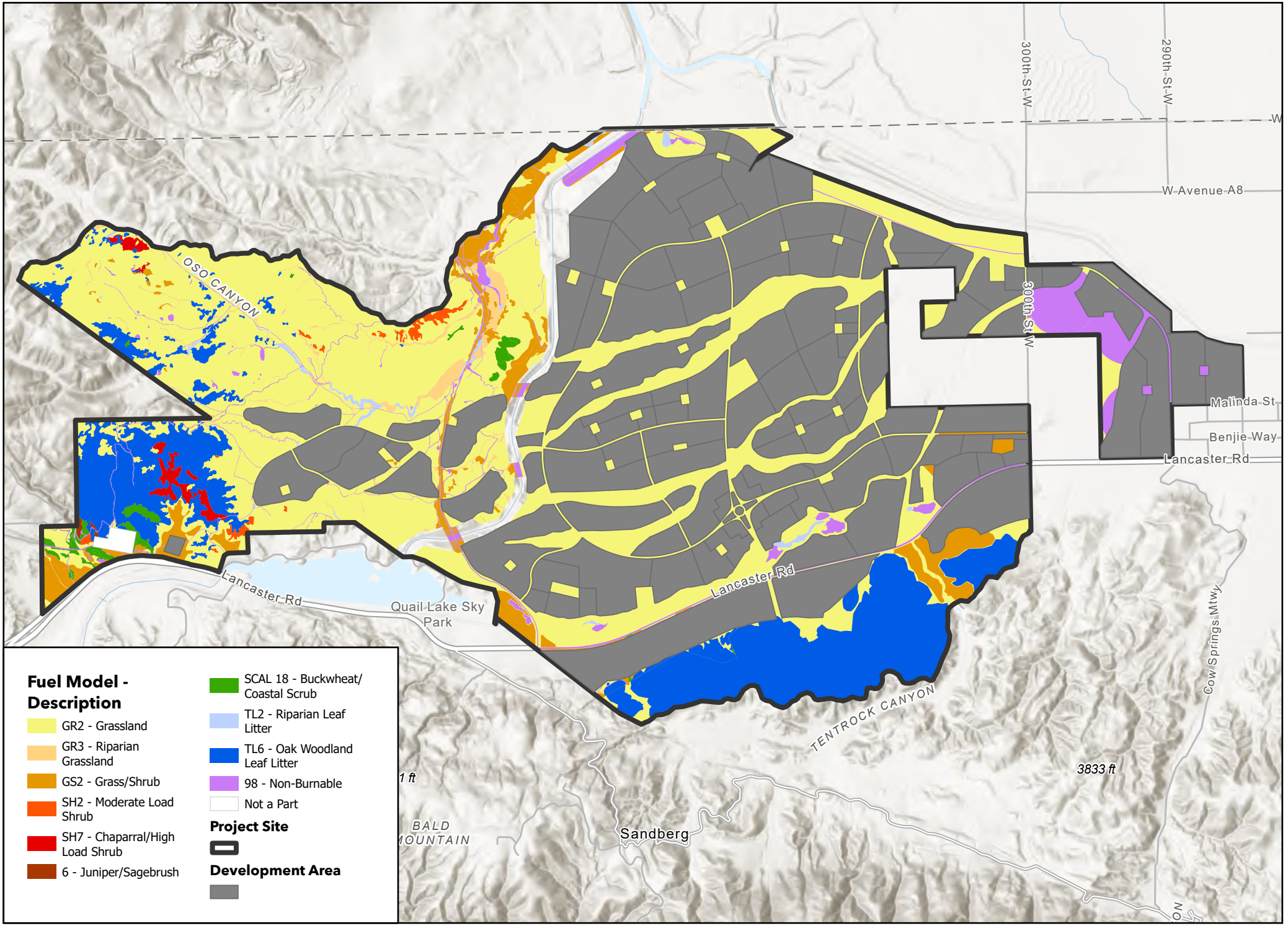

DUDEK

Source: Bonterra, 2009, Tejon Ranch, 2023

FIGURE 13

Vegetation - Fuel Models (Post-development)

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4.2 Wildfire Behavior Summary

4.2.1 Pre-Project Baseline Conditions

Given the climatic, vegetation, and topographic characteristics along with the fire history and fire behavior modeling results discussed in this WSP, the Centennial Specific Plan Project site is determined to be potentially vulnerable to wildfire starting in, burning onto, or spotting onto the site. Based on this information, the anticipated Project-related human population growth and corresponding increase in potential ignition sources, and the fire history of the area, it is expected that wildfires will occur on this site in the future, although over half of the currently available fuels will be converted to urban, irrigated landscapes, representing a reduction in the potential ignition and spread of wildfire.

Under extreme fall weather conditions (95th percentile fuel moistures and maximum wind speeds of 47 mph), fire can move rapidly through the site's fuels. The most common type of fire anticipated in the vicinity of the Project area is a fire burning onto the Project site from the south (e.g., originating along Highway 138), or one approaching the Project site from I-5. Worst-case flame lengths near planned development areas were calculated at approximately 24 feet in grass-shrub vegetation types. Spread rates on site may exceed 6 mph in dry flashy fuels (grasses and scrub) under extreme weather and slope conditions. Finally, under extreme weather and wind conditions, fireline intensity values may exceed 1,000 Btu/feet/second limiting the options for fire response personnel and emphasizing the importance of fuel modification and defensible space for the planned community.

4.2.2 Post-Development Conditions

As presented in Table 11 Dudek conducted modeling of the Centennial Project Site for post-FMZ fuel recommendations. Fuel modification includes the establishment of irrigated and thinned zones on the periphery of the Project's planned development areas. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the FMZ Zone A (Fuel Model 8) and FMZ Zone B (50% thinning zones – Fuel Model GR1, Fuel Model Sh1). The FMZ areas experience a significant reduction in flame length and intensity. The maximum 20-foot (Annual Grassland and Grass-shrub Fuels) and 11-foot (Oak woodland) tall flames predicted during pre-treatment modeling during extreme weather conditions are reduced to less than 11 feet tall at the outer edges and less than 4 feet in the near the structures of the development due to the higher live and dead fuel moisture contents. While not presented, the fire intensity and flame lengths in untreated, open space areas outside of FMZs would remain the same.

4.3 Modeling Results When Including Ongoing Livestock Grazing

The Project, along with the larger Tejon Ranch, benefits from reduced fire ignitions and fire behavior resulting from the ongoing Tejon Ranch agricultural and grazing activities. Specifically, the livestock grazing program utilizes practices implemented on the greater Ranch over and continues these practices as part of the holistic land management approach and managing wildfire risk simultaneously.

Exhibit 1. Photograph taken at the Centennial Site showing short and sparse grassland fuels which have been managed by historical and ongoing cattle grazing (Fuel Model GR1). Note that the steeper hillsides are outside of the Project development area.

This modeling described above conservatively does not consider any benefits from Tejon's ongoing grazing operations by analyzing the Project area's fire behavior with a vegetation baseline condition that is assumed to be untreated/undisturbed, native fuel beds. This conservative approach ensures that the provided FMZ widths are adequate for protecting the structures and future populations even if the ongoing grazing operations were to cease in the future for a period of time.

However, for information purposes, the modeling also considered the scenario with ongoing livestock grazing, which results in reduced fire behavior in terms of flame lengths, fire spread rates, heat output, and overall intensity. For example, flame lengths are reduced throughout the treated area and the highest modeled flame lengths were reduced from 14 feet to 3 feet (See Table 12). It is anticipated that the livestock grazing program will continue to provide these benefits, but even if the program is halted at some future date, the Project's planned FMZs provide the necessary setbacks and protection and do not rely on livestock treatments. Thus, the ongoing livestock grazing program provides additional benefits with respect to wildfire protection but is not necessary for the purpose of this WSP's evaluation.

Table 12. Differences in wildfire behavior across three grass fuel models (GR1 and GR2).

Fuel Model	BehavePlus Output	97th Percentile Weather Fire Behavior
GR1 (Grazed grass fuels)	Surface Rate of Spread	0.47
	Flame Length	3.1 ft.
	Fireline Intensity	<100 BTU-ft-sec
GR2 (Ungrazed grass fuels)	Surface Rate of Spread	4.1 mph
	Flame Length	14.0 ft.
	Fireline Intensity	1000+ BTU-ft-sec

4.4 Landscape Burn Probability Modeling

Landscape burn probability (LBP) represents the likelihood that a given location in a landscape would burn, considering the model inputs used. Burn probability is related to the size of fires that occur on a given landscape, where larger fires produce higher burn probabilities than smaller fires. Because fire size is a function of wildfire spread rate and wildfire duration, weather conditions that reduce spread rates reduce burn probability (USDOI and USDA 2022b). In this analysis, weather conditions were set to 97th percentile and 50th percentile conditions to mimic extreme and average fire weather conditions that would be experienced at the Project site. LBP results are useful to identify the relative likelihood of fire occurring at the landscape level.

The modeling results for burn probability are displayed with seven distinct categories describing relative probability. The first two classes represent pixels that did not burn:

- Non-burnable – Pixels have a non-burnable fuel model and cannot burn.
- Burnable but did not burn – Pixels have burnable fuels but did not burn (e.g., a fire never reached the pixel, or a fire started within the pixel, but it was unable to burn out of the pixel because the fire spread rate was too slow).

The other five classes are dynamic and based on the maximum value of burn probability for the model run:

- Lowest (0–20% of maximum)
- Lower (20–40% of maximum)
- Middle (40–60% of maximum)
- Higher (60–80% of maximum)
- Highest (80–100% of maximum)

Results

As displayed in Figures (14 and 15), the Project site is situated away from areas with greater burn probabilities during both average (50th percentile) and extreme Santa Ana conditions (97th percentile).

Santa Ana Weather

During Santa Ana conditions, large wildfires are much more likely to occur in the steep, heavily vegetated, and mountainous terrain to the south and north of the Project site as presented in Figure 14. The location of the Project site makes it less susceptible to significant and direct wildfire impacts during Santa Ana weather. Although Santa Ana winds blow strongly from the northeast, the fuel conditions and terrain in that direction are not likely to lead to large, high-intensity wildfires reaching the Project site. This area, at the western edge of the Antelope Valley, consists of light fuel loads in grasslands and agricultural land. If a wildfire were to ignite to the northeast or east of the Project site, it would likely be a grass fire with minimal risk to developed areas. Furthermore, the offsite areas to the northeast have many access points that firefighters can use to contain any wildfires approaching the Project site. The California Aqueduct and the adjacent disturbed areas also border the Project site's northeastern edge, serving as a permanent fuel break during wind-driven grass fires.

If wildfires occur southeast of the Project site, Santa Ana winds from the northeast are likely to push the fires southwest, where the terrain and fuel conditions are more conducive to fire spread. It is possible that these fires could reach the southeastern edge of the Project site, where commercial development is planned. However, this development is set back from the more hazardous fuels found in the steeper terrain to the south. Additionally, fires in this area during Santa Ana conditions are likely to move parallel to the wind direction, known as a flank fire. Flank fires typically burn at lower intensities compared to head fires, which spread in the wind's direction. Potential wildfire impacts in this area would be mitigated by perimeter parking areas, Fuel Modification Zones (FMZs), and fire-hardened commercial buildings.

Average Weather

During typical weather conditions, large wildfires are more likely to occur in areas northwest and south of the Project site as presented in Figure 15. Fires to the south are not expected to move towards directly towards the site due to the prevailing northwest wind direction. While wildfires to the northwest could spread towards the Project site, the grassland fuels and moderate terrain in this region are not conducive to high-intensity fires. This is especially true during average weather conditions, when fuel moisture is higher, and wind speeds are lower. An analysis of historic wildfires shows that no fires have ever encroached on the Project site from the north or northwest

4.5 Integrated Hazard Modeling

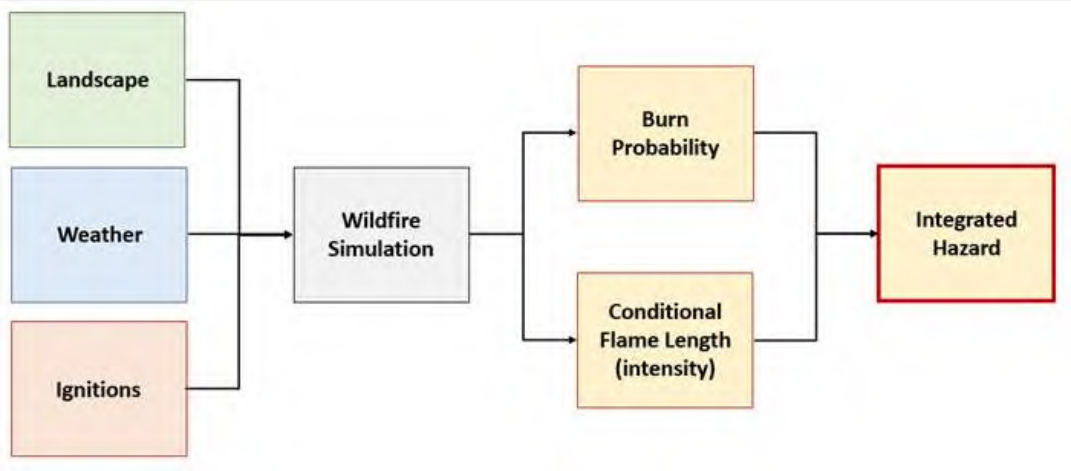
Integrated Hazard is quantified and categorized using the Landscape Burn Probability Model embedded within the Interagency Fuel Treatment Decision Support System (IFTDSS) fire behavior modeling system. Integrated Hazard is a term used in fire behavior modeling to evaluate (1) the probability of a fire occurring at a specific point under a specified set of conditions, and (2), if a fire does occur, the fire intensity at that specific point.

A diagram of the Integrated Hazard analysis process is provided in Figure 16. IFTDSS Integrated Hazard is categorized into seven distinct hazard classes. The first two are for pixels that did not burn, and the remaining five classes are dynamic based on the integrated hazard matrix presented in Figure 17. The seven classes are as follows:

- Non-Burnable
- Burnable but Not Burned
- Lowest Hazard

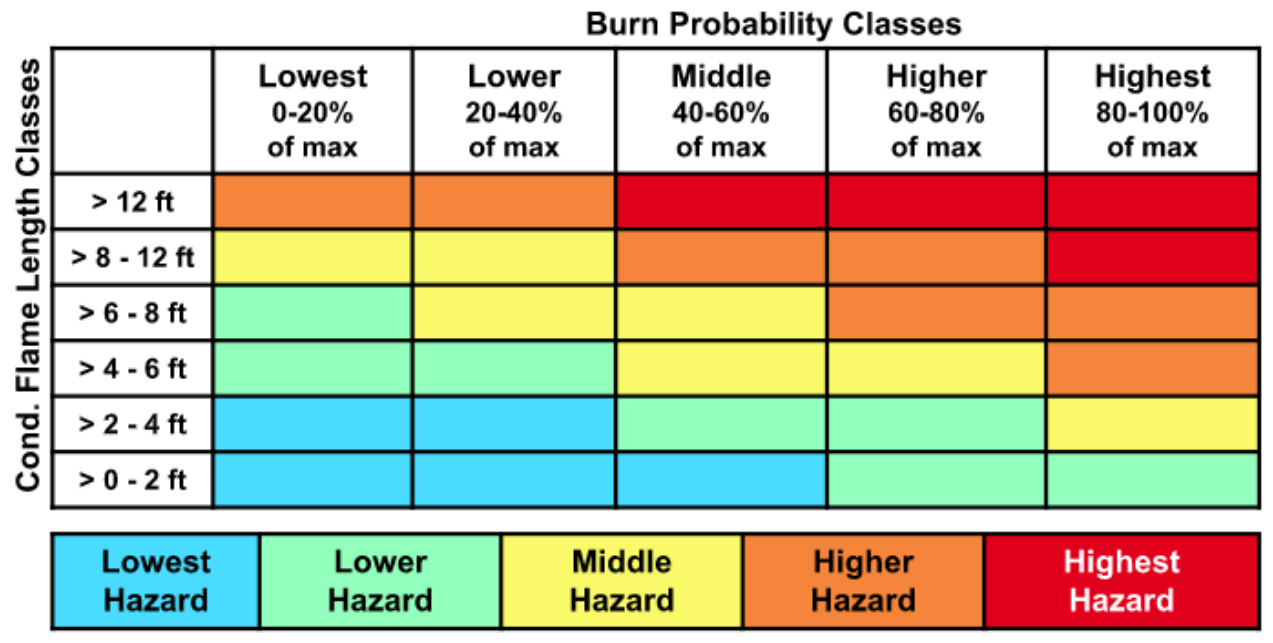
- Lower Hazard
- Middle Hazard
- Higher Hazard
- Highest Hazard

Figure 16. IFTDSS Integrated Hazard Model Diagram



Source: USDOI and USDA 2022b.

Figure 17. IFTDSS Integrated Hazard Matrix



Source: USDOI and USDA 2022b.

Results

Integrated hazard modeling outputs for the Project site and surrounding areas during Average and Santa Ana weather conditions are provided in Figures (18 &19) and Table 13. In both scenarios, greater wildfire intensity and likelihood is expected in offsite areas to the north, northwest, and south due to heavier fuels and steeper terrain compared to conditions within the Project site itself.

During average weather conditions, wildfire hazard within the Project site is considered low, with 72% percent of the Project site considered lowest hazard. As expected, due to higher wind speeds and lower fuel moistures, wildfire hazard within the Project site during Santa Ana weather increases the areas considered middle and higher hazard. However, areas mapped as lowest and lower hazard still remain dominant, accounting for 68 and 81% percent of the Project site during Average and Santa Ana weather conditions, respectively.

Table 13. Integrated Hazard within the Project site during Average and Santa Ana weather conditions.

Integrated Hazard Score	Santa Ana Conditions (97th Percentile)	Average Conditions (50th Percentile Weather)
Non-burnable	13%	13%
Burnable, not burned	<1%	<1%
Lowest Hazard	15%	72%
Lower Hazard	53%	9%

Table 13. Integrated Hazard within the Project site during Average and Santa Ana weather conditions.

Integrated Hazard Score	Santa Ana Conditions (97th Percentile)	Average Conditions (50th Percentile Weather)
Middle Hazard	9%	5%
Higher Hazard	8%	<1%
Highest Hazard	0%	0%

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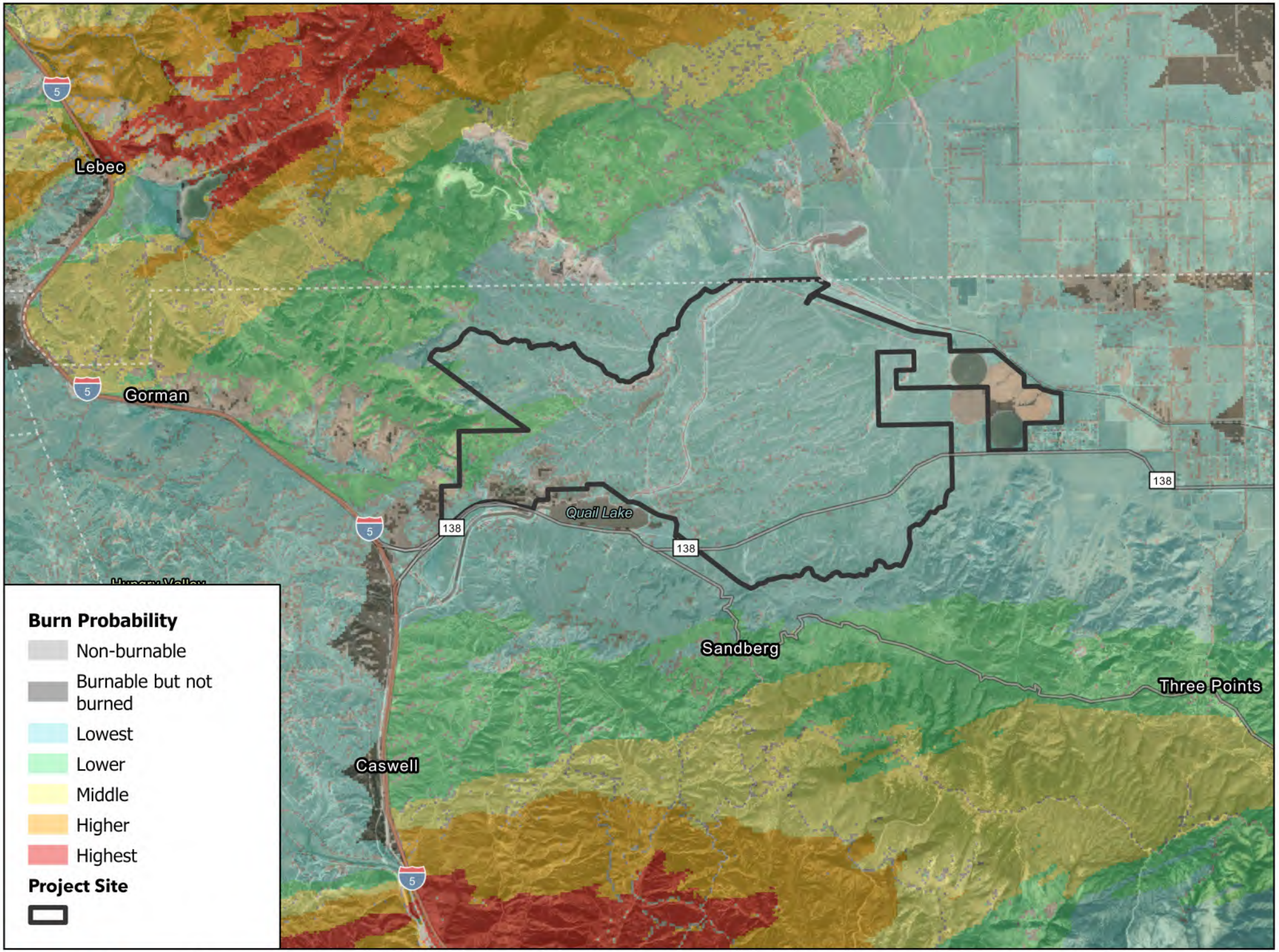

DUDEK

Source: Tejon Ranch, 2023

N

0 0.5 1 2 Miles

FIGURE 14

Landscape Burn Probability (Santa Ana Weather)

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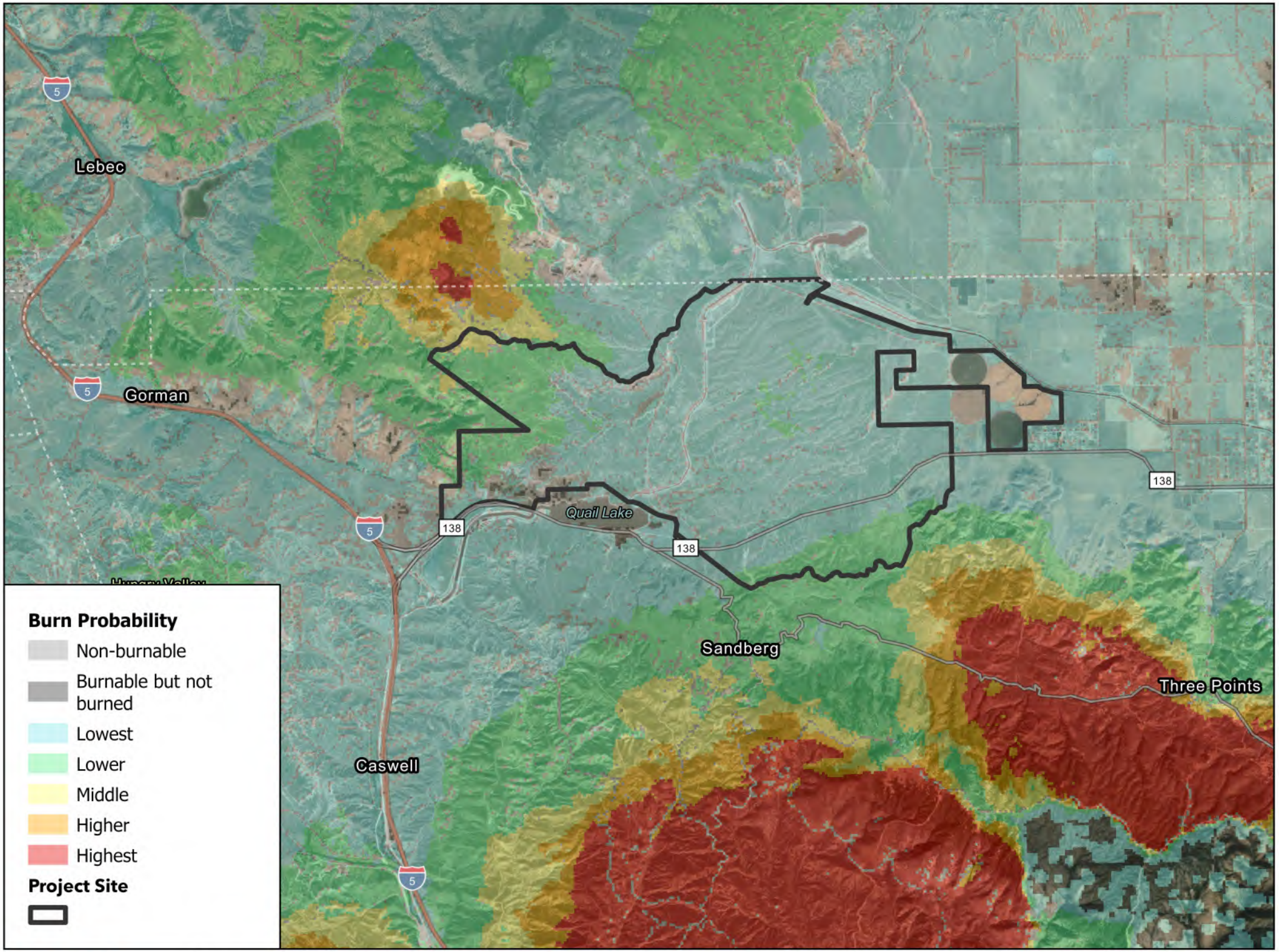

DUDEK

Source: Tejon Ranch, 2023

N

0 0.5 1 2 Miles

FIGURE 15

Landscape Burn Probability (50th Percentile Weather)

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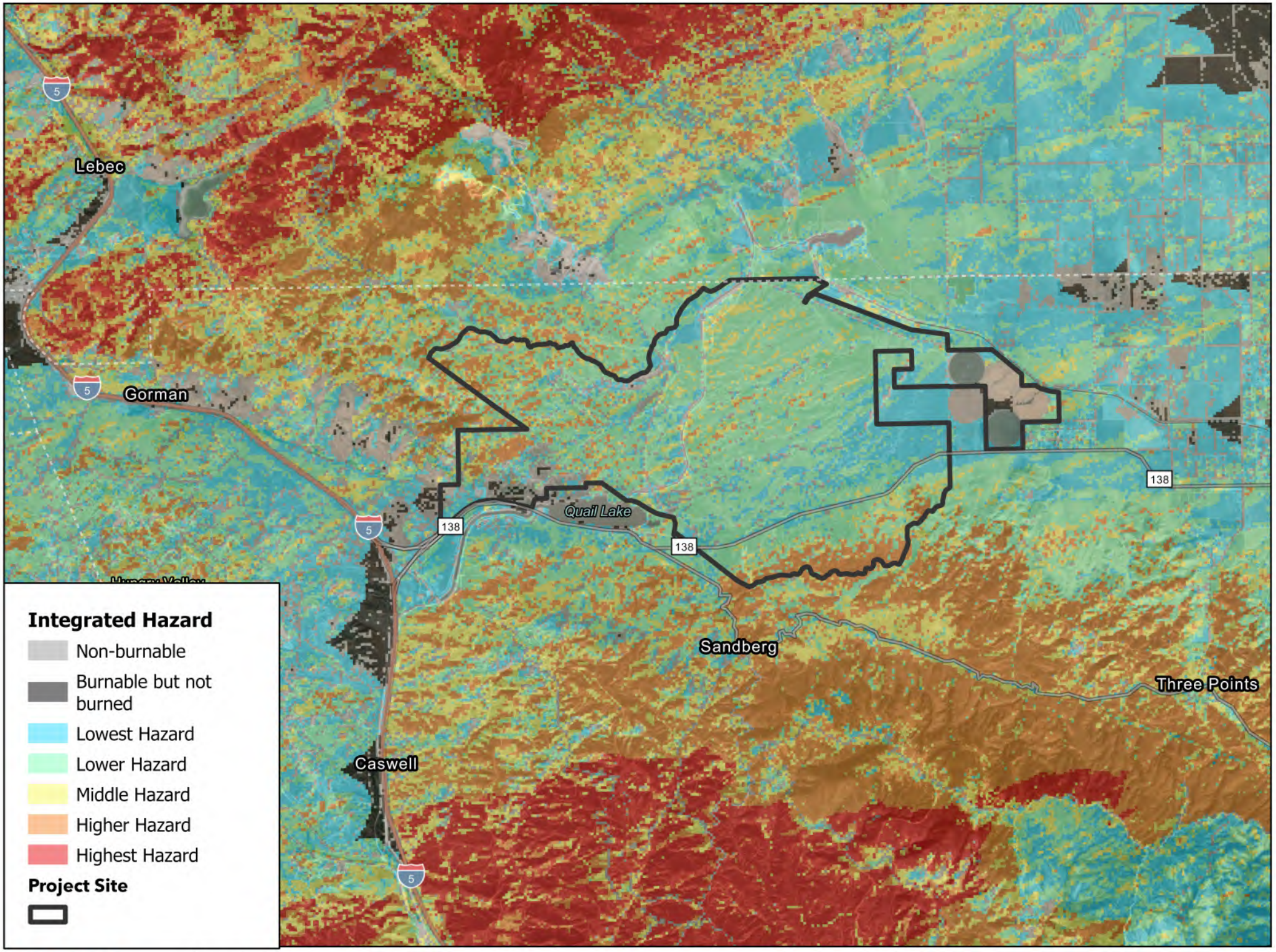

DUDEK

Source: Tejon Ranch, 2023

N

0 0.5 1 2 Miles

FIGURE 18

Integrated Hazard (50th Percentile Weather)

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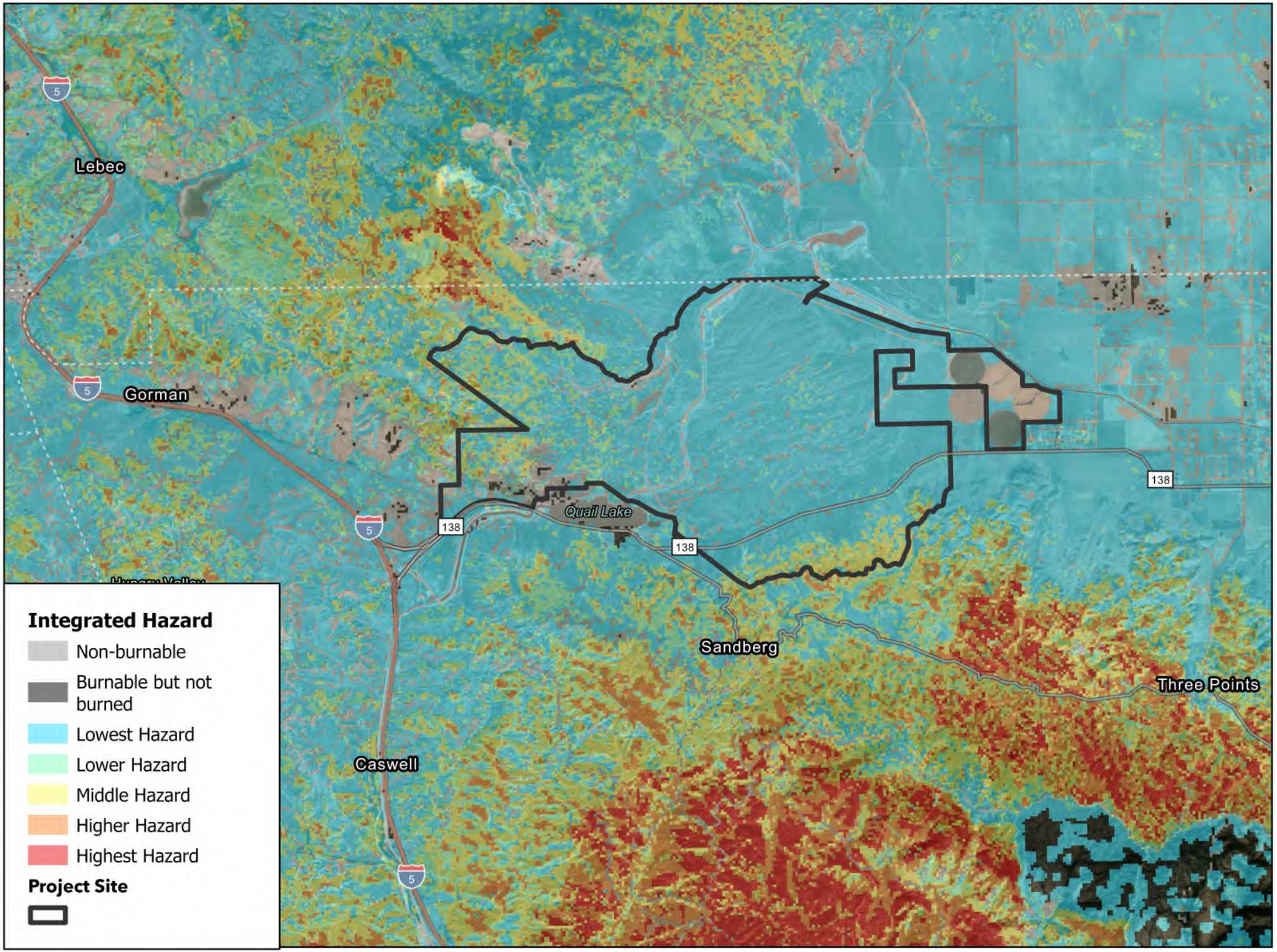

DUDEK

Source: Tejon Ranch, 2023

N

0 0.5 1 2 Miles

FIGURE 19

Integrated Hazard (Santa Ana Weather)

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4.6 Wildfire Progression Modeling

Wildfire Progression Modeling was performed to assess how wildfires may spread towards the Project site and how fires may influence Project evacuations. Fire progression modeling predicts how a fire will spread over time by simulating its behavior based on current conditions such as fuel types, weather, and topography. These simulations forecast the fire's intensity, spread, and perimeter under specific conditions. Using hypothetical ignition locations, the simulations depict fire arrival times based on predicted wildfire spread.

Through a review of fire history records and landscape burn probability model results, wind patterns, terrain, and vegetation, three scenarios were modeled to simulate likely fire events in the Project's vicinity. Ignition points were mapped out in a linear fashion to consider various possible starting points for wildfires in each scenario. Table 14 below provides information on the ignition points for each scenario along with the corresponding weather conditions.

Table 14. Fire Progression Modelling Scenarios.

Scenario	Ignition Location	Weather
1	Interstate-5 Eastern Roadside	50th Percentile Weather, winds 7 mph from the NW
2	Undeveloped land to the north	97th Percentile Santa Weather, winds 47 mph from the NE
3	Undeveloped land to the southeast	97th Percentile Santa Weather, winds 47 mph from the NE

Wildfires encroaching on the site from the south were not modeled as wind patterns are not conducive to wildfire spread towards the Project site from these directions. While Santa ana winds do blow from the east, wildfire spread towards the Project from fires burning directly from the east was also not modeled due to substantial agricultural areas and sparse fuel loads present in the Antelope Valley which prevent wildfire ignition and spread (See Fire History, Figure 6). In addition, the burn probability modeling results as presented in Figures 14 &15 indicate a low likelihood of fire occurrence and spread within the region to the east of the Project site.

Results

In all modeled scenarios, the direction and speed of wildfire spread are influenced by various factors. Weather conditions, particularly wind speed and direction, play a significant role, alongside low humidity, high temperatures, and dry conditions, which can accelerate fire propagation. Additionally, topography, including slope and aspect, impacts the fire's path and speed, with steep slopes often facilitating faster movement. Fuel availability and moisture content also contribute; dry, dense vegetation ignites more easily and burns more rapidly than moist or sparse vegetation. The ignition source affects the initial spread and, once ignited, fire behavior, including flame intensity and ember spotting, further dictates spread patterns. Fire suppression is not accounted for during this analysis.

Scenario 1 – Fire Approaching from the Northwest:

This scenario assumes a wildfire that ignites along Interstate-5 northwest of the project site and spreads is a southeast/eastern direction toward the Project site. Wildfire spread is slow due to lighter wind speeds during these

weather conditions. The wildfire is not predicted to reach the Project site within the 8-hour simulation period. While a shelter in place approach at the Project site is likely during this scenario, evacuation via SR-138 east is unlikely to be impacted by wildfire as displayed in Figure 20.

Scenario 2 – Fire Approaching from the Northeast

This scenario assumes a wildfire that ignites northeast of the Project site and spreads in a southwest direction through undeveloped areas to the northeast of the Project site. This scenario further assumes that wildfire is driven by strong Santa ana winds and moves at a rapid rate of spread. Assuming no fire suppression efforts, the wildfire is modeled to reach development areas in the northern extreme of the Project site within 245 minutes (approximately 4 hours). The fire skirts the northern edge of the Project site and continues to travel southwest. When considering evacuations during this scenario, SR-138 eastbound and westbound is not expected to be impacted by wildfire as displayed in Figure 21

While the fire is modeled to reach the Project site (assuming no fire suppression efforts), the predicted fire behavior near planned development areas is modeled to be generally of low to moderate intensity. Fireline intensity is lower in these areas to due light fuels and moderate terrain which are not conducive to extreme fire behavior (See Figure 22). Perimeter FMZs bordering development areas would act to further reduce Fireline intensity near development areas.

Scenario 3: Fire Approaching from the Southeast:

This scenario assumes a wildfire that ignites southeast of the Project site and spreads in a southwest direction through undeveloped areas to the south of the Project site. The wildfire is driven by strong Santa ana winds and moves at a rapid rate of spread. Assuming no fire suppression efforts, the wildfire is modeled to reach far southeastern development areas within 295 minutes (roughly 5 hours). The fire skirts the northern edge of the Project site and continues to travel southwest (Figure 23).

Similar to Scenario 2, fire intensity where the fire is modeled to reach the southern edge of the proposed development areas is considered low (Figure 24). Given the fire's southwest direction of spread which is not directly towards the Project site, fire behavior along the Project's southern edge would represent a flanking fire. Unlike head fires, which move in the direction of the wind and exhibit greater fire severity, flank fires move parallel to the wind direction and therefore burn at reduced severity. In addition to increased likelihood of successful suppression of a flank fire in the Project's southern edge, potential wildfire impacts in this area would be mitigated by perimeter parking areas, Fuel Modification Zones (FMZs), and fire-hardened commercial buildings.

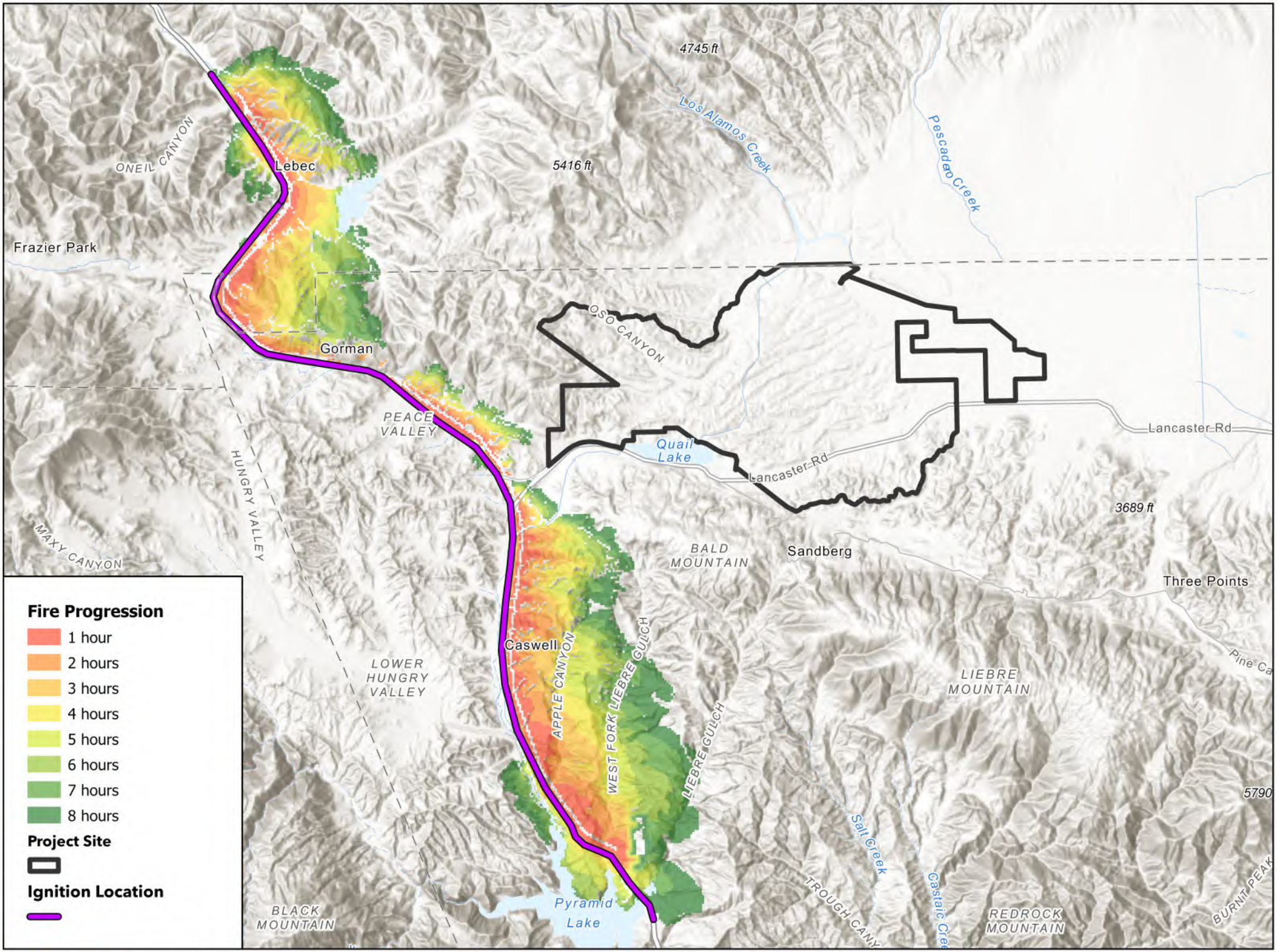

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FIGURE 20

Fire Progression - Northwest Ignition (50th Percentile Weather)

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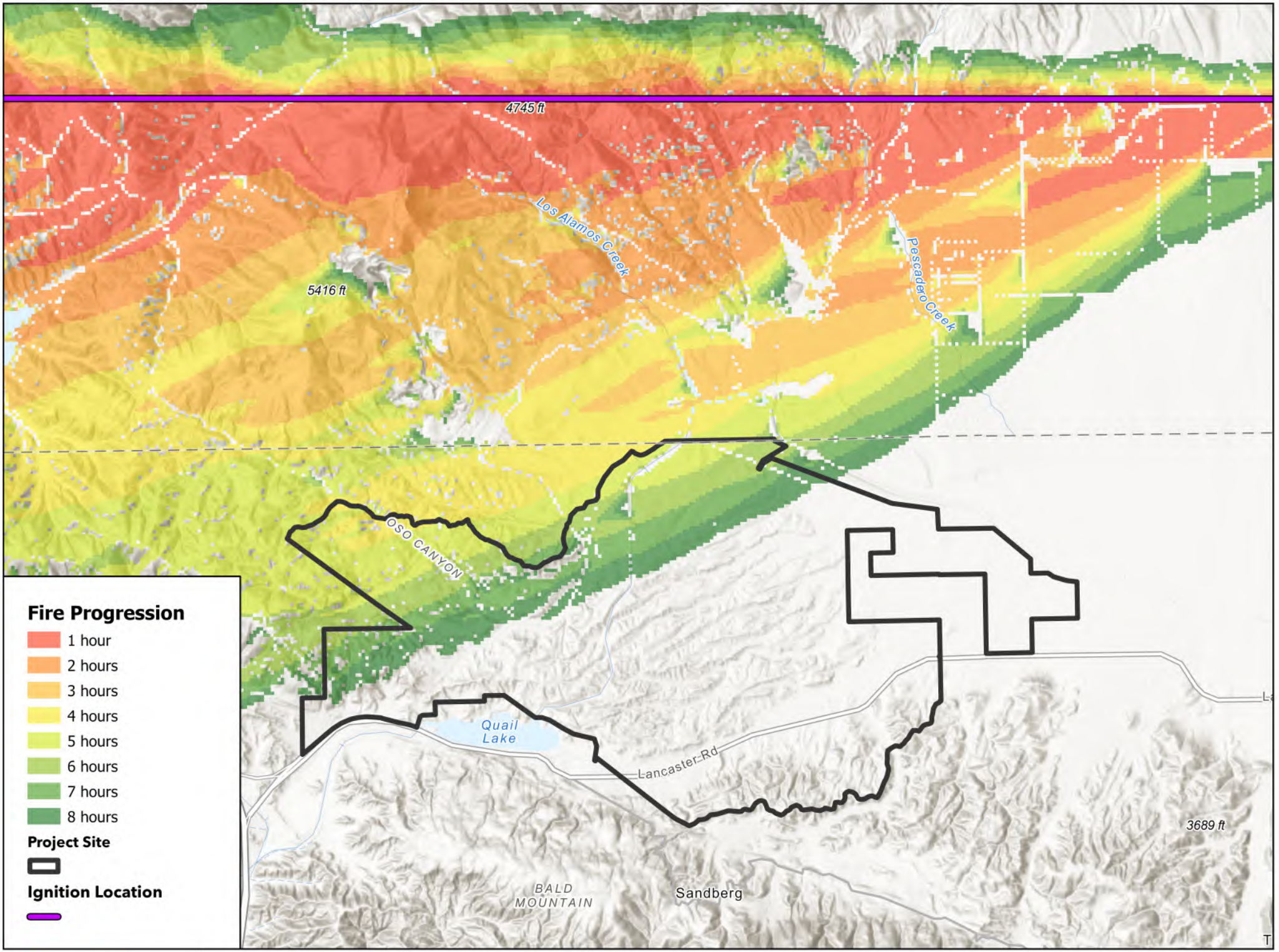

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FIGURE 21
Fire Progression - North Ignition (Santa Ana Weather)

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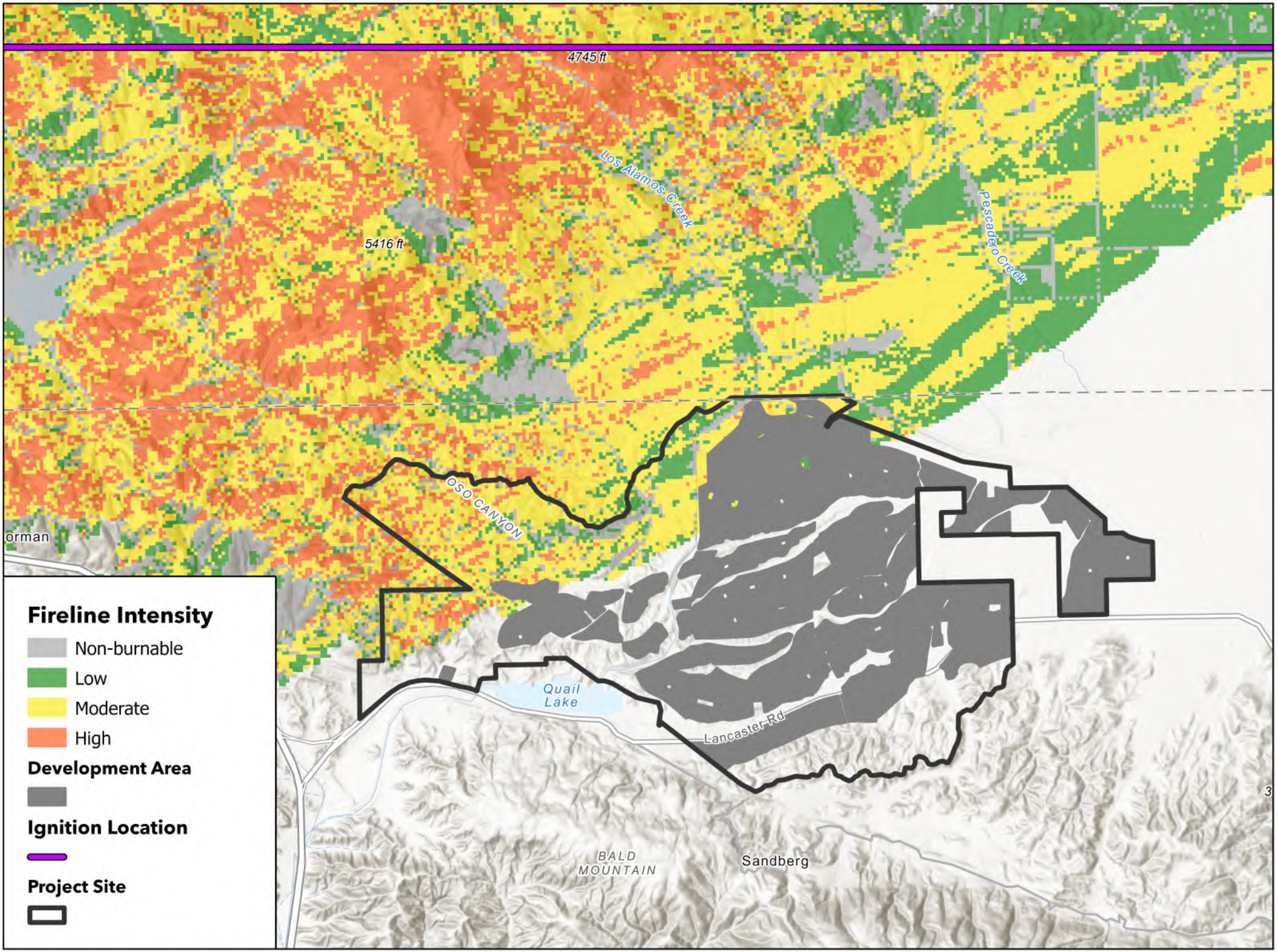

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FIGURE 22
Fireline Intensity - North Ignition (Santa Ana Weather)

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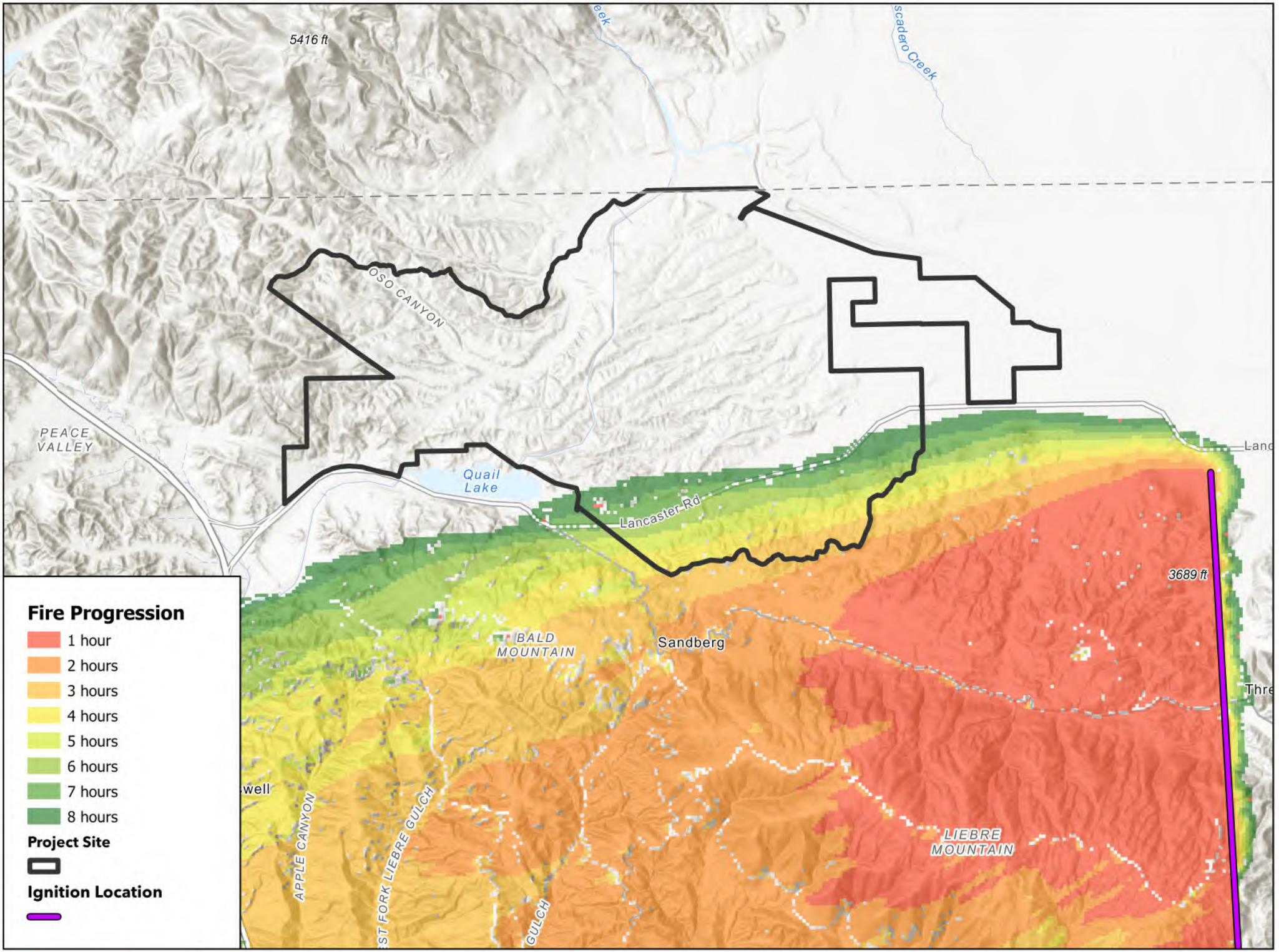

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FIGURE 23
Fire Progression - Southeast Ignition (Santa Ana Weather)

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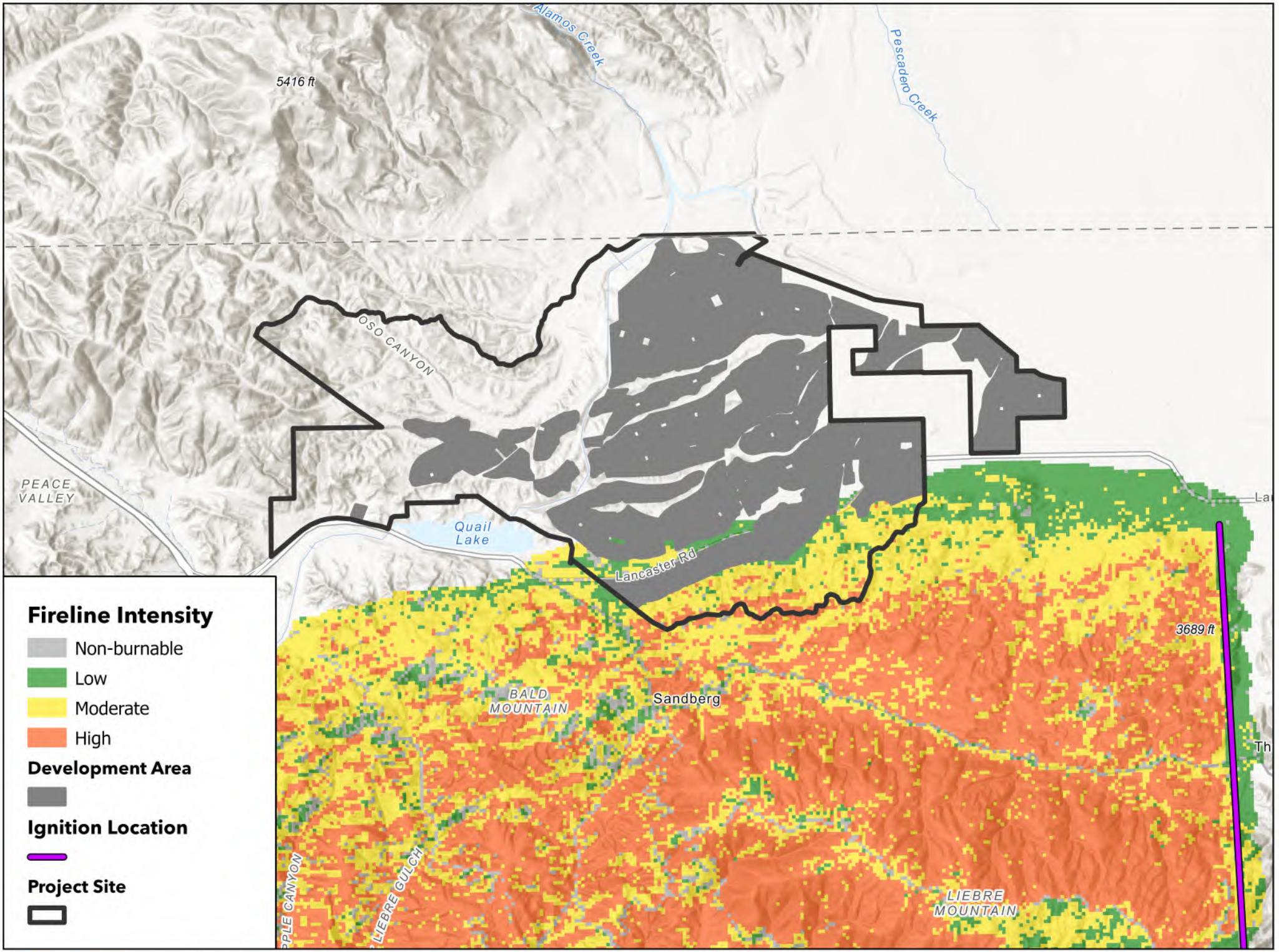

DUDEK

FIGURE 24

Fireline Intensity - Southeast Ignition (Santa Ana Weather)

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4.7 Firebrand Hazard Discussion

Airborne embers, commonly referred to as firebrands, are burning materials which become airborne and carried for some distance in an airstream (Babrauskas 2020). Firebrands can serve as ignition sources through a phenomenon defined as spotting. Spotting occurs when firebrands are lofted into the air and ignite small fires called spot fires ahead of the main fire front when landing on a receptive fuel bed. Wildfire spotting is multi-faceted and occurs at varying levels of severity. Main drivers of wildfire spotting include (NWCG, 2021):

- Firebrand Source, Size, and Amount
- Firebrand travel distance
- Probability of ignition where firebrands land

Firebrands pose significant risk to communities. In extreme cases, California chapparal has been found to cause ignitions up to four miles away from the main fire front. However, these risks can be mitigated through the implementation of fire-resistant construction methods, properly maintained landscaping, Fuel Modification Zones, and ignition resistant landscaping (NIST, 2022, Tacaliti, 2023). While the majority of home losses in the WUI are due to firebrands (NIST, 2021), a review of structural loss data highlights that modern master-planned communities are extremely unlikely to be destroyed by wildfires (CBIA, 2022). Of all wildfires in California since 2017, less than 1% of structures lost were structures built after 2010 (CBIA, 2022). Structural hardening requirements mandated through Chapter 7A of the California Building Code and implementation of adequate defensible space at the community and parcel scale are designed to effectively mitigate structural ignition risks from firebrands.

The following section discusses wildfire hazards caused by firebrands. Factors influencing firebrand production, transport, and ignition are highlighted, emphasizing the importance of fire-resistant construction methods and defensible space.

4.7.1 Firebrand Generation

In extreme cases, fire spread by firebrands can become the dominant form of fire spread and overwhelm fire suppression efforts. In order for firebrands to pose a hazard, they must have had sufficient initial size to sustain enough heat during transport to ignite a receptive fuel bed (Babrauskas 2020). Firebrand size is influenced by an array of factors including fuel type, fire intensity, and wind speed (Adusumilli and Blunck, 2023, Suzuki and Manzello, 2022). However, the complex nature of firebrand production and spread remains relatively unstudied. Limited research exists regarding processes of firebrand generation and its relation to the source materials which produce firebrands (Manzello and Suzuki, 2023). The vast majority of available of firebrand research is focused on transport of firebrands, with little research focused on the burnout process of firebrands following generation and transport (CBC, 2022).

Currently, no computed models exist for predicting firebrand generation. Instead, research into the topic relies on experimental studies. In general, greater fire intensity is found to generate more firebrands (Thomas et al. 2021). Fuel load, or the total amount of combustible fuels, has been found to related to the severity of firebrand production. The total number of burning firebrands has been observed to increase alongside an increase in the height of trees or shrubs (Adusumilli et al., 2021).

4.7.2 Firebrand Transport

Firebrand transport is the most commonly studied component of firebrands. This is likely because the processes behind firebrand transport are the simplest to model. In addition, understanding maximum firebrand transport provides important information for firefighters and emergency managers during wildfires. Models predicting maximum firebrand transport or spotting distance account for factors such as fuel type, tree height and crown width, wind speed, spotting location (ex. Ridgetop, valley) (Albini 1979, Chase 1981, Rothermel 1983, Albini 1983, Chase 1984, Morris 1987). Before firebrands can travel downwind in the atmospheric air current, they first must be lofted into the air. Ember lofting leads to firebrands and is influenced by fire intensity, fuel loading, and terrain features (NWCG, 2021). Once airborne, firebrand transport distance is mainly driven by wind speed and firebrand size (Manzello and Suzuki, 2023).

4.7.3 Firebrand Ignition

Several properties influence a firebrand's ignition potential upon landing. Firebrand characteristics such as mass and size, thermal degradation or burnout, and environmental conditions (i.e. weather) greatly influence the potential for new ignition caused by firebrands (Bearinger et al., 2020). For example, firebrands may burnout completely in the atmosphere, or, after landing, undergo glowing combustion and die out, smolder, or transition into flaming and grow into a larger fire (Manzello et al, 2021). While the relationship between firebrand characteristics and ignition potential is understudied, several factors are known to mitigate structure losses from firebrands in the WUI. It is known from general understanding of thermodynamics that the condition of the receptive fuels, both urban and natural, is a significant predictor of new ignitions from firebrands.

Ensuring code compliant defensible space surrounding structures has been found to mitigate structure losses from firebrands in the WUI. Defensible space is often created in the form of Fuel Modification Zones, which create buffers between natural vegetation and structures. In many jurisdictions, Fuel Modification Zones within 30 feet of structures are required to be irrigated, further limiting the potential for firebrand ignitions. New research has shown that vegetation, decorations, and additional flammable material attached to the house are of the most important factors contributing to structure ignition from firebrands (IBHS, 2023). Research has shown that firebrands more easily collect around the edges of structures and can significantly contribute to structure ignitions if fuels are readily ignitable (IBHS, 2023). In response to these findings, CAL FIRE has created a new defensible space zone, Zone 0, which requires the first 5 feet from structures to be void of combustible materials.

The condition of building materials themselves greatly determines structure losses from firebrands (NIST, 2022). Studies suggest that building construction is as if not more important than defensible space in determining structure losses in the WUI (Syphard et al. 2017). As mentioned previously, firebrands are responsible for the majority of all structure losses in the WUI. Chapter 7A of the California Building Code has been developed through partnership with experimental research into structure losses. Incorporating the building construction and design requirements outlined in Chapter 7A (ex. Roof type and assembling, exterior decking, siding materials, etc.) have been proven to mitigate structure losses from firebrand ignitions (NIST, 2022).

4.8 Firebrand Production From Urban Fuels

The following sections discuss the potential for firebrand production from structure fires in modern master-planned communities, noting the effectiveness of building design features and fire safety measures in reducing the risk

producing firebrands from onsite wildfires. Historical data on wildfires caused by structure fires are also presented, identifying common characteristics associated with wildfire incidents caused by structure fires.

4.8.1 Historical Wildfires Caused by Structure Fires

CAL FIRE maintains fire history data throughout the state and includes ignition causes when available (CAL FRAP, 2023). According to the historical fire record, wildfires caused by structure fires account for only <1% percent of all wildfires where the cause is known. Wildfires by cause in California is summarized below in Table 15.

Table 15. Wildfire Occurrences in California by Cause

Fire Cause	Frequency	Percent of All Causes
1 - Lightning	3483	22%
9 - Miscellaneous	3458	22%
2 - Equipment Use	1325	8%
7 - Arson	945	6%
5 - Debris	757	5%
10 - Vehicle	534	3%
11 - Powerline	444	3%
4 - Campfire	391	3%
3 - Smoking	337	2%
8 - Playing with fire	192	1%
18 - Escaped Prescribed Burn	103	1%
6 - Railroad	78	<1%
15 - Structure	27	<1%
19 - Illegal Alien Campfire	17	<1%
16 - Aircraft	15	<1%
13 - Non-Firefighter Training	11	<1%
12 - Firefighter Training	5	<1%

Note: Does not include wildfires with Unknown cause
Source: CAL FIRE FRAP, 2022

Through a detailed assessment of these fires, clear patterns and characteristics related to community design and the surrounding landscape are identified. These include:

- Wildland Urban Intermix stye development with substantial vegetation surrounding structures.
- Limited setback from wildland vegetation with structures located in close proximity to unmaintained natural vegetation.
- Adjacent wildland vegetation often resembles heavy fuels. Vegetation surrounding structures is rarely herbaceous.
- Surrounding terrain is often steep with structures located on steep slopes.
- Structures are often positioned atop slopes.
- Development can be described as rural, with structures located far from existing communities or fire stations.
- Structure age is considered old.

Attachment X provides a graphical depiction of historical wildfires caused by structure fires. These occurrences exemplify many or all of the characteristics identified above. It is important to note that the Centennial Project is set apart from these characteristics and features a clustered master plan design with code compliant design features that minimize the potential for onsite structure fires to result in offsite ignitions. Centennial's development footprint does not include unmaintained vegetation near structures. Structures will be constructed in accordance with the latest building code requirements for fire safety and each structure will be equipped with automatic interior fire sprinklers. Development edges feature one, continuous interface between development and offsite grassland fuels buffered by annually maintained Fuel Modification Zones. Planned development pads are not located on steep terrain or on ridgelines. Further, Centennial will include three onsite fire stations with an optional fourth as determined necessary by LACoFD to ensure rapid response to potential onsite structure fires. **As described, Centennial does not include factors that increase the potential for offsite ignitions caused by onsite structure fires.**

4.8.2 Potential for Firebrand Production from Structure Fires in Modern Master Planned Communities

It is possible for structure fires to produce firebrands when the structures are assembled with combustible materials (Manzello and Suzuki, 2023). However, firebrand production from structure fires is highly dependent on fire safety features, building construction, and structure fire intensity.

The installation of Interior Automatic Fire Sprinklers is understood as the single most effective tool for extinguishing structure fires in their early stages (NFPA, 2021). Structural fire suppression aims to extinguish fires early or contain the fire to its original point of origin without spreading to additional portions of the structure. In buildings equipped with automatic fire sprinklers, 95% of fires were confined to their room of origin, a 24% increase compared to buildings without automatic fire sprinklers. In addition, structure losses have been reduced by up to 68% when equipped with automatic fire sprinklers (NFPA, 2021). It can be concluded that firebrand production from structure fires is likely to occur when the structure and its exterior become engulfed in flames. **When fires are confined to the interior of the structure, it is not likely that firebrands will escape its interior. Therefore, automatic fire sprinkler systems are an effective way to prevent firebrand production from structure fires.**

As with vegetative fuels, characteristics of structure fuels influence ember production, transport, and offsite ignitions. Heydayati et al. (2020) found that a modern wall assembly utilizing fiber cement siding produced 28.6 percent less firebrands under high winds than a wall assembly utilizing cedar siding. Suzuki and Manzello (2016) found that firebrands produced by cedar siding had large projected areas and low mass that caused them to be easily lofted long distances under applied wind as compared to assemblies with only studs and sheathing. Roofing characteristics have been observed to substantially influence firebrand production from structure fires, specifically, avoiding wooden roofing assemblies. Wood-shake roof shingles are notorious for producing large firebrands that can travel extensive distances. The maximum spotting distance recorded from untreated wood shake roofs was 8 miles (Wilson 1962). This figure stemmed from a large-scale conflagration known as the Bel Air Fire that created significant convective air currents capable of lofting firebrands far in advance of the flaming front. **It can be concluded that constructing buildings with fire-resistant building materials reduces the potential for ember production from structure fires.**

As described above, the potential for firebrand production from structure fires is influenced by fire safety building design features, building construction, and structure fire intensity. **Modern master planned communities like the Centennial Project do not include design features that are likely to contribute to high intensity structure fires that may ignite offsite wildfires.**

First, all Centennial structures will be equipped with interior automatic fire sprinklers which have been proved to effectively keep fires form spreading beyond their point of origin (NFPA 2021). Therefore, if they do occur, structure fires are unlikely to reach high intensities that may result in active combustion of the entire structure and related firebrand production. In addition to interior fire sprinklers, fire response time plays a large role in preventing extreme losses during structure fires. Buffington and Ezekoye (2019) found that fire response times were strongly correlated with extreme damage to at least one story of a structure. Centennial's planned onsite fire stations are designed to ensure quick fire response in the event of a structure fire occurring onsite. Quick fire fighter response at Centennial is likely to reduce the severity of structure fires leading to a decrease in firebrand production.

As described, greater fire intensity is found to increase firebrand production. In an urban environment, fire intensity and fire suppression difficulty increase dramatically when multiple structures are burning simultaneously. This phenomenon is referred to as an urban conflagration when offsite wildfires encroach upon communities and destroy multiple structures in one event. Code compliant master planned communities such as Centennial are designed to prevent the occurrence of urban conflagration as proven in multiple studies (FEMA, 2023). Code compliancy across structures, fire department access, and community design create a layered approach towards reducing the potential for conflagrations. Preventing conflagrations, started by either offsite or onsite fires, and confining structure fires to their structure of origin is influential towards decreasing the amount of firebrands produced from structure fires.

While design features of master planned communities are largely designed to prevent losses to structures from wildfires originating offsite, the same features can be concluded to prevent losses to structures caused by structure fires originating onsite. In the scenario of a structure fire, ignitions to neighboring structures are effectively mitigated through code-compliant ignition-resistant building construction which significantly reduces structural ignition through features such as dual pane windows, non-combustible siding, and Class A non-combustible roofing, among others. In addition, ignition resistant landscaping achieved through maintained Fuel Modification Zones including the implementation of Zone 0 Ember Resistant Zone within the first 5 feet of structures further reduces the potential for spot fires caused by structure fires to ignite adjacent structures.

4.9 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 the Project Site. However, because the adjacent lands are part of a historic grazing operation, the fuels are lighter, spacing is less dense, and ongoing grazing maintains reduced fire behavior. Wildfire in Mediterranean-type ecosystems 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 forests 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. 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 grazed remnants of non-native grasses and sage scrub shrubs. With the conversion of the landscape to ignition-resistant development, wildfires may still encroach upon and drop embers on the Project Site, but would not burn readily through the Site due to the lack of available fuels. Wildfires starting on the Project Site would not be anticipated to increase from existing levels due to the ignition-resistant landscapes, and perimeter fuel modification zones which are designed to protect the Project while also minimizing the likelihood that an on-site fire escapes into wildland areas.

Therefore, it will be critical that the latest fire protection requirements, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition-resistant construction and for creating defensible space are implemented and enforced. The Project, once developed, would not facilitate wildfire spread and would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the Project Site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the Site's landscapes. In addition, the proposed 100-200-foot FMZ widths and the fuel breaks provided by the grazed lands immediately adjacent to the Project provide a significant buffer and reduce wildfire intensity and flame lengths to levels that present a much lower threat to a hardened community like the Centennial Project.

4.9.1 Assessment of the Characteristics of Communities Destroyed by Wildfire in California

Seven of California's most destructive wildfires have occurred since 2015 resulting in extensive property damage and loss of life. While wildland fires are highly dynamic and dependent on a variety of factors such as weather conditions, fuels, and terrain among others, most communities that experience significant losses include key characteristics that make them highly susceptible to severe impacts.

As a result of the recent wildfires in northern California, there have been concerns expressed regarding the development of new communities in Los Angeles County, specifically those proposed within Urban Wildland Interface Areas. Some of the public concerns that have been raised relate to recent wildfires in other parts of the State, specifically the Camp Fire in Butte County, the Tubbs Fire in Sonoma County, and the Woolsey Fire in Los Angeles County.

This section assesses community characteristics of these highly destructive fires which when combined resulted in 26,083 structures destroyed and 136 deaths. The characteristics of the communities impacted by these fires are compared and contrasted with the proposed Centennial development to highlight their substantial differences.

4.9.1.1 Camp Fire

The Camp Fire occurred in Butte County on November 8, 2018, and had devastating impacts. It stands as the deadliest and most destructive wildfire in California's history with 85 deaths. The fire destroyed more than 18,000 buildings with the towns of Paradise and Concow particularly impacted, with nearly 95% of their structures destroyed. Other areas, such as Magalia and Butte Creek Canyon, also suffered significant damage. The fire ignited due to a faulty electric transmission line and quickly traveled downslope driven by a strong windstorm.

The extensive damage and loss of life during the Camp fire was influenced by extreme fire behavior, fuel conditions, and community features which left structures highly susceptible to losses from wildfire. Strong downslope winds paired with heavy forest fuels and steep terrain resulted in extreme fire behavior and long-range spotting. To make conditions even worse, the region had not experienced significant precipitation within the past 200 days. Vegetation surrounding impacted communities included 100-year-old, highly dense forested areas with limited separation between tree canopies and surface and ladder fuels. This resulted in an active crown fire which occurs when fire moves uncontrollably through the forest canopy. Active crown fire led to substantial firebrand production which caused the majority of structure losses. Fuel ignition potential, or the likelihood of firebrands to start new spot fires, was considered extreme. Many first responders have stated that ember ignitions were 100%, meaning each landing firebrand resulted in a new ignition. Fuel receptivity within communities was extreme due to the density of vegetative

fuels near structures and the ignition potential of the structures themselves. The communities of Paradise, Concow, and Magalia resemble Wildland Urban Intermix communities that have been developed over time within the local wildland vegetation. Because of this, fire was able to spread rapidly through the heavy fuels between and around structures, resulting in uncontrollable structure-to-structure spread.

Mass destruction during the Camp Fire was largely related to homes igniting via an ember storm. Many homes burned from the inside out following embers entering the structure via vents, windows, under doors, etc. The community of Paradise included many old homes which were not built to the current ignition resistant standards. In a review of the structures lost, structural hardening factors such as the presence of fire-resistant siding and roofing, double paned windows, and the absence of entry points such as uncovered vents were very important in determining structural survival. Newer structures built after 2007 experienced significant reductions in losses largely due to construction materials in compliance with Chapter 7A of the California Building Code.

4.9.1.2 Tubbs Fire

The Tubbs Fire occurred in Northern California during October 2017 and burned through parts of Napa, Sonoma, and Lake counties, inflicting the greatest damage in the city of Santa Rosa. At the time, it held the distinction of being the most destructive wildfire in California's history. The Tubbs Fire consumed approximately 36,810 acres and claimed the lives of at least 22 people. It started in the rural northern part of Calistoga, Napa County and was caused by a private electrical system adjacent to a residential structure. The destruction was immense, with more than 5,643 structures lost, half of which were homes in the City of Santa Rosa. The economic toll on Santa Rosa was estimated at $8.7 billion, with five percent of the city's housing stock destroyed. The Community of Coffey Park was severely impacted by the fire, with almost every structure of the residential community destroyed.

Fire severity during the Tubb's Fire was extreme and exacerbated by strong winds referred to regionally as the Diablo winds. Wind speeds were observed as high as 70 miles per hour leading to crowning in forested area and significant firebrand production, causing an ember storm in urbanized areas. Fire whirls were commonly observed which can occur when intense heat and turbulent winds interact, creating rotating columns of fire. From its point of ignition, the fire quickly ran 12 miles in just 4 hours.

In the community of Coffey Park specifically, structure loss was largely attributed to structure-to-structure spread. Initial structure fires were caused by firebrands which blew across Highway 101 and ignited structures. The fire quickly turned into a conflagration with multiple structures burning simultaneously caused by rapid structure-to-structure spread. Rapid spread from structure to structure was likely caused by poor ignition resistance of the community's homes which often included features such as combustible siding, large exterior vents, and wooden fences adjacent to homes. These features would not be present had the homes not been constructed prior to the requirements mandated by Chapter 7A of the California Building Code. In addition, defensible space in the Coffey Park community was poorly enforced, with many homes surrounded by poorly maintained ornamental vegetation. This condition increased the potential for new spot fires and likely drove the spread of fire within the community.

4.9.1.3 Tunnel/Oakland Hills Fire

The Tunnel Fire, also referred to as the Oakland Hills Fire, occurred in October of 1991. The fire started in the Berkely Hills and was extinguished by firefighters who left the area at nightfall. However, embers that remained after ~~during~~ the mop up effort were kicked up by Diablo winds and the fire reignited and spread into adjacent brush and grasses. Fueled by strong winds and dry conditions, the fire burned rapidly through residential areas destroying

2,900 structures and killing 25 people. In addition to the extreme winds, the fire's intensity and destruction is attributed to a combination of factors including hazardous fuels, steep terrain, and limited water supply.

Fuel loading within communities is believed to be a major reason for the extreme fire behavior observed during the Tunnel Fire. Blue gum eucalyptus trees were prevalent within communities and significantly contributed the fire's severity. Eucalyptus trees are considered hazardous from a fire perspective. Fuel buildup in blue gum eucalyptus stands is very rapid, exceeding that of other tree species, and its litter (dead leaves and debris) is especially flammable (Agee et al. 1973; NPS 2006; Wolf and DiTomaso 2016). The bark of Blue gum eucalyptus is also highly flammable and carries fire readily into the tree canopy. Burning eucalyptus leaves are often lofted high into the air and travel far downwind, increasing the potential for spot fires and structure losses. Eucalyptus trees in the Tunnel Fire are believed to have contributed as much as three-quarters of the fire's energy.

Terrain in the Oakland Hills is steep and variable, with many homes accessed by windy and narrow roadways. During the fire, many emergency vehicles were prevented from accessing threatened houses due to congestion and private vehicles blocking the narrow and steep roadways. Water supply for fire suppression also was an issue, as many water pumps existed above ground and were damaged during the fire. This prevented water flow in many areas of the community. In addition, hydrants lacked universal hookups, meaning emergency responders from different departments were unable to pull water from hydrants.

Building construction and inadequate defensible space were also to blame for the extensive structure losses during the Tunnel Fire. Many homes were constructed with wooden shake roofs which are highly receptive to ignition from airborne embers. Rooftop ignitions were further fueled by poor maintenance and the accumulation of leaf and pine-needle litter on shingles and within gutters. Paired with dense urban vegetation and combustible construction materials, fire spread rapidly through the Oakland Hills.

4.9.1.4 Common Features Associated with Communities Destroyed in Historic Wildland Fires in California and Comparison to the Centennial Project

Table 16 provides a list of community and characteristics that led to extensive damage and loss of life during the Camp, Tubb's, and Tunnel/Oakland Hills Fires. These characteristics are juxtaposed with those of the Centennial Project in Table 17 to highlight the stark differences between the factors leading to these disasters and those present at the Centennial Project. In many cases, communities impacted by these destructive fires were exposed to heavy fuel loading in offsite wildlands and within the communities themselves. Defensible space is generally limited, with many structures in close proximity to flammable fuels. In some cases, steep terrain exacerbated fire intensity while also presenting challenges for emergency access and evacuation. Across the board, structure losses were largely caused by structure-structure spread due to buildings constructed to poor ignition resistance standards.

Table 16. Characteristics of California's Three Most Destructive Wildfires

Fuels in Adjacent Wildlands	Urban Fuels	Terrain	Building Construction	Other Factors
▪ Heavily forested with high fuel loading ▪ Limited crown separation creating conditions conducive to crown fire. ▪ Stressed and fire receptive vegetation due to prolonged drought. ▪ High proportion of non-native species, many of which are considered hazardous species	▪ Wildland vegetation intermixed within communities at a high degree. ▪ Contiguous forests present within Community areas. ▪ Poor separation between vegetation and structures ▪ Abundant vegetation existing between parcels. ▪ Heavy Pine needle accumulation on rooftops ▪ Poor defensible space enforcement	▪ Development bounded by steep canyons that funnel winds towards communities. ▪ Communities built on steep slopes	▪ Buildings constructed prior to the construction requirements mandated in Chapter 7A of the California Building Code ▪ Combustible building materials prevalent ▪ Building construction is susceptible to ignition from airborne embers	▪ Steep and narrow roads limit emergency response and evacuation ▪ Roads with numerous burnover potentials hinder evacuations. ▪ Limited water supply ▪ Community members not well versed in evacuation procedures. ▪ Communities are not generally within HOAs, resulting in high variability in the creation and maintenance of defensible space.

Table 17. Characteristics of the Centennial Project Site.

Fuels in Adjacent Wildlands	Urban Fuels	Terrain	Building Construction	Other Factors
▪ Offsite fuels are predominantly grass fuels. ▪ Fuel loads are considered light and are maintained through long withstanding grazing management.	▪ Urban vegetation will consist of irrigated landscaping that will undergo routine maintenance. ▪ Hazardous plant species will be prohibited. All ornamental plants will be approved by LACoFD.	▪ Onsite terrain is considered flat to rolling. ▪ Development is not located on ridgetops or near terrain features likely to exacerbate wind speeds.	▪ All buildings will be constructed in accordance with the ignition resistant standards mandated in Chapter 7A of the California Building Code	▪ Centennial will include onsite fire stations and rapid emergency response. ▪ In addition to code complaint water supply, Centennial also includes multiple dip sites for aerial fire suppression resources.

Table 17. Characteristics of the Centennial Project Site.

Fuels in Adjacent Wildlands	Urban Fuels	Terrain	Building Construction	Other Factors
▪ The Project site is located far away from higher hazard chapparal fuels	▪ All structures will be provided with at least 150 feet of fuel modification. ▪ Perimeter Fuel Modification Zones will be inspected and maintained annually, with irrigate landscaping required within the first 100 feet from structures. ▪ Zone 0- *Ember Resistant Zone* will be required for all structures	▪ Development is setback considerably from steep slopes present in offsite wildlands.	▪ Structures will be highly resistant to ignitions from airborne embers and not conducive to structure-structure spread	▪ The Centennial HOA will fund and enforce wildfire mitigation practices including the perimeter Fuel Modification Zones ▪ Centennial's Wildfire Evacuation Plan and Education Program will educate residents how to prepare for wildfire and evacuate safely ▪ Evacuation at Centennial would be an unlikely occurrence, but if necessitated, there are major roadways and low potential for burnover exposures compared to areas experiencing evacuation difficulties

5 Additional Factors Reducing Potential Wildfire Risks Associated with the Project's Introduction of New Development

Research indicates that while humans can drive wildfire ignition risk in the WUI, comprehensive actions can be taken to mitigate such risks to less than significant levels (Elia et al., 2019). When fire protection is implemented at the parcel level and leverages ignition resistant building materials, infrastructure improvements, increased response capacity, and incorporates landscape design FMZs, the wildfire risk can be reduced not only within the proposed development but in the surrounding environment as well (Newman et al., 2013). The following section summarizes factors for determining wildfire risk from new development and potential opportunities to mitigate such risks.

Research has indicated that increased human activity in WUI areas can result in an increased likelihood of ignition (Keeley & Syphard, 2018; Syphard, Clayton, et al., 2007; Syphard & Keeley, 2015). As such, residential development within fire-prone areas is commonly characterized as the principal driver of wildfire risk (Keeley & Syphard, 2018; Syphard, Clayton, et al., 2007; Syphard & Keeley, 2015). However, as humans can drive wildfire risk they can in turn reduce it by household level or parcel level decisions, such as home siting, building materials, and landscape design that can reduce risk in the WUI environment (Newman et al., 2013). These decisions can take the form of reducing fire ignition risks by converting fire-prone areas to ignition-resistant, maintaining ground covers, constructing ignition-resistant homes and hardscapes, and increasing the development setback from the wildland-urban interface (Newman et al., 2013). This change occurs through the strategic implementation of fire protection measures that result in planned alterations to fuel, increased ignition resistant construction, enhanced fire protection features, higher wildfire risk awareness, and maintenance of fire protection features. When developments are planned accordingly, the fuel availability and fuel continuity decrease, while the probability of fire suppression increases (Fox et al., 2018). The dual benefit of building a fire-hardened development is that the same features that protect the development from a wildfire also play a significant role in protecting wildlands and surrounding areas from Project-related fires through ignition reduction.

5.1 Reducing Wildfire Risks Associated with Introducing Ignition Sources and increasing Human Activities in the WUI

As previously mentioned, in southern California humans play a major role in ignitions by influencing the timing and spatial pattern of fires (Keeley & Syphard, 2018). As a result, humans account for more than 95% of ignitions in the region (Keeley & Syphard, 2018). The relationship between human activities and natural dynamics has contributed to altering fire regimes (Syphard et al., 2007). One alteration is that urban development increases the risk of repeated fires on the landscape (Syphard, Clarke, et al., 2007). As humans move into landscapes with patterns of ignitions change as well (Syphard, Clarke, et al., 2007). However, the number of ignitions and the area burned varies by an ignition source (Syphard & Keeley, 2015). Overall, human-caused ignitions peaked in 1980

and have since dropped likely due to increased efficiencies in fire prevention, changes in infrastructure, a decline in smoking, neighborhood watch program, penalties for arsonists, and new developmental rules (Keeley & Syphard, 2018). However, while the number of ignitions has decreased the area burned has not changed, indicating while fires are fewer they are larger in magnitude (Keeley & Syphard, 2018). The relationship between ignitions and human development is complex. While human-caused ignitions increase as populations and development expand into the WUI this increase reaches a peak and then declines at the point at which development or impervious surfaces (hardscape) outweigh the wildland fuels (Keeley & Syphard, 2018).

By analyzing all wildfire ignitions included in the CAL FIRE Fire and Resource Assessment Program (FRAP) database dating back over 100 years it was found that in the case of one Southern California county (San Diego County), equipment-caused fires were by far the most numerous (Syphard & Keeley, 2015). These ignitions accounted for most of the area burned, followed closely by the area burned by power line fires (Syphard & Keeley, 2015). This pattern is consistent beyond San Diego County and is applicable in Los Angeles County. In Los Angeles County a common source of wildfire ignition stems from human activities such as smoking, playing with fire, and powerlines (Keeley & Syphard, 2018). Ignitions are classified as equipment caused resulted from exhaust or sparks from power saws or other equipment with gas or electric motors, such as lawnmowers, trimmers, or tractors. In San Diego County and Los Angeles County, ignitions were more likely to occur close to roads and structures, and intermediate structure densities (Syphard & Keeley, 2015). Powerline-based ignitions that have caused or contributed to recent fires, such as the Camp Fire in 2018, have demonstrated how the presence of powerlines (particularly the lower height distribution lines) can result in significant wildfire ignitions. Part of the challenge is that as humans push into WUI areas powerlines are often located in areas where access is difficult creating challenges for firefighting tactics (Syphard & Keeley, 2015). Research has indicated that important factors in structure loss are the coincidence of human-caused ignitions with severe weather and the location and pattern of housing development (Schwartz & Syphard, 2021). However, it is important to note that often these themes are researched in isolation with small proportions studying two more themes limiting our understanding of the interactions and dependencies (Price et al., 2021).

Given the number and intensity of wildfires in recent years, there has been an increasing focus on wildfires and reducing the size of wildfires (Syphard et al., 2014). However, addressing wildfires in the WUI with fuels reduction and prescribed burning is often faced with challenges related to private property constrictions (Schwartz & Syphard, 2021). Studies have shown that land-use decision-making, defensible space, homeowner preparation, and ignition prevention can complement traditional management in reducing wildfires and addressing fuels management (Schwartz & Syphard, 2021; Syphard et al., 2017). Further, given the importance of the WUI and often the lack of capacity for large-scale fuels reduction such as grazing creating safer spaces within the WUI is critical (Schwartz & Syphard, 2021). Because most fires are caused by humans ignition reduction is a powerful management strategy (Syphard & Keeley, 2015). Given that we are moving into a more hazardous wildfire future land-use planning and ignition prevention represent the most effective long term solutions while traditional management and fuel breaks still play a role in addressing the coincidence of human-caused ignitions and severe fire weather (Schwartz & Syphard, 2021; Syphard et al., 2017). To minimize the negative effects, the Project has designed multi-scaled fire protection features to address the existing fire hazard, reduce ignition probability, and lower the fire risk for the Project and the surrounding area. As discussed above, one of the most effective solutions to wildfire problems in the WUI is to address the wildfire hazard through land-use planning and ignition prevention. The Project would result in the conversion of readily ignitable fuels, such as grass and scrub fuels, to irrigated/thinned landscaping and development. Notably, the Project minimizes ignition risk by incorporating 100-200 foot FMZs around the entire project perimeter, which will provide defensible space and reduce fire intensity and flame lengths in the event of ignition occurring. These FMZs, which are based on LA County Fire requirements and confirmed with site-specific

modeling, will be implemented by knowledgeable professionals, inspected by third-party inspectors, and maintained in perpetuity by the Project HOA. Additionally, other fuel modification/landscaping requirements like the Project's roadway fuel modification zones, stormwater basin vegetation management, and the prohibition of certain highly flammable plants will further reduce the risk of fire ignition and spread despite the introduction of additional humans in the area. Critically, the structures in the Project will also be built in accordance with the most state-of-the-art, ignition-resistant construction standards and building codes required by the County and the State, including Chapter 7A of the Los Angeles County Building Code (Title 26, Chapter 7A), which requires that the buildings are resistant to ignitions from direct flames, heat, and embers. Other structural requirements include fire-resistant roofing, vent covering and opening limitations, noncombustible or ignition-resistant exterior walls, ignition-resistant eaves, and porch ceilings, insulated windows and exterior doors, and other measures that have proven to substantially reduce the risk of building ignition and fire spread. Finally, a key component of reducing the chances of fire ignition and spread involves educating residents to have a high fire risk awareness. In this respect, the Project includes as mitigation a robust education awareness program that will provide residents with wildfire safety information and create greater risk awareness for occupants and their employees. Through this program, residents will learn about necessary landscape maintenance, activities in a wildfire risk area, preventing wildfires, structural-based fire protection features, and wildfire evacuation information.

As evidenced by these measures and the other measures described in Section 3 Fire Safety Requirements – Regulations and Design Features, the Project has outlined steps in which it will implement ignition reduction from common anthropogenic ignition sources, leverage its capacity for implementing fuels reduction including defensible space, and consider both onsite and offsite wildfire risk. In addition, Centennial has agreed to make certain additional commitments to fund wildfire prevention, protection, and response activities within the Project, and to fund grants to improve wildfire prevention, protection, and response activities in nearby communities.

Still, there are other project-specific anthropogenic fire risks that are worthy of being highlighted for the purposes of this WSP. These include powerlines, vehicles, and machinery. Each is discussed below.

5.1.1 Powerlines

Common ignition sources in southern California are related to powerlines and many destructive fires across the State have been caused by powerlines (Keeley & Syphard, 2018). However, this risk can be mitigated by burying powerlines. The Project will underground all new project-related distribution power lines on the Project site.

5.1.2 Vehicles

A potential source of vegetation ignitions in the Project area is the existing Interstate (I-5), SR-138, and other roads used by Project residents and occupants. The Project provides roadside fuel modification via the removal of flammable vegetation and provisions for landscaping along roads it controls. Additionally, Tejon Ranch's historic grazing program in areas adjacent to developed and developing areas reduces fuel loads adjacent to Project access roads. The Project includes provisions for creating increased separation from potential roadside ignition sources and potential fuel beds that will not only protect the Project but also adjacent communities such as Gorman and Lebec. These efforts reduce or minimize the ability of a vehicle-related spark, catalytic converter failure, or another ignition source to ignite and spread fire from the roadsides into unmaintained fuels. **While the Centennial Project will lead to an increase of vehicle traffic on offsite roadways, ongoing maintenance along I-5 and SR-138 is provided by Caltrans and is expected to continue, if not increase in frequency as part of overall fire reduction efforts that are beyond the control of the Project. Centennial will collaborate with Caltrans to ensure that roadside vegetation**

management of offsite roadways is being performed annually. Caltrans's Integrated Vegetation Management (IVM) program utilizes various methods of vegetation control to meet specific roadside vegetation control goals, including herbicides, mowing, weed whacking, targeted grazing, and hand removal. **In addition, portions of the Good Neighbor Fire Protection Fund from the Climate Resolve Settlement Agreement could be used to fund offsite roadside fuels reduction projects in the region.** As such, the Project is not expected to significantly increase the already known fire risk associated the preexisting roads. The onsite roadways would comply with all fire department access requirements and be adjacent to fuel modification. Further, the Interior roadways are also not expected to result in significant vehicle ignitions due to roadside FMZs that would minimize receptive fuel beds for sparks or hot metal from vehicles as described in Section 3.3.1 and the Project's Construction Fire Prevention Plan (CWSP). Therefore, even if ignition were to occur within the Project, it is highly unlikely it would be sustained or spread beyond the Project site due to the hardened landscapes, hardscape, and adjacent fuel modifications areas.

5.1.3 Machinery

The use of equipment in WUI areas is another common source of modern-day human-caused ignitions. This is due to heated machinery, sparks, hot fluids, or exhaust igniting vegetation. Potential ignitions due to equipment use can occur during construction activities or ongoing operational risk.

5.1.3.1 Construction Activities

Construction activities associated with the Project would introduce potential ignition sources to the Project site. However, the Project would comply with LA County Fire requirements for activities in hazardous fire areas and the CFC. Spark arrestors would be required on all equipment with a solid or liquid fuel motor used on the Project Site. The Project would also comply with Section 326.12.1 of the LA County Fire Code which prohibits the use or operation of any tractor, construction equipment, engine, machinery, or any steam, oil, or gasoline-operated stationery or mobile equipment, from which a spark or fire may originate unless such equipment is provided with a qualified device that has been approved by the state fire marshal and that will prevent the escape of fire or sparks. Further construction activities would comply with Chapter 33 of the CFC Fire Safety During Construction and Demolition. Per Section 3304 the Project would take precautions against ignitions such as but not limited to prohibiting smoking except in approved areas, preventing the accumulation of and removing combustible debris, implementing fire watch personnel where required by the fire code official, having approved water supply onsite, and maintaining vehicle access for firefighting to all construction and demolition area. Additionally, the project would prepare a Construction Wildfire Safety Plan (CWSP) that will address fire safety practices to reduce the possibility of fire during construction activities. However, due to the existing vegetation conditions, there is a potential for a significant fire hazard due to construction activities. As such, additional construction Design Features would be implemented by the Project to lower the potential fire hazard below the level of significance. This would require that prior to combustible materials being brought on-site utilities, access roads, and fuel modification zones would be first established. The design features, CWSP, and regulatory requirements would reduce the risk of wildfire ignition and spread from the Project during construction activities.

5.1.3.2 Operational Activities

Operational activities associated with maintenance or use of the Project site also have the potential to introduce ignitions to the area. The operational activities would also be required to comply with the CFC spark arrestor requirements, Chapter 33 Fire Safety During Construction and Demolition for any post-development construction, maintenance, or renovations, and other applicable codes and requirements based on the activity type. Operational

activities would also comply with LA County Fire requirements for activities in fire hazard areas as described above. FMZs and landscaping within the Project site would require ongoing maintenance. These common area landscapes and perimeter FMZs would be managed and maintained by the HOA through a qualified contractor. The contractor would be required to meet fire safety requirements regarding equipment, the timing of maintenance, and fire suppression capabilities. This type of maintenance program is far safer and more controlled than if each homeowner provided their own maintenance of FMZ areas. Additionally, maintaining the FMZs and landscaping accordingly would allow them to continue their function purpose of reducing potential ignition and fire spread both from fire onsite or offsite in origin. Further, even if the equipment were to cause a fire it is unlikely it would spread offsite due to the adjacent FMZs and ignition resistant landscape. A robust wildfire education program would provide residents and occupants with ongoing education regarding wildfire, as described in Section 6.1. The education program would be implemented by the HOA and have a layered approach to wildfire awareness that includes both passive and active features. The educational program would cover a wide range of information such as residential evacuation planning, defensible space guidelines, how to maintain fire protection features, activities in a fire risk area, and more, all provided in easy-to-understand, graphically based materials. This would education regarding safe activities in wildfire risk areas, including the appropriate use of machinery, during red flag warning days, restrictions on the use of machinery in the Project area would be implemented. This requirement, in conjunction with the Project Design and regulation compliance, will significantly reduce potential ignitions both in the Project area and limit the potential impact on the surrounding area.

5.1.4 Project Design Features Addressing Fire Risk Associated with Increasing Human Activities in the WUI

5.1.4.1 Vegetation Management

The fuel conditions immediately adjacent to the Project will also be addressed through FMZs. The existing hazardous fuel, mostly shrub fuels, on the Project site and within FMZ areas would be converted into hardscape and or to reduce fuel densities that are managed and maintained. In an FMZ, combustible vegetation would be removed and/or and partially or totally replaced with more appropriately spaced drought-tolerant, fire-resistant plants including an irrigated zone. This would provide a managed area where fire spread is not facilitated toward the Project or away from the Project into wildland areas by redistributing the fire risk on a landscape and altering the interaction between fire, fuels, and weather (Cochrane et al., 2012). FMZs would also reduce the likelihood of canopy fires, lower ember cast, and have a shadow effect on the untreated landscape by reducing the probability of burning and the potential fire size (Cochrane et al., 2012). As such, the Project would lower ignition potential in the area by reducing and altering the available fuel scape to a less flammable managed condition not conducive to fire spread and increasing the probability of fire suppression if ignition occurs (Fox et al., 2018). Further, Project benefits from Tejon Ranch's historic grazing program addresses larger scale landscape fuel conditions. As a result, the risk of a structure being destroyed, whether from a fire from within the development or outside the development, is significantly lower when defensible space is implemented. Studies have also indicated that treatments in close proximity to residential buildings provide greater protection (Syphard et al., 2014). Accordingly, the Project will provide an ERZ which is a 5-foot wide non-combustible zone around all structures to address the potential for ember-caused ignitions next to structures.

The Project's FMZs and fuels management will serve to create defensible space around the structures. Defensible space adjacent to structures also functions to limit the spread of fire from the built environment into off-site vegetation (Warziniack et al., 2019). The FMZ areas and historic grazing areas function as fuel breaks which are

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

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

These features will further reduce the potential for wildfire in open space areas and potential impacts on surrounding communities.

5.1.4.2 Ignition Resistant Construction

With the incorporation of ignition-resistant construction, the likelihood of structural ignition occurring within the Project area is minimized. Ignition-resistant construction is critical in preventing building ignitions from windblown embers. The Project will comply with Chapter 7A of the Los Angeles County Building Code (Title 26, Chapter 7A), “Construction Methods for Exterior Wildfire Exposure” so that the buildings are resistant to ignitions from direct flames, heat, and embers. The Project, based on its location and ember potential, is required to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the LA County Fire and the County’s Fire and Building Codes (e.g., Chapter 7A). The structure design is crucial against wind-driven fires and newer homes are more likely to survive. Dual paned windows were significant in protecting against thermal exposure. (Syphard et al., 2017). This lowers the threat of onsite fires impacting offsite areas as the structures themselves are very unlikely to act as fuel which will minimize the potential for home-to-home ignitions, reducing the likelihood of an onsite fire spreading within the community or toward open space. Additionally, the adjacent fuel modification will aid in isolating onsite structure fires or accidental ignitions to the Project area should they occur.

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

5.2 Site Specific Assessment of Offsite Ignition Risk

The following section summarizes the assessment of the constructed and inhabited Project resulting in an increased likelihood of wildfire ignitions that impact existing land uses in the Project's proximity. This assessment has been conducted as part of the Project's proactive approach to fire safety.

To date, there is no organized method for analyzing off-site ignition risk impacts from a proposed Master Plan Community. There are various data available that can be used to evaluate some aspects of the potential for a population to result in ignitions, but understanding how specific and targeted design features and mitigation measures lessen the potential ignition increase, if not prevent it altogether, have not been formalized. In many cases, Centennial's features and measures also provide a public benefit beyond lessening the potential for increased ignitions and off-site fire spread, as discussed herein. To that end, this analysis provides a new and comprehensive approach to evaluating the potential off-site ignition and spread related impacts for a new master planned community in a fire hazard severity zone.

A team of fire protection experts was assembled to develop this assessment method utilizing best practices, extensive research, publicly available and project-specific fire environment data, and years of professional experience to quantify and weight the various fire protection measures. The process involved creation of an off-site wildfire risk matrix that calculates risk based on provisions for fire safety and protection features (Appendix D).

5.2.1 Centennial Offsite Wildfire Risk Potential

A Focused Off-site Ignition Risk Assessment was conducted to determine the Project's potential to exacerbate wildfire risk in off-site areas (Appendix D). The off-site ignition risk evaluation of the proposed Project included reliance on a vast amount of site-specific information, fire environment data, fire behavior and spread modeling, and extensive mitigations that will be provided above and beyond the strict code requirements. This information was available for this effort because the Project applicant made considerable investment to evaluate wildfire risk and needed protections as part of its planning process. As such, the Project bases its off-site risk analysis on supporting information provided within the (1) Project WSP; (2) Project Construction Fire Prevention Plan (3) Fuel Modification Plan; and (4) a Project Wildfire Evacuation Technical Report. In addition, extensive analysis and modeling was conducted as part of an FHSZ remapping comment exercise, based on which CAL FIRE corrected their initial remapping of the site to reduce the total extent of the Very High Fire Hazard Severity Zone. Based on Dudek's technical review of the site and surrounding areas and development of a comprehensive wildfire ignition risk and risk reduction method, it was determined that the Project's off-site ignition risk of Moderate, as determined by the presented method, is accurate and supported. Taken together, the fire prevention, suppression, and response measures incorporated into the Project and mandated by applicable regulatory requirements serve to adequately protect both on-site and off-site resources in the event of an on-site fire ignition, the most significant of which are as follows:

- Wide FMZ around the perimeter of the Project.
- Continued grazing of Project's open space.
- Ignition-resistant structures.
- Interior fire sprinklers.
- Ignition-resistant, planned, and maintained landscape.
- Undergrounding of power lines.

- On-site fire stations.
- Code Compliant Water availability and fire flow.
- Code Compliant Fire access roads.

5.3 Fire Facilities

Fire protection to the Centennial Specific Plan Project site is provided by the LACoFD. The fire department currently serves the area from Battalion 6, which has 13 fire stations located primarily in the Santa Clarita Valley. In addition, Kern County Fire Department (KCFD) provides assistance through an automatic mutual aid agreement. Four of the KCFD Fire Stations are within 30 miles of the Centennial Specific Plan Project site. The LACoFD and KCFD Fire Stations that would be the likely responders to an incident on site are summarized in Table 18.

Table 18. Current Los Angeles County Fire Department Response Configuration

Fire Station Number	Location	Estimated Response Time/Miles to Project Entrance
LACoFD		
77	468333 Peace Valley Road, Gorman, California 93423	5 minutes/4 miles
149	31770 Ridge Route, Castaic, California 91350	25 minutes/21.2 miles
78	17021 Elizabeth Lake Rd, Lake Hughes, California 93532	30 minutes/24.9 miles
112	8812 Ave E-8, Lancaster, California 93536	31 minutes/29.7 miles
76	27223 Henry Mayo Dr., Valencia, California 91355	35 minutes/29.5 miles
126 (Hdqtrs)	26320 Citrus Street, Santa Clarita, California 91355	38 minutes/31.7 miles
111	26829 Seco Cyn. Rd., Saugus, California 91350	39 minutes/32.7 miles
124	25870 Hemingway Ave., Stevenson Ranch, California 91381	41 minutes/33.8 miles
73	24875 N. San Fernando Rd., Newhall, California 91321	41 minutes/34.1 miles
156	24525 W. Copper Hill Dr., Santa Clarita, California 91350	42 minutes/35.2 miles
104 (Temp)	26201 Golden Valley Road, Santa Clarita, California 91350	43 minutes/36.1 miles
107	18239 W. Soledad Cyn., Canyon County, California 91351	46 minutes/38.1 miles
123	26321 N. Sand Cyn. Rd., Canyon Country, California 91351	56 minutes/ 46.5 miles
132	29310 Sand Canyon Rd., Canyon Country, California 91387	57 minutes/47.2
75	23310 Lake Manor Dr., Valencia, California 91355	1 hour and 7 min/55.7 miles
KCFD – Automatic Mutual Aid Response		
56	1548 Golden State HighwayLebec, California 93242	15 minutes/12 miles
57	P.O. Box 402, 729 West End Drive, Frazier Park, California 93225	20 minutes/16 miles
55	5441 Dennis McCarthy Road, Mettler, California 93243	23 minutes/18 miles
58	P.O. Box 5179, 2420 Symonds Drive, Pine Mountain Club, California 93222	38 minutes/29 miles

As depicted in Table 18, there are a minimum of 19 LACoFD and KCFD Fire Stations that may respond to wildfire or other emergencies at the Centennial Specific Plan Project site. However, only one station, Fire Station No. 77, can reach the Project's entrance (Gorman Post Road and Lancaster Road) within approximately 5 minutes. Because

the Project site is large, it would take at least another 15 minutes to reach more remote portions of the Project site.Local Response Standards

The County's General Plan includes a response time goal consistent with National Fire Protection Association (NFPA) standards (NFPA Standard 1720, 2020 edition). It should be noted that there are no national standards for response times to vegetation fires, but a 5-minute response and a 1.5-mile service radius is used in the County for typical urban response. According to these response standards, the current Fire Station distribution does not include a station that could respond according to the minimal proposed standards. However, as required by the Project's Certified EIR the Project Applicant/Developer shall provide land, convey title, and shall construct and equip, to the specifications and requirements of the LACFD, for up to four new Fire Stations to the LACoFD. The approved final plans and specifications for the Project shall identify locations of the fire stations. The LACoFD shall have final approval over the fire station site locations. The timing for the construction of the on-site fire stations shall be established by the LACFD dependent upon the phasing of development, with the first on-site fire station operational no later than the time the 1,000th dwelling unit is built on site (Mitigation Measure MM 16-3). Additionally, as required by the Project's Certified EIR, at buildout, the Los Angeles County Fire Department (LACoFD) fire stations shall be located such that response times to the Project site shall be 5 minutes or less for fire service responses and 8 minutes or less for the advanced life support (paramedic) unit responses within the Project site (Mitigation Measure MM 16-1). Figure 3-30 of the Specific Plan provides approximate locations of existing and proposed fire stations. Further, also required by the Project's EIR, the Developer must pay developer fees in accordance with the LACoFD Developer Fee Program until such time as the Developer has conveyed an approved, operational fire station to LACFD, unless otherwise agreed to by the Developer and LACoFD in accordance with the LACoFD Developer Fee Program's land-in-lieu of fees provisions (Mitigation Measure MM 16-2).

With properly built, ignition-resistant protection for structures, internal fire sprinklers, customized fuel modification zones, water supply, fire hydrants and access roads, as detailed in this WSP, the structural fire risk and exposure risk to structures from a vegetation fire can be significantly reduced. However, the Emergency Medical Services (EMS) risk and need for timely EMS response is critical and requires on-site capabilities.

According to County standards, the first arriving emergency unit, with paramedic and structural firefighting capabilities, should arrive within approximately a 5-minute timeframe for basic life support and eight minutes for advanced life support.

Common mitigating measures for projected slower emergency response for residential structural fires includes the inclusion of additional firefighting resources closer to the assets and/or the use of interior fire sprinklers. Fire Stations in close proximity to assets result in reduced travel distance and correspondingly reduced response time. Conversely, interior sprinklers minimize the need for additional Fire Stations (to a threshold) by extinguishing interior fire or extending the time for "flashover" of structure fires. This corresponds directly to enabling more time for firefighting resources to arrive on site and begin attack.

The Project is committed to providing a safe environment for residents and visitors of the proposed community. Therefore, the Project is consistent with County standards for emergency response and interior sprinklers.

5.4 Estimated Calls and Demand for Service from the Project

Emergency call volumes related to typical projects, such as new residential and commercial developments, can be reliably estimated based on the historical per-capita call volume from a particular fire jurisdiction. The LACoFD documented 379,517 total incidents for 2020 generated by a County-wide service area total population of approximately 4,067,549 persons in 58 cities and all unincorporated communities within Los Angeles County. The County's per capita annual call volume is approximately 93 calls per 1,000 persons. The resulting per capita call volume is 0.093 (LACoFD 2021).

The following estimated emergency calls are based upon annual emergency call data for the entire area protected by LACoFD. This data was applied to the Centennial Specific Plan Project for anticipated total estimated calls, structure fires, vegetation fires and emergency medical calls as a comparison for perspective. The per capita call generation for this development is based upon the development-specific information provided by the Project's EIR. The following sections provide an analysis of the estimated call volume and overall demand on the response capability of the existing stations.

The following is an estimated annual emergency call volume for the Centennial Specific Plan Project that is based upon per capita data from total annual LACoFD calls within their jurisdiction (based on 2019 data), except as noted previously:

- Total population served by LACoFD: 4,096,325
- Total annual calls: 382,202. Per capita call generation: 0.093

Using the assumptions noted previously, the estimated annual emergency call volume for Centennial Project was calculated. In order to provide this conceptual estimate, Project-specific data was provided by the Project applicant, which includes a residential population and commercial user population totaling roughly 57,150 persons. This number is a conservative estimate and may be somewhat more than the actual population. Based on this population, the calculated call volumes by type of call are provided in Table 19.

Table 19. Calculated Call Volume (Conceptual Based on 57,150 Persons)

Type of Call	Per Capita Call Generation Factor	Number of Estimated Annual Calls (per day)
Total Calls	0.097	5,315 (14.5)
Total Fires	0.0017	97 (0.3)
Total EMS/Rescue Calls	0.082	4,686 (12.8)

As mentioned, these conceptual estimates may be somewhat high, as the LACoFD annual data includes areas in the County where call volumes are typically higher due to the type of calls associated with higher density urban populations. The on-site public, recreational, business and retail, golf course and equestrian centers will generate more calls than the single family, detached dwellings and most of those calls will be EMS.

A call volume of approximately 15 per day would be considered high for one Fire Station. However, these calls will be divided amongst three stations, averaging between 3 and 5 calls per day, depending on the station. This is not excessive for a fire station crew. For perspective, five calls per day are probably average in an urban or suburban area. A busy fire station company would be one with 10 or more calls per day. The medical emergency call data is calculated using LACoFD data. EMS calls for this development will probably amount to about 80% of all calls (approximately 12 per day).

5.4.1 Response Capability Impact Assessment

Fire Response

One possible result of the Project is a fire response service decline. The Centennial Specific Plan Project represents an increase in service demand on LACoFD's existing facilities due to the number of new structures and people living in or using the community. Based on the calculations presented in the preceding sections, and the estimated 15 calls per day generated by the Project, additional on-site firefighting capabilities plus other emergency response recommendations are made in this Wildfire Safety Plan.

A second result of development in a WUI setting is related to the potential for increased exposure of residents to wildland fire. Based on the response times from existing stations, Centennial Project would require on-site fire protection capabilities.

The effects on the firefighting and response resources and to the residents residing within Centennial Project are considered substantial. However, the measures provided by the Project comprisea layered fire protection system, designed to reduce demands placed on the fire responders while minimizing exposure of humans to potentially harmful fire environments and backed by the construction and operation of three new new fire stations with a possible forth as determined necessary by LACoFD in the community along with upgrades to an existing station.

The following key elements of the Project's fire protection program are discussed in detail throughout this WSP and include:

- Inclusion of firefighting capabilities on site and meeting County codes
- Use of interior residential fire sprinklers to Code
- Ignition resistant structures designed to withstand significant wildfire
- Customized fuel modification on the Project's managed land.

Ambulance Response

The number of estimated EMS calls per day represents a substantial demand on current response capabilities and to the people who could require fast medical response for a variety of emergency medical situations. The demand justifies the need for timely response to EMS emergencies and the need for paramedics as paramedic calls may amount to about 60% of the total EMS call volume (7 Advanced Life Support calls per day).

The Project will be prepared to station a private paramedic ambulance company, or equivalent LACoFD paramedic unit on site. In the event of a full cardiac arrest, five trained responders including a medic are needed in 4 to 6 minutes, and the medic is needed within eight minutes of the beginning of the arrest.

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6 Wildland Fire Evacuation Technical Report and Education Program

Early evacuation for any type of wildfire emergency at the Project Site is the preferred method of providing for resident safety, consistent with the LA County Fire's current approach within Los Angeles County. With early, evacuation, evacuations often take place over a staggered period of time (staged evacuation) and are adjusted as authorities watch fire events. Under this strategy, the goal is to focus on evacuating strategic areas depending on the risk (Chen and Zhan 2008). This allows for evacuations to flow more smoothly and reduce the likelihood of significant congestion. Staged evacuations have also increased in practice with many cities and judication implementing staged evacuation tools such as Genasys Protect. County Fire and the Los Angeles County Sheriff Department (LASD) have extensive experience with evacuating large masses of people during wildfire events under both types of scenarios. During the Woolsey fire in 2017 LASD and other law enforcement were able to successfully coordinate the mass evacuation of over 250,000 people (County of Los Angeles, 2019). For perspective, the Project's estimated population is 57,150 people. The Project is within the Los Angeles County Operational Area Emergency Response Plan (OAERP) (County of Los Angeles, 2012). The OAERP addresses the coordinated response to an emergency within the County. The Project is created with wildfire in mind and this includes the potential for an evacuation. The Project is located in major traffic corridors, such as the I-5 and State Route 138, that would allow for evacuations to occur in multiple directions. Additionally, the Project would provide multiple areas for ingress and egress as well as improved firefighter access. For a detailed description of potential evacuation scenarios and associated evacuation time, please refer to Appendix E – Centennial Wildfire Evacuation Technical Report (WETR).

As such, the Project's HOA would formally adopt, practice, and implement a "Ready, Set, Go!" approach to evacuation. The "Ready, Set, Go!" concept is widely known and encouraged by the State of California and County Fire. Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing the potential for errors, maintaining the Project Site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and Project Area activities during periods of fire weather extremes. Additionally, the ignition-resistant rating of the structures, incorporation of expensive fuel modification, and urbanized landscape would allow for emergency managers to direct residents to take temporary refuge within their protected residences.

"Ready! Set! Go!" is the County Fire adaptation of the State "Ready, Set, Go!" wildfire evacuation preparedness program. The goal of the program is to aid residents of the County to prepare to leave their homes as early and with confidence that they have done everything reasonably possible to protect their homes from wildfire. The "Ready!" aspect of the campaign is centered around preparing your home for wildfire through defensible space implementation and home hardening. The "Set!" component educates residents on how to create a wildfire action plan. Wildfire action plans are prepared in advance of a wildfire and include information for the household such as important phone numbers, what to take, evacuation preparation, emergency supply kits, and pre-evacuation steps to take. Finally, the "Go!" aspect of the campaign is about the steps to take when evacuating from a wildfire. The goal is for residents to leave as early as possible during a wildfire. Within the "Go!" campaign there is also information on what to do if you become trapped, whether on foot, in a car, or at home.

Support for the "Ready, Set, Go!" model has been provided by the preparation of a Wildland Fire Evacuation Technical Report (WETR) for the Project Site, which is available under separate cover (Dudek, 2023). The WETR is

based on standard evacuation planning used by the Los Angeles County Office of Emergency Services. The WETR provides Project residents and occupants with potential egress route information and instructions for following the "Ready, Set, Go!" model. The WFEP provides Project Area-specific procedures for wildfire evacuations and would be provided to the Centennial residents and commercial tenants and posted on the community website.

The WETR would be reviewed by residents at least annually through organized meetings and educational outreach by the HOA, Community Services District, or other means. Evacuation information would be disseminated to residents through a variety of means such as bi-annual mailers, online, workshops, and more detailed below. Among the important concepts that would be included in evacuation, education is the Project Area's fire environment, mitigation strategies, roles and responsibilities, homeowner education materials, preparedness checklist, route planning, and specific procedures for early relocation and contingency planning for situations where evacuation is considered unsafe.

As described above, the Certified EIR would not result in any new impacts or increase impacts to an adopted emergency response plan or emergency evacuation plan.

6.1 Wildfire Education Program

As part of the Project, the Project residents and occupants would be provided ongoing education regarding wildfire, the WFEP, and this WSP's requirements. This educational information would support the fire safety and evacuation features/plans designed for this community. Informational handouts, community website pages, mailers, fire-safe council participation, inspections, and seasonal reminders are some methods that would be used to disseminate wildfire and relocation awareness information. LA County Fire would review and approve all wildfire educational material/programs before printing and distribution.

The Centennial Wildfire Education Program's goal is to provide targeted outreach to residents and other site occupants living in a fire risk area in order to foster a community that has fire adaptive capacity. The educational program would cover a wide range of information such as residential evacuation planning, defensible space guidelines, how to maintain fire protection features, activities in a fire risk area, and more, all provided in easy-to-understand, graphically based materials. The educational program will be based on a layered approach to wildfire awareness that includes both passive and active features. The program will be ongoing in order to maintain high wildfire awareness even as the community grows and evolves. Program features are as follows:

1. **Bi-annual email and mailers:** Residents and occupants will be provided with bi-annual emails and mailers in May and in August. They will include information such as reminders about annual defensible space inspections, maintaining the ERZ, how to prepare for wildfire season, evacuation information, and how to prevent wildfires. There will also be links to various resources on where to get trusted information such as County Fire, 211 LA County, and Ready LA County.
2. **Website:** There will be a dedicated community website with more detailed information and resources about wildfire awareness and prevention. The website will serve as a centralized resource for the fire education program and include information from the WSP. The website will also have fire watch and red flag warning alerts, as well as information on restrictions during fire weather conditions. Residents will also be able to use the website to sign up for an annual residential defensible space inspection from the HOA Fire Committee.
3. **Community workshops and webinars:** Two times a year there will be either in-person or virtual community workshops. The goal of the workshops will be to cover various fire topics more in-depth. For example, this

could include having a County Fire representative come to meet the community, a workshop on how to make a go-bag, a workshop on how to make a residential evacuation plan, or how to maintain the home ignition zone.

4. **New resident packet:** All residents and new residents in the future will also be presented with a wildfire awareness and safety package upon purchase or rental of a home. This will also be given to businesses as part of their employee training program. Within the package will be a link to the website which will harbor the evacuation plan, a list of fire protection features, information on the regional fire hazard, prohibited activities in fire risk areas, how to build a go-bag, and a list of agencies and resources for receiving trusted information.
5. **Emergency alert campaign:** Residents and businesses will be encouraged to sign up for Alert LA County. Alert LA County is the mass notification system for emergency alerts, weather alerts, health notifications, building alerts, and other updates from County, State, and Federal agencies. The campaign will occur annually and encourage residents to sign up for Alert La County. Reminders will also be sent out in the bi-annual mailers and emails, on the community website, in the workshops, and in the new resident package.
6. **Fire watch groups:** Within the community, there will also be volunteer fire watch groups. These will be residents or businesses who volunteer to participate in a fire watch group for the community. During red flag warning days, this group will be responsible for reminding businesses and residents of fire-safe practices and restrictions. During red flag warning days, the fire watch group will also maintain vigilance of potential fires and will be trained on procedures for alerting County Fire in the event of a fire.
7. **HOA fire safety committee:** The fire safety committee will be responsible for overseeing the maintenance of community-wide fire protection features. Residents will be able to report fire hazards or hazardous fuel conditions to the HOA committee for remediation. The committee will be responsible for the coordination of the 3rd party FMZ inspections and the volunteer residential defensible space inspections. The committee will also be responsible for organizing and coordinating an annual education workshop on how to maintain the ERZ. The committee will also be responsible for the creation and distribution of the educational program for the Project. The committee will serve as a communication link between County Fire and the community.

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7 Project-Specific Wildfire Risk Reduction Measures

7.1 Regulatory Requirements

7.1.1 Measure 1: Construction Fire Prevention Plan

Prior to any construction activities, a detailed Construction Fire Prevention Plan (CFPP) shall be implemented for the Project and submitted to the County of Los Angeles for review and approval prior to the issuance of the first grading permit. The CFPP shall designate fire safety measures to reduce the possibility of fires during construction activities, including fire watch during hot works and heavy machinery activities (e.g., welding), spark arresters on all equipment, water supply via hose lines attached to hydrants, or a water tender pursuant to LA County Fire requirements, red flag period restrictions, and mandatory on-site fire resources. Employees would be presented with basic prevention fire training upon employment and the on-site safety officer and/or supervisor/foreman shall maintain documentation of training. Training shall consist of the Project WSP requirements, review of Occupation Safety and Health Administration (OSHA) Fire Protection and Prevention, proper response and notification of a fire, and the use of fire extinguishing equipment. A site safety officer shall be responsible for the implementation of the CWSP, ensuring fire control equipment are maintained in good working conditions, monitoring combustibles onsite, conducting fire safety surveys, posting fire rules in an area visible to employees, stopping work activities that pose a fire hazard or are not in compliance with the CFPP, and reporting all fire ignited on-site to County Fire. County Fire shall review site fire safety conditions prior to the commencement of construction activities.

7.1.2 Measure 2: Pre-Construction Requirements

The applicant shall submit site improvement plans to County Fire prior to the issuance of the building permits. Prior to bringing lumber or combustible materials related to residential and nonresidential building construction onto the Project Site, site improvements within the active development area shall be in place, including utilities, operable fire hydrants, and an approved, temporary roadway surface and fuel modification zones shall be established. Combustible materials may be utilized onsite prior to stated site improvements as needed for providing the improvements (e.g., wood forms for cast-in-place concrete) or for infrastructure construction prior to utilities being installed (e.g. operable fire hydrants). County Fire shall review site fire safety conditions prior to the commencement of building activities.

7.1.3 Measure 3: Annual Fuel Modification Maintenance

All vegetation management with the FMZs and common areas shall be completed annually by May 1 of each year. Vegetation management may be completed more often for fire safety if determined necessary by County Fire. The Project HOA or equivalent entity shall be responsible for the annual maintenance of all vegetation management within the Fuel Modification Zones (FMZs) in the common areas ensuring compliance with LACoFD fuel modification guidelines. Property owners will be responsible for maintaining the Ember Resistant Zone (ERZ) and any fuel modification within their property. The annual maintenance would be managed and maintained by the Project HOA through a qualified contractor that shall be required to meet fire safety requirements regarding equipment, the

timing of maintenance, and fire suppression capabilities. Maintenance activities would include but not be limited to removing dead and dying material, removing undesirable plant species, and conducting thinning activities to maintain adequate spacing requirements. The Project HOA or similar entity shall be responsible for ensuring the long-term funding and ongoing compliance with all provisions of the WSP including, vegetation planting, fuel modification of the perimeter areas, vegetation management on all common areas including roadsides, and open space areas under their control. The Project HOA shall be responsible for the implementation of the annual FMZ maintenance subject to ongoing enforcement by County Fire. The HOA or and County Fire would enforce the vegetation management requirements detailed in the WSP and such requirements would be made a part of deed encumbrances and CC&Rs for each lot, as appropriate. Documentation, as part of the inspection report per Recommended Measure -4, on maintenance activities detailing the FMZS, maintenance operation, and consistency with current County brush clearance requirements shall be submitted to County Fire Bush Clearance Program.

7.1.4 Measure 4: Annual Fuel Modification Inspection

By June 1 of each year, a third-party inspector shall be hired by the Project HOA or equivalent entity to conduct an annual inspection of the Fuel Modification Zones (FMZs), including the Ember Resistant Zone (ERZ) and FMZs that are within private property. The inspector would evaluate the FMZs for compliance with regulations and that they are operating accordingly. The inspector shall notify the HOA of any non-compliant FMZs, recommend measures for remediation, and a timeframe for reinspection. The Project HOA shall be responsible for the long-term funding of the inspections. The HOA and/or County Fire would enforce the vegetation management inspection requirements detailed in the WSP and such requirements would be made a part of deed encumbrances and CC&Rs for each lot, as appropriate. An inspection report shall be submitted to County Fire each year documenting inspection results and compliance with County FMZ requirements.

7.1.5 Measure 5: Landscape Plan

The Project Applicant/Developer shall develop a Landscaping Plan for review and approval by the County Biologist for each tentative map application submittal. The Landscaping Plan must be prepared by a qualified biologist and include a plant palette composed of fire-resistant, non-invasive species that are adopted to the conditions found on the Project site and do not require high irrigation rates. The MMRP further requires that the Landscaping Plan shall also include a list of invasive plant species prohibited from being planted or sold on the Project site and encourage planting of local natives typical of native vegetation within ten miles of the Project site. The Specific Plan's Green Development Program and Hillside Design Guidelines further require the Project to implement fire-safe landscaping techniques consistent with the Specific Plan's plant palette to reduce fire risks to biological resources and human safety in the fuel modification zones, and landscaping in a manner that, among other things, increases fire protection, respectively. Additionally, the Project’s Specific Plan requires landscaping in the plan's Open Space Zone to be dominated by native and/or drought tolerant trees, shrubs and ground cover, taking into consideration fuel modification requirements, such as using plants that are fire resistant and avoid plants with characteristics that make them more readily combustible such as plants with oils, wax or resin content, plants that accumulate dead material or shed bark, and/or plants that grow rapidly. Plants selected will be consistent with LACoFD Planting Guideline regarding prohibited species and appropriate plant spacing with respect to zone location. Finally, the MMRP requires that the map applicant ensure that the approved Landscape Plan be provided to Project builders and all future Project occupants.

7.1.6 Measure 6: Construction Traffic Control Plan

The applicant must include in its application for any tentative map involving construction within the State Route 139 right-of-way a Traffic Control Plan prepared in accordance with the California Manual on Uniform Traffic Control Devices and approved by the California Department of Transportation (Caltrans). The MMRP further requires that all construction activities in the public right-of-way comply with the Traffic Control Plan to the satisfaction of Caltrans. The Traffic Control Plan shall ensure code-compliance access for fire apparatus and first responder vehicles.

7.1.7 Measure 7: Fire Access Infrastructure Conditions

Per the Subdivision Ordinance, each tentative map application and approved tentative map must demonstrate that Project internal circulation system, site access, road dimensions, road connectivity, and other standards related to fire apparatus access are consistent with all applicable County's roadway and fire code standards. Thus, each approved Project tentative map shall require as a condition of final map approval that:

- all interior Project roads comply with all fire apparatus access road standards;
- all interior fire access roadways where a fire hydrant is located will be constructed to a minimum unobstructed road width of 26 feet, exclusive of shoulders and shall be improved with aggregate cement or asphalt paving materials.
- all fire access roadways that are designed to allow parking provide a minimum clear width of not less than 34 feet for parking on one side and a clear width of not less than 42 feet for parking on both sides;
- that the interior residential access roads are designed to accommodate a minimum of a 75,000-pound (lb.) fire apparatus load;
- that any dead-end streets serving new residential structures that are longer than 150 feet have approved provisions for fire apparatus turnaround;
- that all private and public streets for each Project phase meet all applicable requirements of Title 32 of the Los Angeles County Code, as amended, and adopting by reference the 2019 edition of the California Fire Code (CFC), or current edition at time of Project approval (Fire Code);
- that all fire apparatus roads have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with CFC Section 503.6, and an unobstructed vertical clearance clear to the sky to allow aerial ladder truck operation (provided that a minimum vertical clearance of 13 feet 6 inches may be allowed for protected tree species adjacent to access roads);
- that all roads with a median or center divider will have a minimum 20 feet unobstructed width on both sides of the center median or divider;
- that all 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;
- that access roads will be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction;
- that the applicant will provide information illustrating the new roads, in a format acceptable to the LACoFD for use in updating LACoFD fire response maps; and
- that the curb-to-curb width of each private driveway and fire lane will be approved by the Los Angeles County Fire Department and Department of Public Works.

7.1.8 Measure 8: Underground Utilities

As required by the County's subdivision ordinance, all tentative map applications must depict the location of proposed utility easements. As required by applicable standards, all of the Project's horizontal utilities, including but not limited electric transmission lines, will be installed underground to significantly reduce the potential for equipment-related fire starts.

7.1.9 Measure 9: Fuel Modification Plan

Per the MMRP, the Project must prepare a Fuel Management Plan (FMP) demonstrating compliance with the Fire Code, which must be peer-reviewed by the California Department of Forestry and Fire Protection (CAL FIRE) and approved by LACoFD prior to recordation of the Project's first final subdivision map. An important component of a fire protection system for the Project is the provision for fire resistant landscapes and modified vegetation buffers. The FMP will establish Fuel Management Zones (FMZs) designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from fire advancing off-site or on-site by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs were originally developed by CAL FIRE to protect natural resources from urban area fires and over the years, have become essential to setting urban areas back from wildland areas with a dual role of protection structures and people while buffering natural areas from urban ignitions, reducing potential for urban fires to spread into wildland areas.

7.1.10 Measure 10: Confirmation of Code Compliance

At the building permit and site plan review stage of Project development, the County will confirm that all building plans comply with all applicable codes. The Project shall comply with applicable portions of Title 32 of the Los Angeles County Code, as amended, which adopts by reference the 2022 edition of the California Fire Code (CFC). The Project also shall comply with Chapter 7A of the 2022 California Building Code (CBC),the 2022 California Residential Code, Section 237; and the 2019 Edition of the International Fire Code as adopted by the County. The Project would also be subject to the provisions of section 4291 of the Public Resources Code regarding brush clearance standards around structures and the Los Angeles County Fire Department guidelines for Fuel Modification Plans. The Project is required to comply with all future code updates as development proceeds. Code compliance shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy.

7.2 Settlement Agreement Requirements

7.2.1 Measure 11: Centennial HOA Wildfire Education Program

Within one year of occupancy permits being granted for Centennial, the Wildfire Education Program shall be established. The Project residents and occupants shall be provided with ongoing education regarding wildfire, the WSP, and the Wildfire Evacuation Plan. The education program would support fire safety, evacuation practices, and fire safety features designed for the community. The Centennial Wildfire Education Program would provide target outreach to residents and occupants living in a fire risk area and would be a layered approach to maintaining high wildfire risk awareness that includes active and passive features. Contents of the educational program would be reviewed and approved by County Fire before printing and distribution. The Project HOA or similar entity shall be responsible for the ongoing funding and maintenance of the wildfire education program. The HOA or similar entity

shall enforce and maintain the education program requirements such requirements would be made a part of CC&Rs for the Project. The educational program shall consist of the following:

1. Bi-annual email and mailers: Residents and occupants will be provided with bi-annual emails and mailers in May and in August. Mailers would be sent to each property address and property owners would receive digital copies. Property owners would be highly encouraged to share this information with tenants should they choose to rent their property. The mailers and emails would include information such as reminders about annual defensible space inspections, maintaining the Ember Resistant Zone (ERZ), how to prepare for wildfire season, evacuation information, and how to prevent wildfires. There would also be links to various resources on where to get trusted information such as County Fire, 211 LA County, and Ready LA County.
2. Website: There shall be a dedicated community website with more detailed information and resources about wildfire awareness and prevention. The website would serve as a centralized resource for the fire education program and include information from the WSP. The website will also have fire watch and red flag warning alerts, as well as information on restrictions during fire weather conditions. Residents will also be able to use the website to sign up for an annual residential defensible space inspection from the HOA Fire Committee.
3. Community workshops and webinars: Two times a year there shall be either in-person or virtual community workshops. The goal of the workshops would be to cover various fire topics more in-depth. For example, this could include having a County Fire representative come to meet the community, a workshop on how to make a go-bag, a workshop on how to make a residential evacuation plan, or how to maintain the home ignition zone.
4. New resident packet: All residents and new residents in the future shall also be presented with a wildfire awareness and safety package upon purchase or rental of a home. This would also be given to businesses as part of their employee training program. Within the package will be a link to the website which will house with the evacuation plan, a list of fire protection features, information on the regional fire hazard, prohibited activities in fire risk areas, how to build a go-bag, and a list of agencies and resources for receiving trusted information.
5. Emergency alert campaign: Residents and businesses would be encouraged to sign up for Alert LA County. Alert LA County is the mass notification system for emergency alerts, weather alerts, health notifications, building alerts, and other updates from County, State, and Federal agencies alerts, health notifications. The campaign shall occur annually and encourage residents to sign up for Alert La County. Reminders would also be sent out in the bi-annual mailers and emails, on the community website, in the workshops, and in the new resident package.
6. Fire watch groups: Within the community, there shall also be volunteer fire watch groups. These would be residents or businesses who volunteer to participate in a fire watch group for the community. During red flag warning days, this group would be responsible for reminding businesses and residents of fire-safe practices and restrictions. During red flag warning days, the fire watch group would also maintain vigilance of potential fires and would be trained on procedures for alerting County Fire in the event of a fire.
7. HOA fire safety committee: The fire safety committee shall be responsible for overseeing the maintenance of community-wide fire protection features. Residents would be able to report fire hazards or hazardous fuel conditions to the HOA committee for remediation. The committee will be responsible for the coordination of the 3rd party Fuel Modification Zone (FMZ) inspections and the volunteer residential defensible space inspections. The committee shall also be responsible for organizing and coordinating an annual education workshop on how to maintain the ERZ. The committee shall also be responsible for the creation and distribution of the educational program for the Project. The committee would serve as a communication link between County Fire and the community.

7.2.2 Measure 12: Enhanced Wildfire and Prevention and Protection

Following the certification of the Centennial EIR in 2019 by the Los Angeles County Board of Supervisors, Climate Resolve, a California nonprofit public benefit corporation, filed a petition commencing litigation in the Los Angeles County Superior Court captioned Climate Resolve v. County of Los Angeles, et al. (Case No. 19STCP01917), challenging the County's approval of the Project and its certification of the EIR.

Following the dismissal of the above lawsuit with prejudice, Climate Resolve and Centennial entered into a settlement agreement addresses the key issues identified in the Court's ruling in the Climate Resolve litigation of impacts related to climate change and wildfire. In addition to commitments that ensure Centennial will be a Net Zero GHG Project, Climate Resolve and Centennial have mutually agreed to make certain additional commitments to fund wildfire prevention, protection, and response activities within the Project, and to fund grants to improve wildfire prevention, protection, and response activities in nearby communities.

Fire Mitigation:

- Requires establishment and funding of two fire mitigation funds for up to 30 years or until Project buildout:
  - On-site Fire risk mitigation – Fire Protection Plan: $500,000/yr funding to provide for implementation of the EIR-required Wildfire Safety Plan, which identifies community fire hazard reduction measures including building, design, and fuel management requirements.
  - Off-site Fire risk mitigation. Good Neighbor Fire Protection Fund: $500,000/yr funding to provide grants to communities surrounding Tejon Ranch to plan for or implement fire reduction activities, including fuel management, to reduce off-Centennial fire risk
  - Fire Protection Plan outlining code compliance and project risk mitigation

Centennial Monitoring Group (CMG):

- Independent non-profit entity established to monitor compliance with agreement and implementation of terms.
- CMC monitors compliance with commitments made under the Settlement agreement (including fire).
- CMG to publish an Annual Report regarding compliance
- CMG has an enforcement mechanism - arbitration / award - if Centennial is found to be non-compliant.
- Centennial to fund CMG operations annually, starting at $300,000/yr and adjusting as CMG implementation workload varies.
- Will receive and disburse Good Neighbor Firewise Fund grants.

1. Centennial shall implement the Wildfire Safety Plan ("WSP"), which shall be updated and submitted to the CMG for compliance monitoring purposes any time Centennial files a tract map to include any new or state or county fire prevention, protection, and response requirements and will through CC&Rs ensure that each phase of the Project's development is at all times in compliance with then-prevailing standards and fire codes.

a. Prior to the filing of the first application for a building permit for Dwelling Units at the Project, Centennial shall cause the creation of a master Homeowners Association ("HOA") for all Dwelling Units at Centennial to fund the ongoing implementation, including education, inspections, enforcement, and corrective action, of the WSP. Such HOA shall be authorized to assess on each Dwelling Unit at the Project an ongoing, permanent fee, tax, or assessment in the total cumulative amount for the Project of no more than $500,000 per year, inflation adjusted, with a presumptive pro-rata allocation of $26.00 per Dwelling Unit ("Onsite WSP Assessment"). The HOA shall disperse funds consistent with, and to further the implementation of, the WSP.

b. Centennial shall ensure, pursuant to the WSP, that the master Homeowners Association for Centennial will hire a qualified third-party compliance inspector approved by the Los Angeles County Fire Department to conduct a fuel management zone inspection and submit a Fuel Management Report to the CMG before June 1 of each year certifying that vegetation management activities throughout the Project site have been timely and properly performed. The CMG Board will review the Fuel Management Report and will vote whether to verify ongoing compliance of the defensible space, vegetation management, and fuel modification requirements of, and any continuing obligations imposed under, the WSP.

c. Every 2 years after the first Dwelling Units are occupied, Centennial and CMG will meet with the purpose of reviewing evacuation policies and Centennial will demonstrate that they are clearly understood and communicated with residents. Centennial will also work with the HOA to promote creation of Firewise USA communities within the Project.

2. Centennial shall establish a Good Neighbor Firewise Fund, which will provide grants to needs-based applicants to be awarded by the CMG to aid communities with a population of less than 100,000 within 15 miles of the boundaries of Tejon Ranch to reduce offsite fire risks, increase fire prevention, protection and response measures, and avoid adverse impacts of fire, for the Project's residents and neighboring communities. The 100,000-population limit will be adjusted commensurately with population changes in Los Angeles, Kern and Ventura Counties as documented by each Census. Centennial shall fund the Good Neighbor Firewise Fund in the inflation-adjusted amount of $500,000 annually. CMG will review applications and award the grants to applicants based on a majority vote of the CMG Board. The grants shall be in support of the following actions:

   a. Updating planning documents and zoning ordinances, including general plans, community plans, specific plans, local hazard mitigation plans, community wildfire safety Plans, climate adaptation plans, and local coastal programs to protect against the impacts of wildfires;

   b. Developing and adopting a comprehensive retrofit strategy;

   c. Funding fire-hardening retrofits of residential units and other buildings;

   d. Reviewing and updating the local designation of lands within the jurisdiction as very high fire hazard severity zones;

   e. Implementing wildfire risk reduction standards, including development and adoption of any appropriate local ordinances, rules, or regulations;

   f. Establishing and initial funding of an enforcement program for fuel and vegetation management;

   g. Performing infrastructure planning, including for access roads, water supplies providing fire protection, or other public facilities necessary to support the wildfire risk reduction standards;

   h. Partnering with other local entities to implement wildfire risk reduction;

   i. Updating local planning processes to otherwise support wildfire risk reduction;

   j. Completing any environmental review associated with the listed activities;

k. Covering the costs of temporary staffing or consulting needs associated with the listed activities;
l. Implementing community-scale risk reduction programs to become Firewise USA sites;
m. Implementing resiliency plans such as resiliency centers with stable electricity supplies (e.g., microgrid, solar, and battery equipment) available to residents during times of power shutdowns or other emergencies; and
n. Other fire-related risk-reduction activities that may be approved by the CMG Board.

The detailed and specific actions and responsibilities outlined in the FPP and the Settlement Agreement result in a package of on and off-site fire safety that is unprecedented. The fire protection, prevention, and suppression measures combine to present a robust fire hazard reduction strategy that contributes significantly to Centennial's off-site ignition risk ratings.

7.2.3 Measure 13: Master HOA Enforcement of CC&Rs Through Monetary Penalties

To promote enforcement of the CC&Rs, the governing documents of the Master HOA shall vest the governing board of the Master HOA with authority to impose fines on any homeowner who violates any provision of the CC&R related to Fire Safety Requirements, and shall establish a schedule of reasonable monetary penalties to be assessed by the Master HOA against any homeowner that violates any provision of the CC&Rs related to Fire Safety Requirements. The required schedule of monetary penalties shall also be included as part of a general CC&R enforcement policy to be adopted and administered by the governing board of the Master HOA, which policy shall describe in detail the steps to be followed in enforcing the Master HOA governing documents and CC&Rs. As provided in California Civil Code Section 5855, no fine shall be assessed against a homeowner for violating a provision of the CC&Rs related to Fire Safety Requirements unless and until the Master HOA first conducts a hearing on the alleged violation. At least ten days advance notice must be provided to the relevant homeowner of the date and time of the hearing, the general nature of the allegation of rules violation against such homeowner, and informing such homeowner that they have the right to attend such hearing and to address the governing board.

7.2.4 Measure 14: Master HOA Ongoing Maintenance

The governing documents of the Master HOA shall provide that the Master HOA is responsible for the long-term funding and ongoing maintenance of private roads and fire protection systems, including fire sprinklers and private fire hydrants. The Master HOA governing documents shall also provide that the Master HOA is responsible for the long-term funding and implementation of all fuel modification vegetation management in Project common areas, including but not limited to roadsides (including a minimum of 20 feet clearance on each side of roads within the Project development footprint adjacent to open space areas), open space and landscape areas, and fuel modification zones. In addition, the Master HOA shall establish a reverse 9-1-1 system capable of contacting every listed telephone number in the community by computer at a rate of at least 250 calls per minute.

7.2.5 Measure 15: Fire Protections Education Committee

The governing documents of the Master HOA shall establish a Fire Protection Education Committee (FEPC) The purpose of the FEPC shall be to (i) promote education programs and tools that provide information to Project homeowners about the Project's overall Fire Safety Requirements and about each homeowner's individual obligations thereunder; (ii) promote education programs and tools that provide information about wildland fire

ecology, management, protection, and prevention; and (iii) coordinate with the LACoFD and other stakeholders to identify opportunities for improvement in all areas of wildland fire communication, education, protection, and prevention.

The governing documents of the Master HOA shall require the FEPC to prepare and implement of a community-wide fire education program based on the Firewise Communities structure and designed to establish the community as a Firewise USA site and to fully educate Project homeowners of their various responsibilities under the Fire Safety Requirements, including but not limited to maintaining fuel management zones areas on their respective properties. The Project master developer shall ensure that development and ongoing implementation such fire education program is funded by assessment district or by permanent and irrevocable property owner fees.

The FEPC shall annually conduct on-site community fire safety education and training programs, which programs shall be undertaken in coordination with the LACoFD's Community Risk Reduction Unit to the extent feasible or other qualified subject-matter experts, and which shall include community education regarding implementation of the Project's required FMP and ERP, and shall ensure that copies of such plans are provided to all Project homebuyers at the initial point of sale.

The FEPC shall also post on the community intranet information regarding the importance of maintaining fuel management areas in accordance with the FMP, complying with the Project's fire-resistant landscape plan, implementing all applicable Fire Safety Requirements, and regularly reviewing and becoming familiar with the Project's ERP. Complete copies of the FMP and ERP shall also be made accessible for download from the community intranet. LACoFD shall review and approve all wildfire educational material/programs before printing and distribution by the FEPC. In addition, the FEPC shall ensure that annual reminder notices are provided to each homeowner reminding them review the ERP and stay familiar with community evacuation protocols.

The FEPC shall also provide Project homebuyers, at the initial point of sale, educational materials about the health and safety benefits of emergency preparation and the need to maintain adequate emergency response supplies, such as a seven-day supply of potable water and food and solar-powered batteries for communication and refrigeration, to respond to earthquakes and other potential disasters, at the initial point of property sale, and annually thereafter in Property Owner Association Website Notices.

The FEPC shall coordinate with commercial vendors of emergency response supplies and solar batteries in order to secure discounts or other preferential terms to Project site occupants, and shall include a list of such vendors on the community intranet and in educational materials published by the FEPC.

7.2.6 Measure 16: Third-Party Compliance Inspectors

To confirm that the Project’s fuel management zones and landscape areas are being maintained according to the Fire Safety Requirements and the LACoFD’s fuel modification guidelines, the Master HOA shall obtain a fuel management zone inspection and report from a qualified LACoFD-approved third-party inspector in May/June of each year certifying that vegetation management activities throughout the Project site have been timely and properly performed. If the third-party inspector determines that a fuel management zone or landscape area is not compliant with all applicable fire-safety standards, the Master HOA shall have a specified period, not to exceed sixty days, to correct any noted issues so that a re-inspection can occur, and certification can be achieved. Annual inspection fees may be subject to the current Fire Department Fee Schedule.

7.3 2019 EIR MMRP Requirements

7.3.1 Measure 17: Emergency Response Plan

The Project shall prepare an Emergency Response Plan (ERP), which shall be updated as needed for each Tentative Map and shall be submitted to the County (California Department of Forestry and Fire; and County Fire Department and/or County Sheriff's Department) for review and approval. The ERP will utilize existing information from Los Angeles County Office of Emergency Management, coordinate with County emergency planners, and provide site specific procedures for various emergency situations including wildfire. As required by the DA, the Property Owners shall require future residential and commercial property owners associations to develop and implement an emergency preparation and response plan, including shelter-in-place and evacuation plans as well as first aid and emergency electric power supplies.

7.3.2 Measure 18: Implementation Plan

An Implementation Plan, including fire risk abatement measures (including but not limited to vegetation management) required to comply with State and County fire prevention and response legal requirements shall be submitted as part of any application for a tentative subdivision map for those portions of the Project site that border an SEA or mitigation preserve area. The Implementation Plan must include: (a) a summary of applicable State and County fire risk abatement requirements; (b) a prohibition on the use of vegetation clearance within SEA 17 or mitigation preserve areas. The Implementation Plan shall be submitted to the County for approval with the first tentative map and shall be updated to include new or modified State or County fire risk abatement requirements as part of each subsequent tentative tract map submittal.

7.3.3 Measure 19: Identify Fire Station Locations

As required by the MMRP and DA, the Project shall provide at least three and up to four fully equipped fire stations on site. Per the DA, Fire Station # 1 must be a station of 10,000 square feet, Fire Station # 2 must be a station of 13,000 square feet, and Fire Station #3 must be a station of 10,000 square feet. Per the DA, two fire station sites shall have a building pad consisting of a net buildable area of 1.25 acres, and one shall have a net buildable area of 4 acres. All on-site fire stations must be fully equipped in accordance with applicable LACoFD standards. The general locations of the three required fire stations will be situated as identified on 2019 EIR Exhibit 4-1, but LACoFD shall have final approval over all fire station site locations. Per the DA, the final location of Fire Station #1 will be determined when a tentative map is approved for the Project's 1,000th residential unit, and the final locations of Fire Stations #2 and #3 will be determined at the time of any tentative map is approved for a Project residential unit that is located outside of a fire station's five-minute response time radius. Per the DA and MMRP, it remains to be determined whether the Project will be required to construct a fourth fire station, but such determination shall be made by LACoFD and shall be based on need established pursuant to MMRP Mitigation Measure MM 16-1 from the 2019 EIR. Finally, until such time as the Developer has conveyed to LACoFD and approved, operational and equipped fire station on the Project site, the applicant shall pay developer fees in accordance with the LACoFD Developer Fee Program, as provided in 2019 EIR MMRP Mitigation Measure 16-2. Existing LACoFD Fire Station #77 shall serve the Project site until such time as Fire Station #1 is operational.

7.3.4 Measure 20: Construct and Equip Fire Stations

As required by the MMRP, for each tentative subdivision map that includes a fire station site (as discussed in Section 3(a)(vii) of this FPP), the applicant must construct, equip, and convey title to such fire station prior to final subdivision map approval. Per the DA, each fire station must be equipped to be compatible with LACoFD's Development Impact Mitigation Agreement standards.

7.3.5 Measure 21: Ban on Wood Burning Fireplaces

As required by the MMRP, the Project's plans and specifications shall prohibit wood-burning fireplaces in single-family residences throughout the Project site. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home.

7.4 Specific Plan Requirements

7.4.1 Measure 22: Fire-safe Sign Requirements

As required by the Specific Plan, no sign shall be installed, relocated, or maintained so as to prevent free ingress to or egress from any door, window, or fire escape. In addition, no sign of any kind shall be attached to a standpipe or fire escape, except those signs required by other applicable codes or ordinances. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home. During project operation, this Fire Safety Requirement shall be enforced by the Master HOA.

7.4.2 Measure 23: Master HOA Formation and CC&R Recordation

Per the Specific Plan, a non-profit Master HOA shall be formed, and the Master HOA's declaration of conditions, covenants, and restrictions (CC&Rs) will be recorded after the recordation of the Project's first final subdivision map consisting of one or more residential lots and prior to the date of the first transfer of any residential lot to a person other than the subdivider. As additional final maps are approved and recorded, the Project area covered by those maps will be annexed by the Master HOA to ensure that control of development and implementation of the CC&Rs can be maintained. Per the Specific Plan and the MMRP, the applicant for a final map shall submit to the Department of Regional Planning the form of CC&Rs so that it may confirm that new homeowners will be informed about their responsibilities under the Fire Safety Requirements. Per Title 32 of the County Code, a copy of the recorded CC&Rs describing the fuel modification requirements must be provided to the LACoFD's Forestry Division.

To the extent permitted by the California Department of Real Estate, the CC&Rs for each final map shall include provisions obligating each homeowner to comply with all of the Fire Safety Requirements applicable to that homeowner's lot and residential unit, including but not limited to all Fire Safety Requirements that (i) mandate the use of fire-safe landscaping techniques, (ii) require the maintenance of fuel modification zones on their property, (iii) prohibit the use of wood fireplaces, (iv) prohibit the installation, relocation, or maintenance of any sign so as to prevent free ingress to or egress from any door, window, or fire scape; (v) mandate the use of code compliant spark

arrestors in chimneys of any fireplace, barbeque, or any heating appliance in which solid or liquid fuel is used; (vi) mandate that only Class A fire rated roof coverings be used when maintaining or repairing roof coverings; (vii) mandate that exterior windows, window walls, glazed doors, and glazed openings in exterior doors only be repaired or replaced code compliant materials (e.g., multi-pane glazing units with a minimum of one tempered pane); and (viii) require that access be provided for biannual fuel modification zone inspections.

7.4.3 Measure 24: Community Forester

In accordance with the Specific Plan, the Master HOA shall hire a Community Forester who is trained in urban forestry, arboriculture, horticulture, or landscape architecture to undertake tree management responsibilities. The Community Forester will also coordinate FMZs 3rd party inspections on the Project site. The Community Forester is required to developing a policy for managing public trees on the Project site and educating Project residents about the importance of trees in the community, and is responsible for implementing the Project's fire-resistant landscape plan. The Specific Plan further requires the Community Forester to develop programs that involve community organizations and residents in tree preservation, planting and tree care so as to ensure that community trees are, among other things, maintained in accordance with all Fire Code access requirements. Per the Specific Plan, the Community Forester must also prepare an annual tree management plan and implement programs to improve the communities tree canopy in a manner that complies with all Fire Code and LAFCD requirements. In addition, the Specific Plan requires the Community Forester to maintain the Project's fire-resistant plant palette and to consult with the County's staff biologist regarding proposed revisions to the community plant palette described in the Specific Plan. However, the LAFCD shall have final approval over the final plant palette for fuel modification zones and modifications thereto.

7.5 Additional Requirements

7.5.1 Measure 25: Community Wildfire Evacuation Plan

The Project shall formally adopt, practice, and implement a “Ready!, Set!, Go!” approach to evacuation through the creation of a Wildland Fire Evacuation Plan (WFEP) for the Project. The WFEP would be based on standard evacuation planning used by the Los Angeles County Office of Emergency Services and provide residents and occupants with potential egress route information and procedures. The WFEP would be provided to the Centennial residents and commercial tenants and posted on the community website. The WFEP would be reviewed by residents at least annually through organized meetings and educational outreach by the HOA, Community Services District, or other means. Every ten years the WFEP will be reviewed and updated by the HOA or similar entity based on current land use, evacuation polies, and regulations. The WFEP will be available for review and input from County Fire and County sheriff.

8 Conclusion

The Certified EIR for the 2019 Approved Project found that after regulatory compliance and incorporation of mitigation measures, the 2019 Approved Project's wildfire impacts would be less than significant. The Certified EIR also determined that the Project would have a less than significant impact on adopted emergency response plans or emergency evacuation plans based on the location of fire stations, a system of improved roads, and fire flows for the 2019 Approved Project. The Project is not anticipated to increase or exacerbate the wildfire risks analyzed in the Certified EIR. Moreover, the requirements and recommendations set forth in this WSP meet fire safety, building design elements, infrastructure, fuel management/modification, and landscaping recommendations of the applicable codes defined in Section 3 Fire Safety Requirements – Regulatory Requirements and Design Features and summarized in Tables 18 and 19 below. The measures provided in this WSP also have been designed specifically for the proposed construction of structures within a VHFHSZ area. The goal of the fire protection features, both required and those offered above and beyond the Codes, provided for the Project is to provide the structures with the ability to survive a wildland fire with little intervention from firefighting forces. The fire protection system provided for the Project site includes a redundant layering of code-compliant, fire-resistant construction materials, and methods that have been shown through post-fire damage assessments to reduce the risk of structural ignition. When properly implemented on an ongoing basis, the fire protection strategies listed in this WSP, summarized in Tables 20 and Table 21, should significantly reduce the potential fire threat to the community, its structures, and the surrounding area. Additionally, the Project should assist LACoFD in responding to emergencies through improved fire access, increased water capacity, and enhanced firefighting resources. Given the Project's adherence to code and regulations and the inclusion of project-designed code exceeding features, the Project is not expected to pose or be impacted significantly by wildfire.

Study Limitations

Note: fire is a dynamic and somewhat unpredictable occurrence. As such the WSP does not guarantee that a fire will not occur or will not result in injury, loss of life, or loss of property. There are no warranties, expressed or implied, regarding the suitability or effectiveness of the recommendations and requirements in this WSP, under all circumstances. The Project's developers, contractors, engineers, and architects are responsible for the proper implementation of the concepts and requirements set forth in the WSP. It will be extremely important for all homeowners, property managers, and occupants to comply with the recommendations and requirements described and required by the WSP on their property. Homeowners and property managers are also responsible for maintaining their structures and lots, including fuel modification and landscape, as required by this WSP, LA County Fire, and as required by the LA County Fire Code. It is recommended that the homeowners or other occupants who may reside within the Project adopt a conservative approach to fire safety. The approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go" stance on evacuation. The HOA or similar entity would be responsible for ongoing education and maintenance of the common areas, and County Fire would enforce the vegetation management requirements detailed in this WSP. Such requirements would be made a part of deed encumbrances and CC&Rs for each lot, as appropriate. Alternative methods of compliance with this WSP can be submitted to the fire authority for consideration.

Table 20. Primary Code Required Fire Safety Features

Feature No.	Description
1	**Proximity to Fire Stations.** The Project is within LA County Fire's response time goals for initial response. The overall call volume has a less than significant impact on the planned response capacity. Response capacity would be enhanced by three on-site fire stations within the community that will provide a fast response throughout the Project Area.
2	**Ignition Resistant Construction.** All structures within the Project are will be constructed of ignition-resistant construction materials consistent with wildfire protection building construction requirements contained in the Los Angeles Building Code including Los Angles Building Code Title 26 Chapter 7A, Los Angeles County Residential Code Section R327, and Los Angeles County Reference Standards Code Chapter 12-7A. These requirements include ignition resistance construction and are a key component in preventing structural ignition *(Section 3.5 Structural Ignition Resistance Regulatory Requirements).*
3	**Automatic Interior Fire Sprinklers.** Per LA County Fire Code all structures of any occupancy type within the Project will be equipped with an NFPA 13, 13R, and 13D automatic sprinkler system. Automatic sprinklers prevent ember generation by structure fires, isolate fires to the point of origin, and limit fires from spreading within the building. *(Section 3.6.3 Automatic Fire Sprinkler System)*
4	**Fuel Modification Zones.** Per State Fire Code Section 4906 defensible space shall be maintained around all within and structures in all unincorporated land designated as SRA. Consistent with PRC 4290, SRA Fire Safe Regulations, California Code of Regulation Title 14 Division 1.4 Chapter 7 Subchapter 2 Section 1270, and Los Angeles County Fire Code Title 32 Section 4908.1 the Project will provide 100 feet from the exterior of structures toward the undeveloped wildland areas that are divided into a 30-foot wide irrigation Zone A and a 70 foot wide thinning Zone B. The FMZs reduce fire intensity and flame lengths from fires in wildland areas advancing towards structures or vice versa. *(Section 3.2 Defensible space and Vegetation Management Regulatory Requirements)*
5	**Roadside Fuel Modification Zones.** The internal roadways will be maintained with a minimum of 20 feet to 50 feet total width of vegetation clearance that is clear to the sky to allow for fire apparatus access and prevent vehicle-based ignitions. All flammable vegetation or other combustible growth shall be removed on each side of the roadway for a minimum of 10 feet per County Fire Code Title 32 Section 325.10*. (Section 3.3.1 Roadway Fuel Modification Zones)*
6	**Fire Access infrastructure Conditions.** All Project access will be consistent with County Roadway Standards defined in Title 21 and the 2020 CFC Section 503. Typical interior roads will have a minimum width of 24 feet width of unobstructed access. 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 75,000-lb. fire apparatus load. Fire apparatus access roads shall not exceed 15 percent in grades. Dead-end roads and cul-de-sacs will comply with Title 21 to ensure fire apparatus access. Per the Subdivision Ordinance, each tentative map application and approved tentative map must demonstrate that Project internal circulation system, site access, road dimensions, road connectivity, and other standards related to fire apparatus access are consistent with all applicable County's roadway and fire code standards.
7	**Water Availability**. Water capacity and delivery will provide for a reliable water source for operations and during emergencies requiring extended fire flow. Water supply will be consistent with County Title 20, Section 20.16.060 for fire flow and fire hydrant requirements within a VHFHSZ*. (Section 3.6.1 Water Supply and Section 3.6.1 Hydrants)*

Table 20. Primary Code Required Fire Safety Features

Feature No.	Description
8	**Ember Resistant Zone** Although not currently required by law, the Project will also include an Ember Resistant Zone (ERZ) within Zone A, consistent with PRC 4291 to include more intense fuels reduction within the immediate vicinity of structures.[8] The ERZ is from the 5 feet of a structure and includes the area under and around all attached decks. The ERZ forces on preventing structure ignition via ember showers by reducing/eliminating all combustible within this zone. *(Section 3.2 Defensible space and Vegetation Management Regulatory Requirements)*
9	**Underground Utilities**. As required by the County's subdivision ordinance, all tentative map applications must depict the location of proposed utility easements. As required by applicable standards, all of the Project's horizontal utilities, including but not limited electric transmission lines, will be installed underground to significantly reduce the potential for equipment-related fire starts.

[8] Assembly Bill 3074, passed into law in 2020, which requires a third zone for defensible space and amends PRC 4291. The amendment requires the Board of Forestry and Fire Protection to develop the regulation for the new ember-resistant zone (ERZ) within 0 to 5 feet of a structure by January 1, 2023. CAL FIRE currently recommends the implementation of an ERZ. In anticipation of the ERZ requirements becoming codified in PRC 4291, the ERZ has been included in the defensible space requirements for the Project. The above listed requirements are based on the current recommendations for creating an ERZ detailed on CAL FIRE Defensible Space website (https://www.fire.ca.gov/programs/communications/defensible-space-prc-4291/). These requirements will be reviewed and updated once the Board of Forestry and Fire Protection updates the regulations for the ERZ in PRC 4291.FIRE Defensible Space website (https://www.fire.ca.gov/programs/communications/defensible-space-prc-4291/). These requirements will be reviewed and updated once the Board of Forestry and Fire Protection updates the regulations for the ERZ in PRC 4291.

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
1	**Construction Wildfire Prevention Plan.** Prior to any construction activities, a detailed Construction Fire Prevention Plan (CFPP) shall be implemented for the Project and submitted to the County of Los Angeles for review and approval. The CWSP shall designate fire safety measures to reduce the possibility of fires during construction activities, including fire watch during hot works and heavy machinery activities (e.g., welding), spark arresters on all equipment, water supply via hose lines attached to hydrants, or a water tender pursuant to County Fire requirements, red flag period restrictions, and mandatory on-site fire resources. Employees would be presented with basic prevention fire training upon employment and the on-site safety officer and/or supervisor/foreman shall maintain documentation of training. Training shall consist of the Project WSP requirements, review of Occupation Safety and Health Administration (OSHA) Fire Protection and Prevention, proper response and notification of a fire, and the use of fire extinguishing equipment. A site safety office shall be responsible for the implementation of the CWSP, ensuring fire control equipment is maintained in good working conditions, monitoring combustibles onsite, conducting fire safety surveys, posting fire rules in an area visible to employees, stopping work activities that pose a fire hazard or are not in compliance with the CWSP, and reporting all fire ignited on-site to County Fire. (*Section9: Project-Specific Recommend Mitigation Measures)*	Prior to and during construction	Applicant Contractor	County Fire
2	**Pre-Construction Requirements.** Prior to bringing lumber or combustible materials related to building construction onto the Project Site, site improvements within the active development area shall be in place, including utilities, operable fire hydrants, and an approved, temporary roadway surface and fuel modification zones shall be established. Combustible materials may be utilized onsite prior to stated site improvements as needed for providing the improvements (e.g., wood forms for cast-in-place concrete). County Fire will approve site improvement prior to the issuance of the building permits. (*Section9: Project-Specific Recommend Mitigation Measures)*	Prior to issuance of a building permit	Applicant Contractor	County Fire
3	**Annual Fuel Modification Maintenance.** All vegetation management with the FMZs and common areas shall be completed annually by May 1 of each year. Vegetation management may be completed more often for fire safety if determined necessary by County Fire. The Project HOA or equivalent entity shall be responsible for the annual maintenance of all vegetation management within the Fuel Modification	During Operation, Annually by May 1st	HOA	County Fire

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	Zones (FMZs) in the common areas ensuring compliance with County fuel modification guidelines. Property owners will be responsible for maintaining the Ember Resistant Zone (ERZ) and any fuel modification within their property. The annual maintenance would be managed and maintained by the Project HOA through a qualified contractor that shall be required to meet fire safety requirements regarding equipment, the timing of maintenance, and fire suppression capabilities. Maintenance activities would include but not be limited to removing dead and dying material, removing undesirable plant species, and conducting thinning activities to maintain adequate spacing requirements. The Project HOA or similar entity shall be responsible for ensuring the long-term funding and ongoing compliance with all provisions of the WSP including, vegetation planting, fuel modification of the perimeter areas, vegetation management on all common areas including roadsides, and open space areas under their control. The Project HOA shall be responsible for the implementation of the mitigation measure and County Fire shall be responsible for FMZ maintenance meets County requirements. (*Section9: Project-Specific Recommend Mitigation Measures)*			
4	**Annual Fuel Modification Inspection.** By June 1 of each year, a third-party inspector shall be hired by the Project HOA or equivalent entity to conduct an annual inspection of the Fuel Modification Zones (FMZs), including the Ember Resistant Zone (ERZ) and FMZs that are within private property. The inspector would evaluate the FMZs for compliance with regulations and that they are operating accordingly. The inspector shall notify the HOA of any non-compliant FMZs, recommend measures for remediation, and a timeframe for reinspection. The Project HOA shall be responsible for the long-term funding of the inspections. An inspection report shall be submitted to County Fire each year documenting inspection results to ensure compliance with County FMZ requirements. (*Section9: Project-Specific Recommend Mitigation Measures)*	During Operation, Annually by June 1st	HOA	County Fire
5	**Landscape Plan.** The Project Applicant/Developer shall develop a Landscaping Plan for review and approval by the County Biologist for each tentative map application submittal. The Landscaping Plan must be prepared by a qualified biologist and include a plant palette composed of fire-resistant, non-invasive species that are adopted to the conditions found on the Project site and do not require high irrigation rates. The MMRP further requires that the Landscaping Plan shall also	Tentative Map Stage	Applicant	County Fire

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	include a list of invasive plant species prohibited from being planted or sold on the Project site and encourage planting of local natives typical of native vegetation within ten miles of the Project site. The Specific Plan's Green Development Program and Hillside Design Guidelines further require the Project to implement fire-safe landscaping techniques consistent with the Specific Plan's plant palette to reduce fire risks to biological resources and human safety in the fuel modification zones, and landscaping in a manner that, among other things, increases fire protection, respectively. Additionally, the Project's Specific Plan requires landscaping in the plan's Open Space Zone to be dominated by native and/or drought tolerant trees, shrubs and ground cover, taking into consideration fuel modification requirements, such as using plants that are fire resistant and avoid plants with characteristics that make them more readily combustible such as plants with oils, wax or resin content, plants that accumulate dead material or shed bark, and/or plants that grow rapidly. Plants selected will be consistent with LACoFD Planting Guideline regarding prohibited species and appropriate plant spacing with respect to zone location. Finally, the MMRP requires that the map applicant ensure that the approved Landscape Plan be provided to Project builders and all future Project occupants.			
6	**Construction Traffic Control Plan.** The applicant must include in its application for any tentative map involving construction within the State Route 139 right-of-way a Traffic Control Plan prepared in accordance with the California Manual on Uniform Traffic Control Devices and approved by the California Department of Transportation (Caltrans). The MMRP further requires that all construction activities in the public right-of-way comply with the Traffic Control Plan to the satisfaction of Caltrans. The Traffic Control Plan shall ensure code-compliance access for fire apparatus and first responder vehicles.	Tentative Map Stage	Applicant	Caltrans
7	**Fire Access Infrastructure Conditions.** Per the Subdivision Ordinance, each tentative map application and approved tentative map must demonstrate that Project internal circulation system, site access, road dimensions, road connectivity, and other standards related to fire apparatus access are consistent with all applicable County's roadway and fire code standards.	Tentative Map Stage	Applicant	County Fire

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
8	**Underground Utilities**. As required by the County's subdivision ordinance, all tentative map applications must depict the location of proposed utility easements. As required by applicable standards, all of the Project's horizontal utilities, including but not limited electric transmission lines, will be installed underground to significantly reduce the potential for equipment-related fire starts.	Tentative Map Stage	Applicant	County Fire
9	**Fuel Modification Plan**. Per the MMRP, the Project must prepare a Fuel Management Plan (FMP) demonstrating compliance with the Fire Code, which must be peer-reviewed by the California Department of Forestry and Fire Protection (CAL FIRE) and approved by LACoFD prior to recordation of the Project's first final subdivision map. An important component of a fire protection system for the Project is the provision for fire resistant landscapes and modified vegetation buffers. The FMP will establish Fuel Management Zones (FMZs) designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from fire advancing off-site or on-site by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs were originally developed by CAL FIRE to protect natural resources from urban area fires and over the years, have become essential to setting urban areas back from wildland areas with a dual role of protection structures and people while buffering natural areas from urban ignitions, reducing potential for urban fires to spread into wildland areas.	Final Map Stage	Applicant	County Fire
10	**Confirmation of Code Compliance.** At the building permit and site plan review stage of Project development, the County will confirm that all building plans comply with all applicable codes. The Project shall comply with applicable portions of Title 32 of the Los Angeles County Code, as amended, which adopts by reference the 2022 edition of the California Fire Code (CFC). The Project also shall comply with Chapter 7A of the 2022 California Building Code (CBC),the 2022 California Residential Code, Section 237; and the 2019 Edition of the International Fire Code as adopted by the County. The Project would also be subject to the provisions of section 4291 of the Public Resources Code regarding brush clearance standards around structures and the Los Angeles County Fire Department guidelines for Fuel Modification Plans. The Project is required to comply with all future code updates as development proceeds. Code compliance shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy.	Building Permit Stage of Site Plan Review	Applicant	County Fire, County Building Inspectors

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
11	**HOA Wildfire Education Program.** The Project residents and occupants shall be provided with ongoing education regarding wildfire, the WSP, and the Wildfire Evacuation Plan. The education program would support fire safety, evacuation practices, and fire safety features designed for the community. The Centennial Wildfire Education Program would provide target outreach to residents and occupants living in a fire risk area and would be a layered approach to maintaining high wildfire risk awareness that includes active and passive features. Contents of the educational program would be reviewed and approved by County Fire before printing and distribution. The Project HOA or similar entity shall be responsible for the ongoing funding and maintenance of the wildfire education program. The educational program shall consist of the following: 1. **Bi-annual email and mailers:** Residents and occupants will be provided with bi-annual emails and mailers in May and in August. Mailers would be sent to each property address and property owners would receive digital copies. Property owners would be highly encouraged to share this information with tenants should they choose to rent their property. The mailers and emails would include information such as reminders about annual defensible space inspections, maintaining the Ember Resistant Zone (ERZ), how to prepare for wildfire season, evacuation information, and how to prevent wildfires. There would also be links to various resources on where to get trusted information such as County Fire, 211 LA County, and Ready LA County. 2. **Website:** There shall be a dedicated community website with more detailed information and resources about wildfire awareness and prevention. The website would serve as a centralized resource for the fire education program and include information from the WSP. The website will also have fire watch and red flag warning alerts, as well as information on restrictions during fire weather conditions. Residents will also be able to use the website to sign up for an annual residential defensible space inspection from the HOA Fire Committee. 3. **Community workshops and webinars**: Two times a year there shall be either in-person or virtual community workshops. The goal of the workshops would be to cover various fire topics more in-depth. For example, this could include having a County Fire representative come to meet the community, a	During Operation	HOA	County Fire

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	workshop on how to make a go-bag, a workshop on how to make a residential evacuation plan, or how to maintain the home ignition zone. 4. **New resident packet:** All residents and new residents in the future shall also be presented with a wildfire awareness and safety package upon purchase or rental of a home. This would also be given to businesses as part of their employee training program. Within the package will be a memory stick with the evacuation plan, a list of fire protection features, information on the regional fire hazard, prohibited activities in fire risk areas, how to build a go-bag, and a list of agencies and resources for receiving trusted information. 5. **Emergency alert campaign**: Residents and businesses would be encouraged to sign up for Alert LA County. Alert LA County is the mass notification system for emergency alerts, weather alerts, health notifications, building alerts, and other updates from County, State, and Federal agencies. The campaign shall occur annually and encourage residents to sign up for Alert La County. Reminders would also be sent out in the bi-annual mailers and emails, on the community website, in the workshops, and in the new resident package. 6. **Fire watch groups:** Within the community, there shall also be volunteer fire watch groups. These would be residents or businesses who volunteer to participate in a fire watch group for the community. During red flag warning days, this group would be responsible for reminding businesses and residents of fire-safe practices and restrictions. During red flag warning days, the fire watch group would also maintain vigilance of potential fires and would be trained on procedures for alerting County Fire in the event of a fire. 7. **HOA fire safety committee:** The fire safety committee shall be responsible for overseeing the maintenance of community-wide fire protection features. Residents would be able to report fire hazards or hazardous fuel conditions to the HOA committee for remediation. The committee will be responsible for the coordination of the 3rd party Fuel Modification Zone (FMZ) inspections and the volunteer residential defensible space inspections. The committee shall also be responsible for organizing and coordinating an annual education workshop on how to maintain the ERZ. The committee shall also be responsible for the creation and distribution of the educational program			

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	for the Project. The committee would serve as a communication link between County Fire and the community. (*Section 7 Wildland Fire Evacuation and Education Program*)			
12	**Enhanced Wildfire Prevention and Protection Measures (2021 Settlement Agreement).** In addition to commitments that ensure Centennial will be a Net Zero GHG Project, Climate Resolve and Centennial have mutually agreed to make certain additional commitments to fund wildfire prevention, protection, and response activities within the Project, and to fund grants to improve wildfire prevention, protection, and response activities in nearby communities. See Section 7.7 for a complete description of the requirements outlined in the settlement agreement.	During Operation	Applicant	Centennial Monitoring Group (CMG)
13	**Master HOA Enforcement of CC&Rs Through Monetary Penalties.** To promote enforcement of the CC&Rs, the governing documents of the Master HOA shall vest the governing board of the Master HOA with authority to impose fines on any homeowner who violates any provision of the CC&R related to Fire Safety Requirements, and shall establish a schedule of reasonable monetary penalties to be assessed by the Master HOA against any homeowner that violates any provision of the CC&Rs related to Fire Safety Requirements. The required schedule of monetary penalties shall also be included as part of a general CC&R enforcement policy to be adopted and administered by the governing board of the Master HOA, which policy shall describe in detail the steps to be followed in enforcing the Master HOA governing documents and CC&Rs. As provided in California Civil Code Section 5855, no fine shall be assessed against a homeowner for violating a provision of the CC&Rs related to Fire Safety Requirements unless and until the Master HOA first conducts a hearing on the alleged violation. At least ten days advance notice must be provided to the relevant homeowner of the date and time of the hearing, the general nature of the allegation of rules violation against such homeowner and informing such homeowner that they have the right to attend such hearing and to address the governing board.	Project Operations	HOA	Centennial Monitoring Group
14	**Master HOA Ongoing Maintenance.** The governing documents of the Master HOA shall provide that the Master HOA is responsible for the long-term funding and ongoing maintenance of private roads and fire protection systems, including fire sprinklers and private fire hydrants. The Master HOA governing documents shall	Project Operations	HOA	Centennial Monitoring Group

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	also provide that the Master HOA is responsible for the long-term funding and implementation of all fuel modification vegetation management in Project common areas, including but not limited to roadsides (including a minimum of 20 feet clearance on each side of roads within the Project development footprint adjacent to open space areas), open space and landscape areas, and fuel modification zones. In addition, the Master HOA shall establish a reverse 9-1-1 system capable of contacting every listed telephone number in the community by computer at a rate of at least 250 calls per minute.			
15	**Fire Protections Education Committee.** The governing documents of the Master HOA shall establish a Fire Protection Education Committee (FEPC) The purpose of the FEPC shall be to (i) promote education programs and tools that provide information to Project homeowners about the Project's overall Fire Safety Requirements and about each homeowner's individual obligations thereunder; (ii) promote education programs and tools that provide information about wildland fire ecology, management, protection, and prevention; and (iii) coordinate with the LACoFD and other stakeholders to identify opportunities for improvement in all areas of wildland fire communication, education, protection, and prevention. See Section 7.23 for a complete description of this measure.	Project Operations	HOA	Centennial Monitoring Group
16	**Third-Party Compliance Inspectors.** To confirm that the Project's fuel management zones and landscape areas are being maintained according to the Fire Safety Requirements and the LACoFD's fuel modification guidelines, the Master HOA shall obtain a fuel management zone inspection and report from a qualified LACoFD-approved third-party inspector in May/June of each year certifying that vegetation management activities throughout the Project site have been timely and properly performed. If the third-party inspector determines that a fuel management zone or landscape area is not compliant with all applicable fire-safety standards, the Master HOA shall have a specified period, not to exceed sixty days, to correct any noted issues so that a re-inspection can occur and certification can be achieved. Annual inspection fees may be subject to the current Fire Department Fee Schedule.	Project Operations	HOA	Centennial Monitoring Group
17	**Emergency Response Plan.** The Project shall prepare an Emergency Response Plan (ERP), which shall be updated as needed for each Tentative Map, and shall be submitted to the County (California Department of Forestry and Fire; and County Fire Department and/or County Sheriff's Department) for review and approval. The	Tentative Map Stage	Applicant	County Fire and County Sherrif

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	ERP will utilize existing information from Los Angeles County Office of Emergency Management, coordinate with County emergency planners, and provide site specific procedures for various emergency situations including wildfire. As required by the DA, the Property Owners shall require future residential and commercial property owners associations to develop and implement an emergency preparation and response plan, including shelter-in-place and evacuation plans as well as first aid and emergency electric power supplies.			
18	**Implementation Plan.** An Implementation Plan, including fire risk abatement measures (including but not limited to vegetation management) required to comply with State and County fire prevention and response legal requirements shall be submitted as part of any application for a tentative subdivision map for those portions of the Project site that border an SEA or mitigation preserve area. The Implementation Plan must include: (a) a summary of applicable State and County fire risk abatement requirements; (b) a prohibition on the use of vegetation clearance within SEA 17 or mitigation preserve areas. The Implementation Plan shall be submitted to the County for approval with the first tentative map and shall be updated to include new or modified State or County fire risk abatement requirements as part of each subsequent tentative tract map submittal.	Tentative Map Stage	Applicant	County Fire
19	**Identify Fire Station Locations**. As required by the MMRP and DA, the Project shall provide at least three and up to four fully equipped fire stations on site. Per the DA, Fire Station # 1 must be a station of 10,000 square feet, Fire Station # 2 must be a station of 13,000 square feet, and Fire Station #3 must be a station of 10,000 square feet. Per the DA, two fire station sites shall have a building pad consisting of a net buildable area of 1.25 acres, and one shall have a net buildable area of 4 acres. All on-site fire stations must be fully equipped in accordance with applicable LACoFD standards. The general locations of the three required fire stations will be situated as identified on 2019 EIR Exhibit 4-1, but LACoFD shall have final approval over all fire station site locations. Per the DA, the final location of Fire Station #1 will be determined when a tentative map is approved for the Project's 1,000th residential unit, and the final locations of Fire Stations #2 and #3 will be determined at the time of any tentative map is approved for a Project residential unit that is located outside of a fire station's five-minute response time radius. Per the DA and MMRP, it remains to be determined whether the Project will be required	Tentative Map Stage	Applicant	County Fire

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	to construct a fourth fire station, but such determination shall be made by LACoFD and shall be based on need established pursuant to MMRP Mitigation Measure MM 16-1 from the 2019 EIR. Finally, until such time as the Developer has conveyed to LACoFD and approved, operational and equipped fire station on the Project site, the applicant shall pay developer fees in accordance with the LACoFD Developer Fee Program, as provided in 2019 EIR MMRP Mitigation Measure 16-2. Existing LACoFD Fire Station #77 shall serve the Project site until such time as Fire Station #1 is operational.			
20	**Construct and Equip Fire Stations**. As required by the MMRP, for each tentative subdivision map that includes a fire station site (as discussed in Section 3(a)(vii) of the FPP), the applicant must construct, equip, and convey title to such fire station prior to final subdivision map approval. Per the DA, each fire station must be equipped to be compatible with LACoFD's Development Impact Mitigation Agreement standards.	Final Map Stage	Applicant	County Fire
21	**Ban on Wood Burning Fireplaces.** As required by the MMRP, the Project's plans and specifications shall prohibit wood-burning fireplaces in single-family residences throughout the Project site. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home.	Building Permit Stage of Site Plan Review	Applicant	County Building Inspectors
22	**Fire-safe Sign Requirements.** As required by the Specific Plan, no sign shall be installed, relocated, or maintained so as to prevent free ingress to or egress from any door, window, or fire escape. In addition, no sign of any kind shall be attached to a standpipe or fire escape, except those signs required by other applicable codes or ordinances. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home. During project operation, this Fire Safety Requirement shall be enforced by the Master HOA.	Building Permit Stage of Site Plan Review	HOA	Centennial Monitoring Group
23	**Master HOA Formation and CC&R Recordation**. Per the Specific Plan, a non-profit Master HOA shall be formed, and the Master HOA's declaration of conditions, covenants, and restrictions (CC&Rs) will be recorded after the recordation of the Project's first final subdivision map consisting of one or more residential lots and	Project Operations	Applicant	Centennial Monitoring Group

Table 21. Project Specific Wildfire Risk Reduction Measures

Measure	Description	Implementation Timing	Responsible Party for Implementing	Responsible Party for Monitoring
	prior to the date of the first transfer of any residential lot to a person other than the subdivider. As additional final maps are approved and recorded, the Project area covered by those maps will be annexed by the Master HOA to ensure that control of development and implementation of the CC&Rs can be maintained. Per the Specific Plan and the MMRP, the applicant for a final map shall submit to the Department of Regional Planning the form of CC&Rs so that it may confirm that new homeowners will be informed about their responsibilities under the Fire Safety Requirements. Per Title 32 of the County Code, a copy of the recorded CC&Rs describing the fuel modification requirements must be provided to the LACoFD's Forestry Division. See Section 7.20 for a complete description of this measure.			
24	**Community Forester.** In accordance with the Specific Plan, the Master HOA shall hire a Community Forester who is trained in urban forestry, arboriculture, horticulture, or landscape architecture to undertake tree management responsibilities. The Community Forester will also coordinate FMZs 3rd party inspections on the Project site. The Community Forester is required to developing a policy for managing public trees on the Project site and educating Project residents about the importance of trees in the community, and is responsible for implementing the Project's fire-resistant landscape plan. The Specific Plan further requires the Community Forester to develop programs that involve community organizations and residents in tree preservation, planting and tree care so as to ensure that community trees are, among other things, maintained in accordance with all Fire Code access requirements. Per the Specific Plan, the Community Forester must also prepare an annual tree management plan and implement programs to improve the communities tree canopy in a manner that complies with all Fire Code and LAFCD requirements. In addition, the Specific Plan requires the Community Forester to maintain the Project's fire-resistant plant palette and to consult with the County's staff biologist regarding proposed revisions to the community plant palette described in the Specific Plan. However, the LAFCD shall have final approval over the final plant palette for fuel modification zones and modifications thereto.	Project Operations	HOA	Centennial Monitoring Group

9 List of Preparers

Project Manager

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Senior Wildfire Safety Planner
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GIS Analysis and Mapping

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Appendix A

Centennial Fire Protection Plan (2021)

Exhibit 1 - Fire Protection Plan

Fire Protection Plan for Centennial Specific Plan

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1. INTRODUCTION

This Fire Protection Plan (FPP) has been prepared by Dudek and is specifically applicable to the Centennial Specific Plan community (Project) in Los Angeles County (County). This FPP is intended to guide the design, construction, and maintenance of Project improvements in compliance with the Centennial Specific Plan (Specific Plan), applicable fire codes, and the various fire safety mitigation measures described in the Mitigation Monitoring and Reporting Program (MMRP) approved for the Project by the County (collectively, the Fire Safety Requirements, all of which are described in detail on the attached Exhibit A). This FPP address fuel modification, fire protection related infrastructure (water supply, hydrants, primary and second ingress/egress roads, and emergency response) and structural fire protection concepts for the Project. This FPP also addresses how the Project's Fire Safety Requirements will be monitored and enforced over time, as well as the how the Project's master developer will ensure that Project residents are fully educated about their obligations to maintain a fire-safe home. The goal of this FPP is to provide standards to facilitate development of the Project as a "fire hardened" community that will protect Project residents and visitors, as well as the environment, by minimizing and mitigating fire threats on the Project site and reducing Project demands on local fire protection services.

2. OVERVIEW OF THE PROJECT'S FIRE PROTECTION FRAMEWORK

As explained in the Centennial Project Final Environmental Impact Report, State Clearinghouse No. 2004031072 (EIR), the Project would introduce urban development in an undeveloped area subject to wildfire hazards.[1] Fire protection for new developments that, like the Project, are located in a Wildland Urban Interface (WUI) area must utilize a "systems approach" consisting of the components of fuel modification and maintenance, ignition-resistant structures that accounts for expected (potential) exposures (e.g., embers only, radiant heat from adjacent structures or vegetation), water supply, fire protection systems, access (ingress/egress) and emergency response. To that end, this Project will include:

- Substantial on-site firefighting capability (three new fire stations, upgrades to existing fire station), thus ensuring fast response to fire and medical emergencies;

- Customized and peer-reviewed fuel modification zones providing defensible space based on fire behavior modeling results and experienced fire protection planning professionals;

- Ignition-resistant construction meeting Chapter 7A of the California Building Code (CBC), the Title 26 the County of Los Angeles Building Code (LABC), and the Los Angeles County Fire Department (LACoFD) requirements and providing temporary on-site relocation capability for some structures;

[1] Please refer to EIR Chapter 3, *Environmental Setting*, for a detail description of the Project site and its surroundings, and to EIR Chapter 4, *Project Description*, for a detailed description of the Project and its proposed improvements.

- Fire protection systems, including internal fire sprinkler systems, in all structures per applicable code requirements;

- Dedicated fire apparatus and emergency vehicle access via code compliant roads;

- Water capacity, delivery and availability meeting local code requirements;

- Ongoing, funded maintenance, inspections, and enforcement of fuel modification zones and other fire protection features.

- Ongoing resident fire safety education.

The following sections address implementation of the Project's Fire Safety Requirements.

3. IMPLEMENTATION OF THE PROJECT'S FIRE PROTECTION FRAMEWORK

Future development of the Project in accordance with the Specific Plan will require various subsequent discretionary and ministerial approvals from the County, including but not limited to, tentative subdivision maps, final subdivision maps, site plans, conditional use permits, grading permits, and building permits. Initial implementation of the Project's fire protection measures will occur at various stages of the subsequent approval process, as discussed in the Specific Plan, the EIR, and the MMRP. This section describes how each of the Project's fire safety measures will be implemented at various stages of the development process, and describes how the Fire Safety Requirements will be satisfied during Project operation.

a. Fire Safety Requirements Implemented at the Tentative Map Stage of Development.

Pursuant to the Specific Plan and MMRP, the following Fire Safety Requirements will be implemented concurrent with the County's review and approval of any Project tentative subdivision map:

i. Emergency Response Plan

The MMRP requires the Project to prepare an Emergency Response Plan (ERP), which shall be updated as needed for each Tentative Map, and shall be submitted to the County (California Department of Forestry and Fire; and County Fire Department and/or County Sheriff's Department) for review and approval. The ERP will utilize existing information from Los Angeles County Office of Emergency Management, coordinate with County emergency planners, and provide site specific procedures for various emergency situations including wildfire. As required by the DA, the Property Owners shall require future residential and commercial property owners associations to develop and implement an emergency preparation and response plan, including shelter-in-place and evacuation plans as well as first aid and emergency electric power supplies.

With regard to wildfire emergencies, the following components shall be incorporated into the ERP:

- Building and Facility Protection (as defined in this FPP)
- Grounds Protection (fuel modification zone adjacent to common areas and some residential lots purpose)
- Fire Prevention during High Fire Danger and Extreme High Fire Danger periods
- Emergency Supplies
- Telephones/Communications
- FireSafe Council and NFPA Firewise Community Information
- Incident Command List
- Emergency Response Notebook
- Annual Review and Update
- Emergency Notification Procedures
- Advisement of Potential Fire Danger
- Emergency Relocation/Evacuation Plan
- Animal Relocation/Evacuation Plan.

The ERP will provide detailed response procedures for varying types of emergencies, including wildfire emergencies.

Possible wildfire response procedures included in the ERP would vary depending on the type of wildfire threat. Slow moving, distant wildfires that have the *potential* to threaten the Project would require one response whereas a fast moving, wind driven fire nearby or within the Project site would trigger a very different response. Accordingly, the ERP will include response for various types of wildfire emergencies. The following summaries provide potential responses to be considered for various wildfire emergency response scenarios.

Wildfire Emergency Response Scenario

- Fire authority notification of wildfire in jurisdiction, determination of activation of reverse 9-1-1 or mass notification system (if available or provided by Project).
- Reverse 9-1-1 activated – all telephone numbers within district notified via a computer of the fire situation (capable of 264 calls per minute or 15,000 calls within an hour, or more, dependent on system).
- In the absence of Reverse 9-1-1 (for example, should communications be interrupted), fire department sirens and law enforcement intercoms will be used to

inform residents of emergencies. The fire department sirens and police intercoms will be audible by affected parts of the Centennial Specific Plan Project area. The fire department sirens and police intercoms will also be used to supplement the Reverse 911 system.

- On-site LACoFD personnel and law enforcement personnel begin emergency response procedures.

- Centennial employers and residents receive reverse notification call or hear warning sirens and prepare for potential evacuation or on-site relocation.

- If relocation required/recommended, internal relocation plan initiated and residents relocated to designated on-site or off-site areas. LACoFD would direct residents, staff and visitors as well as coordinate with the California Highway Patrol for on-site traffic management.

On-Site Relocation/Off-Site Evacuation Response Scenarios

On-site relocation of Project residents, employees and visitors would typically occur during large, distant wildfire events that, due to weather patterns and difficulty in gaining control, have the potential to threaten parts of the Centennial community but likely do not threaten the entire community. Off-site evacuation would typically occur during large wildfire events that may be closer to the Project and threaten the entire community due to weather patterns and fire containment levels. The required ERP shall plan for both on-site relocation and off-site evacuation scenarios.

If on-site relocation or off-site evacuation of Project residents, visitors and employees of businesses is required in response to a fire threat, the following procedures would be followed and included in the ERP (NOTE: Relocation/evacuation of the Project residents, visitors, and employees, at maximum usage, may require several hours).

- If adequate time is not available for community relocation, partial community relocation may occur. Fire and law enforcement personnel will monitor the situation and relocations will cease when it is determined that it would potentially expose persons to unsafe roadway conditions.

- It is expected that law enforcement will manage the relocation/evacuation of residents. Road closures and traffic control will be among the tasks performed by law enforcement. In addition, each resident will be provided a road circulation map along with at least two designated evacuation routes.

- Law enforcement and LACoFD would evaluate the wildfire event and determine whether and at which point partial on-site relocation would occur, or whether the emergency requires community-wide off-site evacuation. Allowance for adequate relocation/evacuation time will be a key factor in determining the relocation timeframe so that the roads do not become congested. Firefighter access will be a key

priority and the array of improved roads will provide suitable access throughout the site in the event of a wildfire.

- Relocation/evacuation would occur in scenarios that include ample time to relocate the potentially affected number of people from higher exposure areas to designated safer sites. Wolshon and Marchive (2007) simulated traffic flow conditions in a computer derived WUI under a range of evacuation notice lead times and housing densities. To safely evacuate more people, they recommended that emergency managers (1) provide more lead time to evacuees and (2) control traffic levels during evacuations so that fewer vehicles are trying to exit at the same time.

- The Project and its structures will be designed and constructed to withstand the type of wildfires anticipated from the surrounding fire environment. Nevertheless, early notification of the Project's fire personnel and subsequently of Project residents, visitors and employees is critical to the timely and safe relocation/evacuation to the designated relocation/evacuation areas.

- Whether to implement on-site relocation scenario would depend on the wildfire location, movement and weather and how it may affect traffic on local roads. There may also be circumstances that require partial on-site relocation of the Project's higher exposed periphery areas. In these cases, potentially affected residents would be instructed to relocate to on-site areas, such as schools or commercial areas, where they will be temporarily accommodated until the wildfire threat has passed.

- On an annual basis, it is recommended that the Project conduct a fire relocation/evacuation fire drill to train staff, and fire personnel, with the results distributed to residents through various media and summarizing what to do during a wildfire. This drill will be supervised by the LACoFD with the authority to revise the procedure as necessary to provide the most efficient and safest relocation process. Residents will not be required to relocate or evacuate during the drills, but the process and procedures will be enforced through pre-drill public relations and post-drill information dissemination.

- Homeowners will receive ongoing outreach from the HOA along with coordination with LACoFD for important fire safety awareness from the Firewise Committee/Board.

- If on-site relocation or off-site evacuation is required, residents will be notified and directed as to their movement to designated areas or notified that they should remain in their homes according to procedures with LACoFD direction and oversight.

The ERP will provide that the Project will implement the "Ready, Set, Go!" program during the relocation/evacuation scenario. The focus of the "Ready, Set, Go!" program is on public awareness and preparedness, especially for those living in the wildland-urban interface (WUI) areas. The program is designed to incorporate the local fire protection agency as part of the training and education process in order to ensure that evacuation preparedness

information is disseminated to those subject to the potential impact from a wildfire. There are three components to the program:

- "READY" – Preparing for the Fire Threat: Take personal responsibility and prepare long before the threat of a wildfire so you and your home are ready when a wildfire occurs. Create defensible space by planting and maintaining ignition-resistant vegetation near your home. Use only fire-resistant landscaping and maintain the ignition resistance of your home. Assemble emergency supplies and belongings in a safe spot. Confirm you are registered for Reverse 911(if available), Alert LA County, and community alert system. Make sure all residents residing within the home understand the plan, procedures, and escape routes.

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

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

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

Shelter-in-Place Scenario

Sheltering-in-place is the practice of going or remaining indoors during or following an emergency event. This procedure is recommended if there is little time for the public to react to an incident and it is safer for the public to stay indoors for a short time rather than travel outdoors. Sheltering-in-place also has many advantages because it can be implemented immediately, allowing people to remain in their familiar surroundings, and providing individuals with everyday necessities such as telephone, radio, television, food, and clothing. However, the amount of time people can stay sheltered-in-place is dependent upon availability of food, water, medical care, utilities, and access to accurate and reliable information.

Sheltering-in-place is the preferred method of protection for people that are not directly impacted or in the direct path of a hazard. This will reduce congestion and transportation demand on the major transportation routes for those that have been directed to evacuate by police or fire personnel. All structures in Centennial community would conform to the ignition-resistant building codes codified in Chapter 7A of the California Building Code, therefore, structures would be ignition-resistant, defensible and designed to require minimal

firefighting resources for protection, which enables this contingency option when it is considered safer than evacuation.

As of this document's preparation, no community in California has been directed to shelter-in- place during a wildland fire. Even the communities in Rancho Santa Fe, California, which are designed and touted as shelter-in-place communities, were evacuated during the 2007 Witch Creek Fire. This is not to say that people have not successfully sheltered-in-place during wildfire, where there are numerous examples of people sheltering in their homes, in hardened structures, in community buildings, in swimming pools, and in cleared or ignition-resistant landscape open air areas. The preference will always be early evacuation following the "Ready, Set, Go!" model, but there exists the potential for unforeseen civilian evacuation issues, and having a contingency plan will provide direction in these situations that may result in saved lives.

Potential problems during wildfire evacuation from the Project site include:

- Inadequate time to safely evacuate
- Fire evacuations during rush hour traffic or when large events are occurring
- Blocked traffic due to accidents or fallen tree(s) or power pole(s)
- The need to move individuals who are unable to evacuate

It is recommended that local law enforcement and fire agencies conduct concerted pre-planning efforts focusing on evacuation contingency planning for civilian populations when it is considered safer to temporary seek a safer refuge than evacuation.

This FPP does not provide guarantee that all Project residents, employees and visitors will be safe at all times because of the advanced fire protection features it requires. There are many variables that may influence overall safety. This FPP provides requirements and recommendations for implementation of the latest fire protection features that have proven to result in reduced wildfire related risk and hazard.

ii. Implementation Plan

Per the MMRP Mitigation Measure MM 7-21, vegetation management for fire abatement purposes is not permitted in the portion of Significant Ecological Area (SEA) 17 or mitigation preserve areas within or bordering the Project site and, therefore, brush clearance zones shall be contained within the current Project impact boundary and no overlap with the adjacent SEA 17 and/or mitigation preserve areas shall occur. The MMRP further requires that an Implementation Plan, including fire risk abatement measures (including but not limited to vegetation management) required to comply with State and County fire prevention and response legal requirements shall be submitted as part of any application for a tentative subdivision map for those portions of the Project site that border an SEA or mitigation preserve area. The Implementation Plan must include: (a) a summary of applicable State and County fire risk abatement requirements; (b) a prohibition on the use of vegetation clearance within SEA 17 or mitigation preserve areas. The Implementation Plan shall be submitted to

the County for approval with the first tentative map, and shall be updated to include new or modified State or County fire risk abatement requirements as part of each subsequent tentative tract map submittal.

iii. Landscape Plan

As required by the MMRP, the Project Applicant/Developer shall develop a Landscaping Plan for review and approval by the County Biologist for each tentative map application submittal. The Landscaping Plan must be prepared by a qualified biologist and include a plant palette composed of fire-resistant, non-invasive species that are adopted to the conditions found on the Project site and do not require high irrigation rates. The MMRP further requires that the Landscaping Plan shall also include a list of invasive plant species prohibited from being planted or sold on the Project site and encourage planting of local natives typical of native vegetation within ten miles of the Project site. The Specific Plan's Green Development Program and Hillside Design Guidelines further require the Project to implement fire-safe landscaping techniques consistent with the Specific Plan's plant palette to reduce fire risks to biological resources and human safety in the fuel modification zones, and landscaping in a manner that, among other things, increases fire protection, respectively. Additionally, the Project's Specific Plan requires landscaping in the plan's Open Space Zone to be dominated by native and/or drought tolerant trees, shrubs and ground cover, taking into consideration fuel modification requirements, such as using plants that are fire resistant and avoid plants with characteristics that make them more readily combustible such as plants with oils, wax or resin content, plants that accumulate dead material or shed bark, and/or plants that grow rapidly. Plants selected will be consistent with LACoFD Planting Guideline regarding prohibited species and appropriate plant spacing with respect to zone location. Finally, the MMRP requires that the map applicant ensure that the approved Landscape Plan be provided to Project builders and all future Project occupants.

iv. Construction Traffic Control Plan

As required by the MMRP, the applicant must include in its application for any tentative map involving construction within the State Route 139 right-of-way a Traffic Control Plan prepared in accordance with the California Manual on Uniform Traffic Control Devices and approved by the California Department of Transportation (Caltrans). The MMRP further requires that all construction activities in the public right-of-way comply with the Traffic Control Plan to the satisfaction of Caltrans. The Traffic Control Plan shall ensure code-compliance access for fire apparatus and first responder vehicles.

v. Fire Access Infrastructure Conditions

Per the Subdivision Ordinance, each tentative map application and approved tentative map must demonstrate that that Project internal circulation system, site access, road dimensions, road connectivity, and other standards related to fire apparatus access are consistent with all applicable County's roadway and fire code standards. Thus, each approved Project tentative map shall require as a condition of final map approval that:

- all interior Project roads comply with all fire apparatus access road standards;

- all interior fire access roadways where a fire hydrant is located will be constructed to a minimum unobstructed road width of 26 feet, exclusive of shoulders and shall be improved with aggregate cement or asphalt paving materials;

- all fire access roadways that are designed to allow parking provide a minimum clear width of not less than 34 feet for parking on one side and a clear width of not less than 42 feet for parking on both sides;

- that the interior residential access roads are be designed to accommodate a minimum of a 75,000-pound (lb.) fire apparatus load;

- that any dead-end streets serving new residential structures that are longer than 150 feet have approved provisions for fire apparatus turnaround;

- that all private and public streets for each Project phase meet all applicable requirements of Title 32 of the Los Angeles County Code, as amended, and adopting by reference the 2019 edition of the California Fire Code (CFC), or current edition at time of Project approval (Fire Code);

- that all fire apparatus roads have an unobstructed width of not less than 20 feet, exclusive of shoulders, except for approved security gates in accordance with CFC Section 503.6, and an unobstructed vertical clearance clear to the sky to allow aerial ladder truck operation (provided that a minimum vertical clearance of 13 feet 6 inches may be allowed for protected tree species adjacent to access roads);

- that all roads with a median or center divider will have a minimum 20 feet unobstructed width on both sides of the center median or divider;

- that all 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.

- that access roads will be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction.

- that the applicant will provide information illustrating the new roads, in a format acceptable to the LACoFD for use in updating LACoFD fire response maps; and

- that the curb-to-curb width of each private driveway and fire lane will be approved by the Los Angeles County Fire Department and Department of Public Works.

vi. Underground Utilities

As required by the County's subdivision ordinance, all tentative map applications must depict the location of proposed utility easements. As required by applicable standards, all of the Project's horizontal utilities, including but not limited electric transmission lines, will be installed underground to significantly reduce the potential for equipment-related fire starts.

vii. Identify Fire Station Locations

As required by the MMRP and DA, the Project shall provide at least three and up to four fully equipped fire stations on site. Per the DA, Fire Station # 1 must be a station of 10,000 square feet, Fire Station # 2 must be a station of 13,000 square feet, and Fire Station #3 must be a station of 10,000 square feet. Per the DA, two fire station sites shall have a building pad consisting of a net buildable area of 1.25 acres, and one shall have a net buildable area of 4 acres. All on-site fire stations must be fully equipped in accordance with applicable LACoFD standards. The general locations of the three required fire stations will be situated as identified on EIR Exhibit 4-1, but LACoFD shall have final approval over all fire station site locations. Per the DA, the final location of Fire Station #1 will be determined when a tentative map is approved for the Project's 1,000th residential unit, and the final locations of Fire Stations #2 and #3 will be determined at the time of any tentative map is approved for a Project residential unit that is located outside of a fire station's five-minute response time radius. Per the DA and MMRP, it remains to be determined whether the Project will be required to construct a fourth fire station, but such determination shall be made by LACoFD and shall be based on need established pursuant to MMRP Mitigation Measure MM 16-1. Finally, until such time as the Developer has conveyed to LACoFD and approved, operational and equipped fire station on the Project site, the applicant shall pay developer fees in accordance with the LACoFD Developer Fee Program, as provided in MMRP Mitigation Measure 16-2. Existing LACoFD Fire Station #77 shall serve the Project site until such time as Fire Station #1 is operational.

b. Fire Safety Requirements Implemented at the Final Map Stage of Development.

Pursuant to the Specific Plan and MMRP, the following Fire Safety Requirements will be implemented concurrent with the County's review and approval of any Project final subdivision map:

i. Fuel Modification Plan

Per the MMRP, the Project must prepare a Fuel Management Plan (FMP) demonstrating compliance with the Fire Code, which must be peer-reviewed by the California Department of Forestry and Fire Protection (CAL FIRE) and approved by LACoFD prior to recordation of the Project's first final subdivision map. An important component of a fire protection system for the Project is the provision for fire resistant landscapes and modified vegetation buffers. The FMP will establish Fuel Management Zones (FMZs) designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from fire advancing off-site or on-site by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. FMZs were originally developed by CAL FIRE to protect natural resources from urban area fires and over the years, have become essential to setting urban areas back from wildland areas with a dual role of protection structures and people while buffering natural areas from urban ignitions, reducing potential for urban fires to spread into wildland areas.

The Project will be exposed to naturally-vegetated open space to the north, south and west of the Project site, as well as agricultural lands to the east. For the Centennial Specific Plan

Project site, the FMZ widths between the naturally vegetated open space areas and all combustible structures are proposed to be 100, 150, or 200 feet. The FMZs will be constructed from structures outwards towards undeveloped areas. A 20-foot wide roadside FMZ along each side of the roads adjacent to the open space shall be required as well.

Although FMZs are very important for setting back structures from adjacent unmaintained fuels, the greatest concern is from firebrands or embers as a principal ignition factor. To that end, the Project site, based on its location and ember potential, is required to include the latest ignition and ember resistant construction materials and methods for roof assemblies, walls, vents, windows, and appendages, as mandated by the LACoFD and the County's Fire and Building Codes.

Per applicable County fuel modification requirements, each fuel modification areas will incorporate three zones, these are 1) a setback zone, 2) an irrigated zone, and 3) a thinning zone. The widths of the zones will vary, depending on the anticipated fire behavior. The widths will either total 100, 150, or 200 feet. Landscaping on private lots directly adjacent the WUI will include standard County fuel modification requirements. Flammable plant species will be restricted, spacing standards implemented, and basic low fuel requirements will be applicable per :LACoFD plant selection guidelines. The following descriptions provide details for the different fuel modification zones on site:

Zone A (Setback Zone)

- Irrigation by automatic or manual systems shall be provided to landscaping to maintain healthy vegetation with high live fuel moisture and greater fir resistance.

- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers and adequately spaced shrubs and trees. The overall characteristics of the landscape shall provide adequate defensible space in a fire environment.

- Plants in Zone A shall be inherently highly fire resistant and spaced appropriately. Species selection should be made referencing Appendix E Fuel Modification Plant Reference. Other species may be utilized subject to approval by the Homeowners' Association (HOA).

- Except dwarf varieties or mature trees small in stature, trees are generally not recommended within Zone A, but are not prohibited.

- Vines and climbing plants shall not be allowed on any combustible structure.

- Target tree species (including but not limited to Eucalyptus, Pine, Juniper, Cypress, Cedar, Canary Island Date Palm, Mexican Fan Palm and Bougainvillea) shall not be allowed within 10 feet of combustible structure, defined as any accessory structure not required to be built to Chapter 7A building code standards (ex. Structures under 120 square feet).

- Within Zone A will be the Home Ignition Zone from 0 to 5 feet of the exterior wall surface of the building extending five feet on a horizontal plane.
    - This zone shall be continuous hardscape or limited to fire-resistive plantings acceptable to LACoFD.
    - Vegetation in this zone shall not exceed 6 to 18 inches in height and irrigation is required,
    - This zone shall be free of all combustible materials and the use of mulch is prohibited.

Zone B (Irrigated Zone)

- Irrigation by automatic or manual systems shall be provided to landscaping to maintain healthy vegetation with high live fuel moisture and greater fire resistance.
- Landscaping and vegetation in this zone shall consist primarily of green lawns, ground covers, and/or adequately spaced shrubs and trees. The overall characteristics of the landscape shall provide adequate defensible space in a fire environment.
- Plants in Zone B shall be fire resistant and spaced appropriately. Species selection should be made referencing Centennial Specific Plan, Table 3-7, "Plant List," in Section 3.3, "Landscape Plan." Other species may be utilized subject to approval by the HOA.

Zone C (Native brush thinning zone)

- Irrigation systems are not required for this zone.
- Landscaping and vegetation in this zone may consist of modified existing native plants, adequately spaced ornamental shrubs and trees, or both. There may also be replacement landscape planting with ornamental or less flammable native species to meet minimum slope coverage requirements of County Public Works or Parks and Recreation Landscape or Hillside ordinances. In all cases the overall characteristics of the landscape shall provide adequate defensible space in a fire environment.
- Existing native vegetation shall be controlled by thinning and removal of species constituting a high fire risk; including but not limited to laurel sumac, chamise, ceanothus, sage, sage brush, buckwheat, and California juniper. Please reference the County Fuel Modification Plant Reference.
- Fuel loads shall be reduced by pruning up the lower one-third of remaining trees or shrubs and removing dead wood. Native plants may be thinned by reduced amounts as the distance from development increases.
- Plants in Zone C shall be spaced appropriately. Species selection should be made referencing the County Fuel Modification Plant Reference.

- General spacing for existing native shrubs is 15 feet between canopies. General spacing for existing native trees is 20 feet between canopies.

The distance requirements for each zone are described below:

- 200-foot Setback
    - Zone A extends 20 feet from the edge of any combustible structure, accessory structure, appendage or projection.
    - Zone B extends from the outermost edge of Zone A to 100 feet from structure (or 80 feet from the outermost edge of Zone A).
    - Zone C extends from the outermost edge to Zone B to 200 feet from structure (or 100 feet from the outermost edge of Zone B).
- 150-foot Setback
    - Zone A extends 20 feet from the edge of any combustible structure, accessory structure appendage, or projection.
    - Zone B extends from the outermost edge of Zone A to 50 feet from the structure (or 30 feet from the outermost edge of Zone A).
    - Zone C extends from the outermost edge of Zone B to 150 feet from the structure (or 100 feet from the outermost edge of Zone B).
- 100-foot Setback
    - Zone A extends 20 feet from the edge of any combustible structure, accessory structure, appendage, or projection.
    - Zone B extends from the outermost edge of Zone A to 50 feet from the structure (or 30 feet from the outermost edge of Zone A).
    - Zone C extends from the outermost edge of Zone B to 100 feet from the structure (or 50 feet from the outermost edge of Zone B).

Vegetation Management is recommended within parks and open space areas in compliance with the guidelines in this FPP.

- Undesirable/target flammable vegetation must be removed per LACoFD plant selection guide, Title 32 Section 304.1.2 and Section 325.2.1., or as determined by LACoFD.
- Grasses must be maintained/mowed to 4 inches.

- Types and spacing of trees, plants and shrubs, must comply with the criteria in this plan.

- Areas shall be maintained free of down and dead vegetation.

- Flammable vegetation and flammable trees shall be removed and shall be prohibited.

- Trees shall be properly limbed and spaced and shall not be of a prohibited type (identified in this plan).

- No species from the County Prohibited Plant List.

Vacant Lots will not be required to implement Vegetation management strategies until construction begins. However, perimeter Vegetation Management Zones must be implemented prior to commencement of construction utilizing combustible materials. Moreover, prior to issuance of a permit for any construction, grading, digging, installation of fences, the outermost 30 feet of the lot is to be maintained as a Vegetation Management Zone. Existing flammable vegetation shall be reduced by 60% on vacant lots upon commencement of construction. Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuels shall be removed and trees/shrubs shall be properly limbed, pruned and spaced per this plan. The remainder of the Vegetation Management Zones required for the particular lot shall be installed and maintained prior to combustible materials being brought onto any lot under construction.

As required by the MMRP, the FMP shall ensure relocation of grading boundaries and fuel modification zones to completely avoid disturbance to the site(s) of eligible archaeological resources. If it is determined that the relocation of grading boundaries and fuel modification zones in accordance with this subsection is not feasible, then a qualified archaeologist shall be present in the vicinity of eligible archaeological resources sites during grading and fuel modification brush clearance. (NOTE: confidential archaeological mapping is on file at the Natural History Museum of Los Angeles County and the South Central Coastal Information Center [SCCIC] at California State University, Fullerton. Review of this material is restricted to qualified individuals and project proponents on a need to know basis.) Fencing shall be erected outside the eligible archaeological resources sites to visually depict the areas to be avoided during construction. All eligible archaeological resources sites avoided in accordance with this subsection (a) shall be subject to the preservation requirements of MMRP Mitigation Measure MM 6-4.

As further required by the MMRP, if it is determined that the relocation of grading boundaries and fuel modification zones is not feasible with respect to eligible archaeological resources sites CA-LAN-3201, CA-LAN-3240 and/or CA-LAN-3242, as identified in the EIR, then a qualified Archaeologist and a Native American monitor representing the Tejon Indian Tribe shall be present in the vicinity of any such eligible archaeological resources site during grading and fuel modification brush clearance to monitor all activities and ensure that archaeological resources are not impacted. (NOTE: confidential archaeological mapping is on file at the Natural History Museum of Los Angeles County and the SCCIC. Review of this material is restricted to qualified individuals and project proponents on a need to know

basis.) Temporary construction fencing shall be erected outside any such eligible archaeological resources site to visually depict the areas to be avoided during construction, in accordance with MMRP Mitigation Measure MM 6-2. Any temporary fencing materials (i.e., plastic web, chain link, etc.) placed during construction should not become permanent. Any permanent fencing erected in accordance with MMRP Mitigation Measure MM 6-4 to protect the sites should be visually pleasing and consistent with the overall aesthetic experience of the community of Centennial. All eligible archaeological resources sites avoided in accordance within this subsection (a) shall be subject to the preservation requirements of MMRP Mitigation Measure MM 6-4.

ii. Construct and Equip Fire Stations

As required by the MMRP, for each tentative subdivision map that includes a fire station site (as discussed in Section 3(a)(vii) of this FPP), the applicant must construct, equip, and convey title to such fire station prior to final subdivision map approval. Per the DA, each fire station must be equipped to be compatible with LACoFD's Development Impact Mitigation Agreement standards.

c. Fire Safety Requirements Implemented at the Building Permit or Site Plan Review Stage of Development.

Pursuant to the Specific Plan and MMRP, the following Fire Safety Requirements will be implemented concurrent with the County's review and approval of any Project building permit and, as applicable, site plan:

i. Confirmation of Code Compliance

At the building permit and site plan review stage of Project development, the County will confirm that all building plans comply with all applicable codes. The Project shall comply with applicable portions of the Fire Code. The Project will also comply with Chapter 7A of the 2019 California Building Code (CBC) with July 2021 Supplement; the 2019 California Residential Code (CRC), Section 237; and 2018 Edition of the International Fire Code as adopted by the County. Code compliance shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy.

Chapter 7A of the CBC addresses reducing ember penetration into homes, a leading cause of structure loss from wildfires (California Building Standards Commission 2019). Thus, code compliance is an important component of the requirements of this FPP, given the Project's WUI location and VHFHSZ and HFHSZ designations. The Project would meet applicable code requirements for building in these higher fire hazard areas. These codes have been developed through decades of wildfire structure save and loss evaluations to determine the causes of building losses and saves 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 CBC.

The following provides an overview of ignition resistant construction required under the Fire Code, the CBC, and the CRC:

- *Roofs and roof edges* (CBC 705A/CRC R337.5): Roof coverings shall be Class A fire rated as specified in Section 1505.2. 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 firestopped with approved materials or have one layer of minimum 72 pound (32.4 kg) mineral-surfaced non-perforated cap sheet complying with ASTM D3909 installed over the combustible decking. Wood shingles and wood shakes are prohibited in any Fire Hazard Severity Zones regardless of classification (LABC Section 705A.2).

- *Exterior Walls/siding* (CBC 707A.3 /CRC R337.7.3): Noncombustible, listed ignition-resistant materials, heavy timber, 5/8" Type X gypsum sheathing behind exterior covering, exterior portion of 1-hr assembly or log wall construction is allowed. The Office of the State Fire Marshall website (https://osfm.fire.ca.gov/) lists many types of exterior wall coverings that are approved.

- *Eaves and porch ceilings* (CBC 707A.4, A.6 / CRC 337.7.4. R337.7.6): The exposed roof deck under unenclosed eaves and underside of porch ceilings shall be noncombustible, listed ignition resistant materials, or 5/8" Type X gypsum sheathing behind exterior covering. Solid wood rafter tails on the exposed underside of roof eaves having a minimum 2" nominal dimension may be unprotected.

- *Vents* (CBC 706A / CRC R337.6): Attic vents and underfloor vent openings must be Wildland Flame and Ember Resistant approved and listen by the Sate Fire Marshal or listed in ASTM E2886. Vents shall be baffled and may include a minimum of 1/16" and maximum 1/8" corrosion-resistant, noncombustible wire mesh or equivalent. Ventilation openings on the underside of eaves are not permitted, unless a State Fire Marshal (SFM) approved vent is installed, or the attic is fire sprinklered. Vents of 1/16" min. and 1/8" max corrosion-resistant and noncombustible wire mesh or equivalent that are greater than 12 feet from a walking surface or grade below are allowed.

- *Windows and exterior doors* (CBC 708A / CRC R337.8): Windows must be insulated glass with a minimum of 1 tempered pane or 20 min rated or glass block. Exterior doors must be noncombustible or ignition resistant material or 1 3/8" solid core, or have a 20 min fire-resistance rating.

- *Exterior decking and stairs* (CBC 709A / CRC R337.9): Walking surfaces of decks, porches. balconies and stairs within 10 feet of the building must be constructed of noncombustible, fire-retardant treated or heavy-timber construction. Alternate materials can be used if they are ignition-resistant and pass performance requirements specified by the State Fire Marshal.

- *Underfloor and appendages* (CBC 707A.8 / CRC R337.7.8): Exposed under-floor, underside of cantilevered and overhanging decks, balconies and similar appendages shall be non-combustible, ignition resistant, 5/8" Type X gypsum sheathing behind exterior covering, exterior portion of 1-hr assembly, meet performance criteria SFM Standard 12-7A-3 or be enclosed to grade.

ii. Ban on Wood Burning Fireplaces

As required by the MMRP, the Project's plans and specifications shall prohibit wood-burning fireplaces in single-family residences throughout the Project site. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home.

iii. Fire-safe Sign Requirements

As required by the Specific Plan, no sign shall be installed, relocated, or maintained so as to prevent free ingress to or egress from any door, window, or fire escape. In addition, no sign of any kind shall be attached to a standpipe or fire escape, except those signs required by other applicable codes or ordinances. This requirement will be enforced at the time of building permit issuance and site plan review. Compliance with this Fire Safety Requirement shall also be confirmed by County building inspectors prior to issuance of certificates of occupancy for each single-family home. During project operation, this Fire Safety Requirement shall be enforced by the Master HOA.

d. Project Operations - Ongoing Enforcement of Fire Safety Requirements, Fire Safety Education, and FMZ Clearance Inspections.

Several entities will play important roles to ensure the ongoing implementation of the Fire Safety Requirements once the Project becomes operational. The LACoFD will have primary enforcement jurisdiction over the Project with respect to matters of Fire Code compliance, while the County's Department of Regional Planning is responsible for the overall enforcement of the Specific Plan. But the Project's master homeowner's association (Master HOA) and its Fire Protection Education Committee will have key roles in ensuring Project compliance with the Fire Safety Requirements, as will the Community Forester and qualified third-party compliance inspectors funded by the Master HOA. This section describes the various responsibilities of each of these parties with respect to the comprehensive implementation of the Fire Safety Requirements during the life of the Project.

i. Master HOA Formation and CC&R Recordation

Per the Specific Plan, a non-profit Master HOA shall be formed, and the Master HOA's declaration of conditions, covenants, and restrictions (CC&Rs) will be recorded after the recordation of the Project's first final subdivision map consisting of one or more residential lots and prior to the date of the first transfer of any residential lot to a person other than the subdivider. As additional final maps are approved and recorded, the Project area covered by those maps will be annexed by the Master HOA to ensure that control of development and implementation of the CC&Rs can be maintained. Per the Specific Plan and the MMRP, the applicant for a final map shall submit to the Department of Regional Planning the form of CC&Rs so that it may confirm that new homeowners will be informed about their responsibilities under the Fire Safety Requirements. Per Title 32 of the County Code, a copy of the recorded CC&Rs describing the fuel modification requirements must be provided to the LACoFD's Forestry Division.

To the extent permitted by the California Department of Real Estate, the CC&Rs for each final map shall include provisions obligating each homeowner to comply with all of the Fire Safety Requirements applicable to that homeowner's lot and residential unit, including but not limited to all Fire Safety Requirements that (i) mandate the use of fire-safe landscaping techniques, (ii) require the maintenance of fuel modification zones on their property, (iii) prohibit the use of wood fireplaces, (iv) prohibit the installation, relocation, or maintenance of any sign so as to prevent free ingress to or egress from any door, window, or fire scape; (v) mandate the use of code compliant spark arrestors in chimneys of any fireplace, barbeque, or any heating appliance in which solid or liquid fuel is used; (vi) mandate that only Class A fire rated roof coverings be used when maintaining or repairing roof coverings; (vii) mandate that exterior windows, window walls, glazed doors, and glazed openings in exterior doors only be repaired or replaced code compliant materials (e.g., multi-pane glazing units with a minimum of one tempered pane); and (viii) require that access be provided for biannual fuel modification zone inspections.

ii. Master HOA Enforcement of CC&Rs Through Monetary Penalties

To promote enforcement of the CC&Rs, the governing documents of the Master HOA shall vest the governing board of the Master HOA with authority to impose fines on any homeowner who violates any provision of the CC&R related to Fire Safety Requirements, and shall establish a schedule of reasonable monetary penalties to be assessed by the Master HOA against any homeowner that violates any provision of the CC&Rs related to Fire Safety Requirements. The required schedule of monetary penalties shall also be included as part of a general CC&R enforcement policy to be adopted and administered by the governing board of the Master HOA, which policy shall describe in detail the steps to be followed in enforcing the Master HOA governing documents and CC&Rs. As provided in California Civil Code Section 5855, no fine shall be assessed against a homeowner for violating a provision of the CC&Rs related to Fire Safety Requirements unless and until the Master HOA first conducts a hearing on the alleged violation. At least ten days advance notice must be provided to the relevant homeowner of the date and time of the hearing, the general nature of the allegation of rules violation against such homeowner, and informing such homeowner that they have the right to attend such hearing and to address the governing board.

iii. Master HOA Ongoing Maintenance

The governing documents of the Master HOA shall provide that the Master HOA is responsible for the long-term funding and ongoing maintenance of private roads and fire protection systems, including fire sprinklers and private fire hydrants. The Master HOA governing documents shall also provide that the Master HOA is responsible for the long-term funding and implementation of all fuel modification vegetation management in Project common areas, including but not limited to roadsides (including a minimum of 20 feet clearance on each side of roads within the Project development footprint adjacent to open space areas), open space and landscape areas, and fuel modification zones. In addition, the Master HOA shall establish a reverse 9-1-1 system capable of contacting every listed telephone number in the community by computer at a rate of at least 250 calls per minute.

iv. Fire Protection Education Committee

The governing documents of the Master HOA shall establish a Fire Protection Education Committee (FEPC) The purpose of the FEPC shall be to (i) promote education programs and tools that provide information to Project homeowners about the Project's overall Fire Safety Requirements and about each homeowner's individual obligations thereunder; (ii) promote education programs and tools that provide information about wildland fire ecology, management, protection, and prevention; and (iii) coordinate with the LACoFD and other stakeholders to identify opportunities for improvement in all areas of wildland fire communication, education, protection, and prevention.

The governing documents of the Master HOA shall require the FEPC to prepare and implement of a community-wide fire education program based on the Firewise Communities structure and designed to establish the community as a Firewise USA site and to fully educate Project homeowners of their various responsibilities under the Fire Safety Requirements, including but not limited to maintaining fuel management zones areas on their respective properties. The Project master developer shall ensure that development and ongoing implementation such fire education program is funded by assessment district or by permanent and irrevocable property owner fees.

The FEPC shall annually conduct on-site community fire safety education and training programs, which programs shall be undertaken in coordination with the LACoFD's Community Risk Reduction Unit to the extent feasible or other qualified subject-matter experts, and which shall include community education regarding implementation of the Project's required FMP and ERP, and shall ensure that copies of such plans are provided to all Project homebuyers at the initial point of sale.

The FEPC shall also post on the community intranet information regarding the importance of maintaining fuel management areas in accordance with the FMP, complying with the Project's fire-resistant landscape plan, implementing all applicable Fire Safety Requirements, and regularly reviewing and becoming familiar with the Project's ERP. Complete copies of the FMP and ERP shall also be made accessible for download from the community intranet. LACoFD shall review and approve all wildfire educational material/programs before printing and distribution by the FEPC. In addition, the FEPC shall ensure that annual reminder notices are provided to each homeowner reminding them review the ERP and stay familiar with community evacuation protocols.

The FEPC shall also provide Project homebuyers, at the initial point of sale, educational materials about the health and safety benefits of emergency preparation and the need to maintain adequate emergency response supplies, such as a seven-day supply of potable water and food and solar-powered batteries for communication and refrigeration, to respond to earthquakes and other potential disasters, at the initial point of property sale, and annually thereafter in Property Owner Association Website Notices.

The FEPC shall coordinate with commercial vendors of emergency response supplies and solar batteries in order to secure discounts or other preferential terms to Project site occupants, and shall include a list of such vendors on the community intranet and in educational materials published by the FEPC.

v. Community Forester

In accordance with the Specific Plan, the Master HOA shall hire a Community Forester who is trained in urban forestry, arboriculture, horticulture, or landscape architecture to undertake tree management responsibilities. The Community Forester will also coordinate FMZs 3rd party inspections on the Project site The Community Forester is required to developing a policy for managing public trees on the Project site and educating Project residents about the importance of trees in the community, and is responsible for implementing the Project's fire-resistant landscape plan. The Specific Plan further requires the Community Forester to develop programs that involve community organizations and residents in tree preservation, planting and tree care so as to ensure that community trees are, among other things, maintained in accordance with all Fire Code access requirements. Per the Specific Plan, the Community Forester must also prepare an annual tree management plan and implement programs to improve the communities tree canopy in a manner that complies with all Fire Code and LAFCD requirements. In addition, the Specific Plan requires the Community Forester to maintain the Project's fire-resistant plant palette and to consult with the County's staff biologist regarding proposed revisions to the community plant palette described in the Specific Plan. However, the LAFCD shall have final approval over the final plant palette for fuel modification zones and modifications thereto.

vi. Third-Party Compliance Inspectors

To confirm that the Project’s fuel management zones and landscape areas are being maintained according to the Fire Safety Requirements and the LACoFD’s fuel modification guidelines, the Master HOA shall obtain a fuel management zone inspection and report from a qualified LACoFD-approved third-party inspector in May/June of each year certifying that vegetation management activities throughout the Project site have been timely and properly performed. If the third-party inspector determines that a fuel management zone or landscape area is not compliant with all applicable fire-safety standards, the Master HOA shall have a specified period, not to exceed sixty days, to correct any noted issues so that a re-inspection can occur and certification can be achieved. Annual inspection fees may be subject to the current Fire Department Fee Schedule.

Exhibit A

Centennial Specific Plan Fire Safety Requirements:

1. Fuel Modification Plan (FMP)

- Required by Mitigation Measure MM 3-9, which provides:

  The Project Applicant/Developer shall prepare a Fuel Modification Plan demonstrating compliance with the County Fire Code Title 32 and shall provide all new residents and business owners with recorded Covenants, Conditions, and Restrictions (CC&Rs) or disclosure statements that identify the responsibilities for maintaining the fuel modification zone(s) on their property, as defined in the approved Fuel Modification Plan. The CC&Rs or disclosure statements prepared by the Project Applicant/Developer shall be submitted to the County to confirm that new property owners will be informed of their responsibilities for maintaining the fuel modification zone(s) on their property.

- Review and approval:
  - Per MMRP, the FMP must be provided to the California Department of Forestry and Fire Protection for peer review and to the LACoFD for review and approval.
- Timing:
  - Per MMRP, the FMP must be approved prior to the recordation of final maps.
- Other Requirements:
  - The Specific Plan, pages 3-99 through 3-100, provides significant detail on the required content and implementation of the FMPs, all of which should be reflected in the Fire Protection Plan.
  - Per the MMRP, a copy of the relevant FMP must be provided to all new residents and businesses with CC&Rs or disclosure statements prior to the sale of any-on-site properties.
  - See also Mitigation Measures MM 6-1, 6-3, MM 7-1, 7-16, and 7-21, which include additional requirements and restrictions regarding fuel modification in order to limit impacts to cultural and biological resources, all of which should be reflected in the Fire Protection Plan.

2. Vegetation Management Fire Abatement Implementation Plan

- Required by Mitigation Measure MM 7-21, which provides:

  In order to ensure that no direct impacts to Significant Ecological Area (SEA) 17 occur,

brush clearance zones shall be contained within the current Project impact boundary and no overlap with the adjacent SEA 17 shall occur. Vegetation management for fire abatement purposes is not authorized in SEA areas. An Implementation Plan, including fire risk abatement measures (including but not limited to vegetation management) required to comply with State and County fire prevention and response legal requirements, shall be submitted as part of the tentative tract map for portions of the Project site that border an SEA or mitigation preserve area. The Plan shall include: (a) a summary of applicable State and County fire risk abatement requirements; (b) a prohibition on the use of vegetation clearance within SEA 17 or mitigation preserve areas. The Plan shall be submitted to the County for approval with the first tentative map, and shall be updated to include new or modified State or County fire risk abatement requirements as part of each subsequent tentative tract map submittal.

- Review and approval:
    - Per the MMRP, the Implementation Plan must be submitted to the California Department of Forestry and Fire Protection for peer review and to the County Department of Regional Planning for review and approval.
- Timing:
    - Per the MMRP, the Implementation Plan must be approved prior to approval of tentative maps for portions of the Project that border a SEA or mitigation preserve area.

3. Fire Stations

- Required by Mitigation Measure 16-1, which provides:

  At buildout, the Los Angeles County Fire Department (LACoFD) fire stations shall be located such that response times to the Project site shall be 5 minutes or less for fire service responses and 8 minutes or less for the advanced life support (paramedic) unit responses within the Project site.

- Required by Mitigation Measure 16-3, which provides:

  The Project Applicant/Developer shall provide land, convey title, and shall construct and equip, to the specifications and requirements of the LACoFD, for up to four new Fire Stations to the LACoFD. The approved final plans and specifications for the Project shall identify locations of the fire stations. The LACoFD shall have final approval over the fire station site locations. The timing for the construction of the on-site fire stations shall be established by the LACoFD dependent upon the phasing of development, with the first on-site fire station operational no later than the time the 1,000th dwelling unit is built on site.

- Review and approval:
    - Per MM 16-3, the LACoFD shall have final approval over the fire station site locations.
- Timing:
    - Per the MMRP, MM 16-1 must be satisfied prior to approval of tentative maps.
    - Per the MMRP, MM 16-3 must be satisfied prior to approval of plans and specifications for final maps.
    - Per the Development Agreement, all fire stations must be equipped to be compatible with the LACoFD's Development Impact Mitigation Agreement standards. See Dev. Agmt., Exhibit G, Section 3.2.
    - Per the Development Agreement, Fire Station # 1 must be a station of 10,000 square feet, Fire Station # 2 must be a station of 13,000 square feet, and Fire Station #3 must be a station of 10,000 square feet and equipped as provided in the Development Agreement, and it must be completed prior to the issuance of a certificate of occupancy. See Dev. Agmt., Exhibit G, Section 3.2.
    - Per the Development Agreement, and per MM 16-3, it remains to be determined whether the Project will be required to construct a fourth fire station, but such determination shall be based on need established pursuant to MM 16-1. See Dev. Agmt., Exhibit G, Section 3.2.
    - Per the Development Agreement, the general locations of the three required fire stations will be situated as identified on Exhibit 4-1 of the FEIR, subject to relocation based on mutual agreement of the Developer and the County. If it is determined that fourth station is required, it will be located based on mutual agreement of the Developer and County. Nevertheless, LACoFD will have final approval of any fire station location. See Dev. Agmt., Exhibit G, Section 3.1.
    - Per the Development Agreement, Fire Station #1 must be completed prior to the issuance of a certificate of occupancy for the Project's 1,000th residential unit, and Fire Stations #2 and #3 must be completed prior to the issuance of a certificate of occupancy for any residential unit located outside of a station's five-minute response time. See Dev. Agmt., Exhibit E-1.
    - Per the Development Agreement, existing Fire Station #77 will serve the first 1,000 Project dwelling units (before Fire Station #1 is operational).
    - Per the Specific Plan, at page 3-37, two fire station sites shall have a building pad consisting of a net buildable area of 1.25 acres. The third site shall have a net buildable area of 4 acres. All sites will be rectangular in shape, with utilities stubbed to the property.

- Other Requirements:

    - Per Mitigation Measure MM 16-2, the Developer must pay developer fees in accordance with the LACoFD Developer Fee Program until such time as the Developer has conveyed an approved, operational fire station to LACoFD, unless otherwise agreed to by the Developer and LACoFD in accordance with the LACoFD Developer Fee Program's land-in-lieu of fees provisions.

4. Emergency Response Plan

- Required by Mitigation Measure MM 3-7, which provides:

  The Project Applicant/Developer shall prepare an Emergency Response Plan for the Project, which shall be updated as needed for each Tentative Map, and shall be submitted to the County (California Department of Forestry and Fire; and County Fire Department and/or County Sheriff's Department) for review and approval. The Project Applicant/Developer shall be responsible for distributing the current Emergency Response Plan to each purchaser or tenant of each property within Centennial, and shall distribute the Plan to all landowners through the Transportation Management Agency (TMA).

- Required by Development Agreement, Exhibit G, Section 12.3, which provides:

  The Property Owners shall require future residential and commercial property owners associations to develop and implement an emergency preparation and response plan, including shelter-in-place and evacuation plans as well as first aid and emergency electric power supplies. The Property Owners shall provide educational information about the health and safety benefits of emergency preparation and response supplies such as a seven-day supply of potable water and food, and solar-powered batters for communication and refrigeration, to respond to earthquakes and other potential disasters, at the initial point of property sale, and annually thereafter in Property Owner Association Website Notices. The Property Owners and Property Owner Association Website Notices may also identify emergency response supply and battery vendors providing discounts or other preferential terms to Project site occupants.

- Review and approval:

    - Per the MMRP, the Emergency Response Plan must be submitted to the California Department of Forestry and Fire Prevention for peer review and to the LACoFD and/or Sheriff's Department for review and approval.

- Timing:

    - Per the MMRP, MM 3-7 must be satisfied prior to approval of tentative maps.

5. Landscape Plan

- Required by Mitigation Measure 7-13, which provides in relevant part:

  The Project Applicant/Developer shall develop a Landscaping Plan for review and approval by the County Biologist. The Landscaping Plan shall be (1) prepared by a qualified biologist, (2) submitted to the County for approval with each tentative map, (3) provided to builders, (4) provided to future project occupants as described in the Specific Plan, and (5) include a plant palette composed of non-invasive species that are adapted to the conditions found on the Project site and do not require high irrigation rates. The Landscaping Plan shall also include a list of invasive plant species prohibited from being planted on the Project site. In addition, retail sales of these invasive plan species will be prohibited at any businesses (nurseries) located within the Project site. Landscape plans shall encourage planting of local natives typical of native vegetation within ten miles of the Project site.

- Review and approval:

  - Per the MMRP, the Landscape Plan must be reviewed and approved by the County Department of Regional Planning.

- Timing:

  - Per Mitigation Measure 7-13, a Landscape Plan must be submitted for approval with each tentative map application.

- Other requirements:

  - The Specific Plan, at page 2-78, provides that "a Community Forester (licensed arborist or licensed with the Department of Forestry and/or fire warden) shall oversee … implementation of the long-term landscape plan within developed areas."

  - The Specific Plan, at page 3-42, explains that the Specific Plan plant pallet was prepared in accordance with the LACoFD's Fuel Modification Plan Guidelines, and, at page 3-99, requires the use of fire-retardant plants in fuel modification zones.

  - The Specific Plan, at page 3-29, requires landscaping in the plan's Open Space Zone to be dominated by native and/or drought tolerant trees, shrubs and ground cover, taking into consideration fuel modification requirements, such as using plants that are fire resistant.

  - The Centennial Green Development Program set forth in Specific Plan Appendix A-1 requires the project to implement fire-safe landscaping techniques to reduce fire risks to biological resources and human safety in the fuel modification zones.

- The Hillside Design Guidelines set forth in Specific Plan Appendix 1-B requires landscaping in a manner that, among other things, increases fire protection.

6. Ban on Wood-Burning Fireplaces

- Required by Mitigation Measure MM 11-3, which provides:

  The Project's plans and specifications shall prohibit wood-burning fireplaces as required by SCAQMD Rule 445 in single-family residences throughout the entire Project site, including at residences that are 3,000 or more feet above mean sea level at which the SCAQMD prohibition would otherwise not apply. Natural gas fireplaces shall be limited to a total of 13,954. These requirements shall be posted on the community intranet and shall be clearly described and distributed to home buyers through their home purchase contracts and CC&Rs.

- Also required by the Specific Plan's General Development Standards. See Specific Plan page 2-78.

- Review and approval:

  - Per the MMRP, compliance with this requirement will be monitored by County Regional Planning and/or the Department of Public Building and Safety.

- Timing:

  - Compliance will be monitored at the building permit stage.

6. Miscellaneous Requirements

- Planned utility undergrounding and Project improvements to Highway 138 will help further reduce fire risk and provide better emergency egress, as discussed on Specific Plan page M-11.

- As discussed on Specific Plan page 3-9, classifications and street cross-sections were developed in partnership with the Department of Regional Planning, as well the County of LA's Public Works and Fire Departments: modifications to theses cross-sections require approval from Public Works and LACoFD.

- As discussed on Specific Plan page 2-83, no sign shall be installed, relocated, or maintained so as to prevent free ingress to or egress from any door, window, or fire escape. No sign of any kind shall be attached to a standpipe or fire escape, except those signs as required by other codes or ordinances.

- As discussed in footnote 21 of the Specific Plan's Appendix 2-C, the curb-to-curb width of each private driveway and fire lane will be approved by the Los Angeles County Fire Department and Department of Public Works

- The Project will be required to comply with all then-current fire code and building safety requirements, which should be detailed in the Fire Protection Plan.

- To ensure safe ingress and egress to, from and within the project site during construction, Mitigation Measure MM 3-8 provides as follows:

  The Project Applicant/Developer shall prepare a Traffic Control Plan in accordance with the California Manual on Uniform Traffic Control Devices (MUTCD). The Traffic Control Plan shall be reviewed and approved by the California Department of Transportation (Caltrans), and all construction activities in the public right-of-way shall comply with the approved Traffic Control Plan to the satisfaction of Caltrans. Documentation of Caltrans approval shall be provided to the County for any Tentative Map involving construction within State Route 138 right-of-way.

Appendix B

Centennial Project Site Photographs

N

0 5,000 10,000 20,000 Feet

Photo 1 Photo 2 Photo 3 Photo 4 Photo 5 Photo 6 Photo 7 Photo 8 Photo 9 Photo 10 Photo 11 Photo 12

Photo 13 Photo 14 Photo 15 Photo 16 Photo 17 Photo 18 Photo 19 Photo 20 Photo 21 Photo 22 Photo 23 Photo 24

Photo 25 Photo 26 Photo 27 Photo 28 Photo 29 Photo 30 Photo 31 Photo 32 Photo 33 Photo 34 Photo 35 Photo 36

Photo 37 Photo 38 Photo 39 Photo 40 Photo 41 Photo 42 Photo 43 Photo 44 Photo 45 Photo 46 Photo 47 Photo 48

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Appendix C

LA County Undesirable Plant List

Plant Selection Guidelines by Zone

Fuel Modification plant selection and location should focus on the density and arrangement of plants related to structures. Second, choose zone appropriate species based on plant characteristics such as moisture content, resin/pitch and the production of dead litter from leaves, bark, seed pods etc. The following guidelines are intended to simplify this process through zone specific compositions.

Zone A (30' from any qualifying structure or the property line whichever is first)

- Zone A should be planted "lean" and selections should consist of small herbaceous or succulent plants less than 2'-3' in height or regularly irrigated and mowed lawns.
- It is best not to use woody trees, shrubs and perennial species or masses of un-mowed grasses within 10 feet of the structure.
- Occasional accents of woody plants can be used sparingly to soften hard edges of structures if the selections are widely spaced and zone appropriate.
- Consider locating hardscape features such as walkways, patios, driveways, sport courts etc. adjacent to the structure itself. Potted plants can be used to soften walls if necessary.

Zone B (30'-100' from any qualifying structure)

- Zone B can be planted with a slightly higher density than Zone A. However, care should be taken not to create horizontal or vertical fuel ladders (see basic fire behavior graphics).
- Screen plantings can be used to hide unsightly views. Hedging is discouraged as it promotes the accumulation of dead litter inside the live hedge.
- Zone B is the ideal location to introduce larger shade trees provided they are zone appropriate and the canopies are not continuous.
- Avoid planting woody plant species larger than 3' at maturity directly beneath any tree canopy.

Zone C (100'-200' from any qualifying structure)

- Zone C often is not landscaped on many projects but is still subject to hazard reduction requirements (brush clearance). Do not denude the property. http://www.readyforwildfire.org/
- If Zone C is to be landscaped, avoid increasing plant density beyond guidelines for Zone B.

Adjacent to Access Roads

- Maintain Fire Access roads with a 20' wide path that remains clear to the sky.

Fuel Ladders/Basic Fire Behavior

Before selecting and locating plants on a Fuel Modification plan a basic understanding of wildland fire behavior is the key factor in properly arranging plants. Eliminating and avoiding the creation of fuel ladders should be the chief concern. Understanding that anything planted in the landscape can become receptive fuel for wildfire: the way it is arranged and maintained will greatly influence fire intensity. The following diagrams will aide in arranging plant compositions wisely.

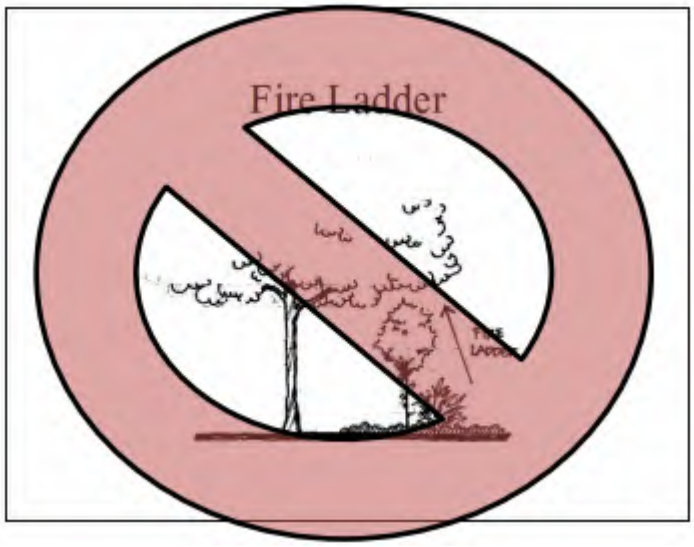

Figure 1: Fire Ladders or Fuel Ladders should be eliminated. The diagram above illustrates what not to do.

Figure 2: Eliminate the vertical and horizontal continuity. This is a good example of adequate separation.

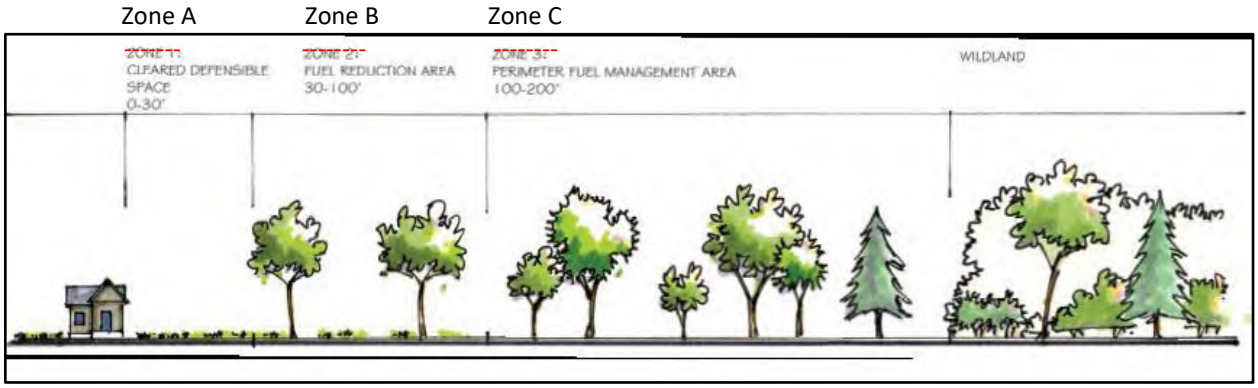

Figure 3: Note the progressive increase in density and arrangement moving away from the structure.

Plant Placement Do's

- Do: use "mass plantings" or herbaceous/succulents as ground covers even if they are not traditionally used as such. Mass plantings if properly selected, can eliminate fuel ladders.
- Do: plant using spacing resulting in near complete coverage at maturity.
- Do: consider using patio trees as an informal screen in Zone A.
- Do: consider vines as an alternative to hedges on walls or fences 10' from structures.
- Do: select varieties of plants that are slower growing and reach manageable sizes at maturity.
- Do: use plants that are appropriately scaled to the size of the property and structure. A single story house does not need to be shaded by a 100' tall Sweetgum.

Plant Placement Don'ts

- Don't plant hedges directly against structures. This includes espaliers of large shrubs not allowed in Zone A, or hedges taller than 6 feet or within 10' of the structure.
- Don't plant large shrubs and trees in continuous lines or large masses in Zones A or B.
- Don't plant at densities that result in an "instant landscape."
- Don't plant large species and use pruning to reduce overall size.
- Don't plant vines on structures. Vines become receptive fuel beds for embers (fire brands).
- Don't assume any plant is "fire proof." All plants will burn and assuming a plant is ignition resistant can be very misleading.
- Don't use large woody species in mass plantings.

Acceptable Plant Selections for Fuel Modification

The provided plant list is intended as a representative sample of plants appropriate for each zone, considering size, moisture content, leaf litter production and chemical composition. This list is not comprehensive, and designers may choose plants not on the list if plant characteristics are zone appropriate. Selecting regionally appropriate plants considering climate and microclimate adaptability is the designer's responsibility.

Undesirable Plants/Target Species

Plants listed below are not allowed as part of an approved Fuel Modification Plan. In addition to this list, designers should avoid planting known invasive plants such as Pampas grass and Hottentot Fig. If there are questions, please reference the California Invasive Plant Council.
http://www.cal-ipc.org/

*This list is not inclusive and some cultivars (dwarf etc.) within the genus listed may be acceptable.

Adenostoma fasciculatum – Chamise

Adenostoma sparsifolium – Red Shank

Artemesia californica – California Sagebrush

Eriogonum fasciculatum – Common Buckwheat

Cortaderia spp. – Pampas Grass

Cupressus spp. – Cypress

Eucalyptus spp – Eucalyptus

Jasminum humile – Italian Jasmine

Plumbago auriculata – Cape Plumbago

Tecoma capensis – Cape Honeysuckle

Example plant selections by zone begin on the next page.

Fuel Modification Plant List

Botanical Name	Common Name	Zone	Minimum distance from structure
Ground Cover			
Acacia redolens 'Desert Carpet'/'Low Boy'	Desert Carpet Acacia	B	30
Achillea tomentosa	Woolly Yarrow	A	
Ajuga reptans	Carpet Bugle	A	
Arctostaphylos (Prostrate Varieties)	Manzanita	B	
Artemisia californica (Cultivars)	Sagebrush - Prostrate Forms	B	30
Artemesia 'Powis Castle'	NCN	B	
Baccharis pilularis 'Pigeon Point'/'Twin Peaks'	Prostrate Coyote Brush	B	
Campanula poscharkyana	Serbian Bellflower	A	
Ceanothus gloriosus	Point Reyes Ceanothus	B	
Cerastium tomentosum	Snow-In-Summer	A	
Chamaemelum nobile	Chamomile	A	
Cistus salviifolius 'Prostratus'	Sageleaf Rockrose	B	
Coprosma kirkii	Mirror Plant	B	
Coreopsis auriculata 'Nana'	Tickseed	A	
Cotoneaster (Prostrate Varieties)	Cotoneaster	B	
Dalea greggii	Trailing Indigo Bush	B	
Delosperma alba	White Training Ice Plant	A	
Dichondra micrantha	Dichondra	A	
Drosanthemum floribundum	Rosea Ice Plant	A	
Duchesnea indica	Indian Mock Strawberry	A	
Dymondia margaretae	NCN	A	
Erigeron glaucus	Seaside Daisy	A	
E. karvinskianus	Santa Barbara Daisy	B	
Euonymus fortunei 'Colorata'	Purple-Leaf Winter Creeper	B	
Festuca cinerea(ovina'Glauca')	Blue Fescue	A	
F. rubra	Red Fescue	A	
Fragaria chiloensis	Wild Strawberrry	A	
Gazania Hybrids	Trailing Gazania	A	
Geranium incanum/sanguineum	Cranesbill	A	
Glechoma hederacea	Ground Ivy	A	
Helianthemum nummularium	Sunrose	A	
Herniaria glabra	Green Carpet	A	
Heuchera species and Cultivars	Coral Bells	A	
Hypericum calycinum/coris	Aaron's Beard	B	
Iberis sempervirens	Evergreen Candytuft	A	
Iva hayesiana	Poverty Weed	B	30
Juniperus (Prostrate species/cultivars)		B	
Laurentia fluviatilis	Blue Star Creeper	A	
Lysimachia nummularia	Moneywort	A	
Liriope spicata	Creeping Lily Turf	A	

Liriope muscari	Lily Turf	A	
Mahonia repens	Creeping Mahonia	B	
Myoporum 'Pacificum' & 'Putah Creek'	Pacific Myoporum	B	
M. parvifolium	NCN	A	
Oenothera berlandieri	Mexican Evening Primrose	B	
O. stubbei	Baja Evening Primrose	A	
Ophiopogon japonicus	Mondo Grass	A	
Pachysandra terminalis	Japanese Spurge	A	
Pelargonium peltatum/tomentosum	Ivy Geranium	A	
Persicaria capitata	Pink Clover	A	
Phlox subulata	Moss Pink	A	10
Phyla nodiflora (Lippia repens)	Lippia	A	
Potentilla tabernaemontanii	Spring Cinquefoil	A	
Ribes viburnifolium	Catalina Perfume	B	
Rosmarinus officinalis (Prostrate Varieties)	Prostrate Rosemary	B	30
Scaevola 'Mauve Clusters'	NCN	A	
Salvia sonomensis	Creeping Sage	B	
Sedum species	Stonecrops	A	
Senecio mandraliscae/serpens	Kleinia/Blue Chalksticks	A	
Soleirolia soleirolii	Baby's Tears	A	
Teucrium cossonii majoricum	Germander	A	
T. X lucidrys 'Prostratum'	Prostrate Germander	A	
Thymus species	Mother of Thyme	A	
Trachelospermum jasminoides	Star Jasmine	A	
Trifolium fragiferum	White Clover	A	
Verbena species (Prostrate Varities)	Garden Verbena	A	
Vinca minor	Dwarf Periwinkle	A	
Viola odorata	Sweet Violet	A	
Wedelia trilobata	Yellow Dot	B	
Zoysia tenuifolia	Korean Grass	A	
Miscellaneous Perennials, Grasses, Ferns etc.			
Acorous gramineous and Cultivars	Sweet Flag	A	
Agapanthus africanus	Lily of the Nile	A	
Alstroemeria cooperi	Peruvian Lily	A	
Armeria species	Thrifts	A	
Bamboos	Bamboo	B	30
Bergenia cordifolia	Heart Leaf Bergenia	A	
Cycas species	Cycads	A	
Cyrtomium falcatum	Holly Fern	A	
Davalia tricomanoides	Rabbits Foot Fern	A	
Epilobium canum	California Fuchia	B	
Helictotrichon sempervirens	Blue Oat Grass	A	15
Hemerocallis hybrids	Daylily	A	
Iris douglassiana	Coastal Iris	A	
Iris germanica	Bearded Iris	A	

Kalanchoe species	Kalanchoe	A	
Leymus condensatus 'Canyon Prince'	Canyon Prince Wild Rye	B	
Lobelia laxiflora		A	10
Pelargonium species	Geranium	A	
Penstemon species	Beard Tongue	A	
Plumeria	Plumeria	A	
Phlebodium aureum	Rabbits Foot Fern	A	
Tulbaghia violacea	Society Garlic	A	
Zephyranthes candida	Zephyr Lily	A	
Shrubs			
Abelia grandiflora (Prostrata)	Glossy Abelia	A	10
Abutilon hybridum	Flowering Maple	A	10
Acanthus mollis	Bear's Breech	A	
Agave species	Agave	A	
Aloe species	Aloe	A	
Alyogyne huegelii	Blue Hibiscus	A	10
Arbutus unedo (Dwarf Cultivars)	Dwarf Strawberry Tree	A	10
Arctostaphylos species	Manzanita	B	
Aucuba japonica	Japanese Aucuba	A	
Baccharis species	Various	B	
Berberis thunbergii	Japanese Barberry	B	
B. thunbergii ' prostrate cultivars'		A	10
Bougainvillea sp.	Bougainvillea	B	
Buddleja davidii	Butterfly Bush	B	
Buxus microphylla japonica	Japanese Boxwood	A	10
Caesalpinia (Shrub Forms)	Bird of Paradise Bush	A	10
Camellia species	Camellia	A	10
Calliandra californica/eriophylla	Baja Fairy Duster	B	
Callistemon citrinus	Lemon Bottlebrush	B	
C. viminalis "Little John"	NCN	A	10
Calycanthus occidentalis	Western Spice Bush	B	
Carissa macrocarpa and Cultivars	Natal Plum	A	10
Carpenteria californica	Bush Anemone	A	10
Cassia artemisioides	Feathery Cassia	A	30
Ceanothus species	Wild Lilac	B	30
Cercocarpus betuiloides	Mountain Mahogany	B	30
Choisya ternata	Mexican orange	B	
Cistus species	Rockrose	B	
Comarostaphylis diversifolia	Summer Holly	B	
Convolvulus cneorum	Bush Morning Glory	B	
Coprosma pumila/repens	Mirror Plant	B	
Cotoneaster species & cultivars	Cotoneaster	B	
Crassula species	NCN	A	
Cuphea hyssopifolia	False Heather	A	
Cycas revoluta	Sago Palm	A	

Dasylirion quadrangulatum/wheeleri	Mexican Grass Tree	A	10
Dendromecon harfordii	Island Bush Poppy	B	
Dietes bicolor/irioides	Fortnight Lily	A	
Dodonaea viscosa (Purpurea)	Hopseed Bush	B	
Elaeagnus pungens & cultivars	Silverberry	B	
Encelia californica	Coast Sunflower	A	10
E. farinosa	Brittle Bush	B	
Erigonum giganteum	St. Catherine's Lace	B	
Escallonia species	Escallonia	A	10
Euonymus japonica & cultivars	Evergreen Euonymus	A	10
Euphorbia species		A	
Euryops pectinatus	NCN	A	
Fatsia japonica	Japanese Aralia	A	
Fouquieria splendens	Ocotillo	A	
Fremontodendron species & cultivars	Flannel Bush	B	
Gardenia jasminoides	Gardenia	A	
Garrya elliptica	Coast Silktassel	B	
Grevillea species & cultivars	Grevillea	B	
Grewia occidentalis	Lavender Starflower	B	
Hakea suaveolens	Sweet Hakea	B	
Hebe species & cultivars	Hebe	A	10
Hesperaloe parviflora	Red Yucca	A	
Hibiscus rosa - sinensis	Chinese Hibiscus	A	10
Ilex species	Holly	B	
Juniperus species	Juniper	B	
Justicia brandegeana	Shrimp Plant	A	10
J. californica	Chuparosa	B	
Keckiella cordifolia	Heart-Leaved Penstemon	B	
Kniphofia uvaria	Red-Hot Poker	A	
Lantana Camara & hybrids	Lantana	A	10
Larrea tridentata	Creosote Bush	B	
Lavandula species	Lavender	A	10
Lavatera assurgentiflora/maritima	California Tree Mallow	B	
Leonotis leonrus	Lion's Tail	B	
Leptospermum scoparium & varities	New Zealand Tea Tree	B	
Leucophyllum species		B	
Ligustrum japonicum	Wax-leaf Privet	A	10
Lupinus species	Lupine	B	
Mahonia aquifolium ('Compacta')	Oregon Grape	A	10
M. fremontii	Desert Mahonia	B	
M. 'Golden Abundance'	NCN	B	
M. lomariifolia	Venetian Blind Mahonia	A	
Malosma - See Rhus			
Malva species	Mallow	A	10
Melaleuca nesophila	Pink Melaleuca	A	10
Mimulus species (Diplacus)	Monkey Flower	A	10
Myrica californica	Pacific Wax Myrtle	B	

Myrsine africana	African Boxwood	A	10
Myrtus communis 'Compacta'	Dwarf Myrtle	A	10
Nandina domestica (including dwarf varieties)	Heavenly Bamboo	A	
Nerium oleander	Oleander	B	
N.o. 'Petite Salmon'	NCN	A	10
Opuntia species	Prickly Pear, Cholla etc.	A	
Phlomis fruticosa	Jerusalem Sage	A	
Phoenix roebelenii	Pygmy Date Palm	A	
Phormium tenax and Cultivars	New Zealand Flax	A	
Photinia fraseri	Photinia	B	
Pittosporum tobira ('Variegata')	Tobira	B	
P.t.'Wheeler's Dwarf'	Dwarf Pittosporum	A	
Punica granatum 'Nana'	Dwarf Pomegranate	A	10
Prunus ilicifolia	Hollyleaf Cherry	B	
Pyracantha species	Firethorn	B	
Rhamnus california/crocea	Coffeeberry	B	
Rhaphiolepis indica and Cultivars	India Hawthorn	A	10
Rhus integrifolia/laurina	Lemonade Berry	B	40
R. ovata	Sugar Bush	B	30
Ribes species	Currant/Gooseberry	A	10
Romneya coulteri	Matilija Poppy	B	
Rosa species (except R. californica)	Rose	A	
Rosmarinus officinalis & cultivars	Rosemary	B	
Salvia species - native varieties	Sage	B	
S. greggii/leucantha	Autumn Sage	A	10
Santolina chamaecyparissus/rosmarinifolius	Lavender Cotton	A	10
Simmondsia chinensis	Jojoba	B	
Strelitzia nicolai/regina	Bird of Paradise	A	
Tagetes lemmonii	Copper Canyon Daisy	B	
Tibouchina urvilleana	Princess Flower	A	10
Trichostema lanatum	Wooly Blue Curls	B	
Viburnum species	Viburnum	A	10
Westringia fruticosa	Coast Rosemary	A	10
Xylosma congestum	Shiny Xylosma	B	
X.c. 'Compacta'	Compact Xylosma	A	10
Yucca species	Yucca	B	
Trees			
Acacia farnesiana	Sweet Acacia	A	15
A. greggii	Catclaw Acacia	B	
A. salicina	Willow Acacia	A	15
A. smallii	NCN	A	15
A. stenophylla	Shoestring Acacia	A	15
Acer negundo	Box Elder	B	
A. palmatum	Japanese Maple	A	
A. saccharinum	Silver Maple	B	30

Aesculus californica	California Buckeye	B	
Agonis flexuosa	Peppermint Tree	B	
Albizia julibrissin	Silk Tree	B	
Alnus rhombifolia	Alder	B	
Arbutus unedo ('Marina')	Strawberry Tree	A	15
Archontophoenix cunninghamiana	King Palm	A	
Bauhinia variegata	Purple Orchid Tree	B	
Betula pendula	European White Birch	A	10
Brachychiton acerifolius/populneus	Flame Tree/Bottle Tree	B	
Brahea armata/edulis	Blue Hesper Palm	A	10
Butia capitata	Pindo Palm	A	10
Callistemon citrinus	Lemon Bottlebrush	B	
C. viminalis	Weeping Bottlebrush	A	15
Calocedrus decurrens	Incense Cedar	B	
Calodendrum capense	Cape Chestnut	B	
Cedrus deodara	Deodar Cedar	B	30
Ceratonia siliqua	Carob	B	30
Cercidium floridum/microphyllum	Blue Palo Verde	A	
Cercis occidentalis/canadensis	Western Redbud	A	10
Chamaerops humilis	Mediterranean Fan Palm	A	10
Chilopsis linearis	Desert Willow	A	15
Chionanthus retusus	Chinese Fringe Tree	A	10
Chitalpa X tashkentensis	Chitalpa	A	10
Chorisia speciosa	Floss Silk Tree	B	
Cinnamomum camphora	Camphor Tree	B	30
Citrus species	Citrus	A	10
Cocculus laurifolius	Laurel Leaf Snail Seed	B	
Cordyline australis	Giant Dracaena	A	
Cyathea cooperi	Australian Tree Fern	A	
Dicksonia antarctica	Tazmanian Tree Fern	A	
Dracaena draco	Dragon Tree	A	
Eriobotrya deflexa/japonica	Bronze Loquat/Loquat	A	10
Erythrina species	Coral Tree	B	
Feijoa sellowiana	Pineapple Guava	A	10
Ficus species	Fig	B	50
Fraxinus species	Ash	B	30
Geijera parviflora	Australian Willow	A	15
Ginkgo biloba	Maidenhair Tree	A	15
Gleditsia triacanthos	Honey Locust	A	15
Grevillea robusta	Silk Oak	B	
Heteromeles arbutifolia	Toyon	A	15
Hymenosporum flavum	Sweetshade Tree	A	15
Jacaranda mimosifolia	Jacaranda	B	
Juglans californica	Black Walnut	B	
Koelreuteria bipinnata/paniculata	Chinese Flame Tree	B	
Lagerstroemia indica	Crape Myrtle	A	10
Laurus nobilis	Sweet Bay	B	

Leptospermum laevigatum	Australian Tea Tree	A	15
Liquidambar formosana	Chinese Sweet Gum	A	15
L. styraciflua	American Sweet Gum	B	
Liriodendron tulipfera	Tulip Tree	B	
Lithocarpus densiflorus	Tanbark Oak	B	
Lophpstemon confertus (Tristania)	Brisbane Box	A	15
Lyonothamnus floribundus	Catalina Ironwood	A	15
Magnolia grandiflora	Southern Magnolia	B	
M. X soulangeana	Saucer Magnolia	A	10
Maytenus boaria	Mayten Tree	A	10
Melaleuca quinquenervia	Cajeput Tree	A	15
Metasequoia glypstroboides	Dawn Redwood	A	15
Metrosideros excelsus	New Zealand Christmas Tree	A	10
Morus alba	White Mulberry	B	
Olea europea	Olive - Fruitless only	A	15
Parkinsonia aculeata	Jerusalem Thorn	A	10
Phoenix dactylifera	Date Palm	B	
Pinus species	Pine	B	75
Pistacia chinensis	Chinese Pistache	B	
Pittosporum phillyraeoides	Willow Pittosporum	A	10
P. rhombifolium	Queensland Pittosporum	B	
Platanus racemosa	California Sycamore	B	
Podocarpus gracilior/macrophyllus	Fern Pine/Yew Pine	B	
Populus fremontii	Fremont Cottonwood	B	
Prosopis chilensis	Chilean Mesquite	B	
P. glandulosa	Honey Mesquite	A	15
Prunus cerasifera 'Atropurpurea'	Purple-leaf Plum	A	10
Punica granatum	Pomegranate	B	
Pyrus calleryana/kawakamii	Ornamental Pear	A	15
Quercus species	Oak	B	30
Rhus lancea	African Sumac	B	
Robinia ambigua	Locust	B	
Sapium sebiferum	Chinese Tallow Tree	B	
Schefflera actinophylla	Queensland Unbrella Tree	A	
Sophora japonica	Japanese Pagoda Tree	B	
Stenocarpus sinuatus	Firewheel Tree	A	10
Syagrus romanzoffianum	Queen Palm	A	
Tabebuia species	Trumpet Tree	A	15
Tipuana tipu	Tipu Tree	B	
Tupidanthus calyptratus	Tupidanthus	A	
Trachycarpus fortunei	Windmill Palm	A	
Umbellularia californica	California Bay	B	
Washingtonia filifera	California Fan Palm	B	30
Zelkova serrata	Sawleaf Zelkova	B	

Appendix D

Centennial Off-site Ignition Risk Assessment

Focused Off-site Ignition Risk Assessment

Centennial

MARCH 2025

Prepared for:

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CEQA	California Environmental Quality Act
CFC	California Fire Code
CMG	Centennial Monitoring Group
EIR	environmental impact report
ERP	Emergency Response Plan
FHSZ	Fire Hazard Severity Zone
FMZ	fuel modification zone
FPP	fire protection plan
FRAP	Fire and Resource Assessment Program
GIS	geographic information system
HOA	Homeowners Association
I	Interstate
IRWIN	Integrated Reporting of Wildland Fire Information
LACoFD	Los Angeles County Fire Department
NFPA	National Fire Protection Association
OAG	Attorney General's Office
PRC	Public Resources Code
Project	Centennial Master-Planned Community Project
SDG&E	San Diego Gas and Electric
SR	State Route
SRA	state responsibility area
WSP	Wildfire Safety Plan
WUI	wildland–urban interface

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1 Executive Summary

The potential fire impacts of the Centennial Specific Plan project (Approved Project) were fully disclosed and analyzed in in the Centennial Specific Plan Draft Environmental Impact Report (DEIR) and Final Environmental Impact (FEIR) (collectively the "2019 EIR") in accordance with the California Environmental Quality Act (CEQA). The 2019 EIR was certified by the Los Angeles County Board of Supervisors on April 30, 2019, but it was subsequently challenged in two separate lawsuits, one of which was brought by Climate Resolve, a public interest environmental organization. Among other claims, the Climate Resolve lawsuit alleged that the 2019 EIR of the environmental impacts caused by Approved Project and related to fire risk failed to comply with CEQA.

On April 5, 2021, the Los Angeles County Superior Court issued an order (Court Order) upholding the 2019 EIR's assessment of fire impacts in most respects. However, it faulted the 2019 EIR for purportedly failing to adequately analyze the Approved Project's potential fire-related impacts on existing off-site resources. Following issuance of the Court Order, but prior to final judgement in the Climate Resolve action, the Approved Project proponent and Climate Resolve entered into a legally enforceable settlement agreement to resolve the Climate Resolve litigation (Settlement Agreement). The Settlement Agreement addresses the key fire-related issues identified in the Court Order by requiring the Approved Project to (i) implement a Fire Protection Plan (FPP) that is subject to ongoing update procedures to incorporate any new or modified state or county fire prevention, protection, and response requirements to ensure that each phase of the Approved Project's development is at all times in compliance with then-prevailing standards and fire codes, (ii) obligate funding of the ongoing implementation of the Settlement Agreement FPP, (iii) ensure the completion of ongoing FPP compliance monitoring by a qualified third-party compliance inspector approved by the Los Angeles County Fire Department, including annual fuel management zone inspection, and (iv) require the establishment of a Good Neighbor Firewise Fund, which will provide grants to needs-based applicants to aid communities with a population of less than 100,000 within 15 miles of the project site to reduce off-site fire risks, increase fire prevention, protection and response measures, and avoid adverse impacts of fire, to be funded in an amount equal to $500,000 per year. Following full execution of the Settlement Agreement, on November 30, 2021, Climate Resolve filed with the Court a dismissal with prejudice of the Climate Resolve litigation, which dismissal was ordered by the Court on December 3, 2021.

The purpose of this report is to assess the potential to cause fires that ignite on-site and subsequently spread off-site, thereby impacting existing land uses in the Project's proximity. It is intended that the determinations of this report will be used to inform the fire impact analysis prepared as a supplement to the 2019 EIR (SEIR) to analyze the environmental impacts of proposed minor revisions to the Approved Project. This assessment also takes into account proposed modifications to the Approved Project to add battery energy storage systems as a conditionally permitted use and local microgrid electrical distribution systems as a permitted use to serve the Specific Plan area with renewable energy generated on site (Proposed Modifications). The Proposed Modifications would also open a portion of the existing Cement Plant Road and the entirety of a new Cement Plant Road for public use to improve overall fire resiliency

To date, there is no recognized scientific method for analyzing off-site ignition risk impacts of a proposed master-planned community such as the Centennial Specific Plan. There are various data available that can be used to evaluate some aspects of the potential for a project's population to result in ignitions, but understanding how specific and targeted design features and mitigation measures reduce potential ignition risk, if not prevent it altogether, have not been formalized. In many cases, the Project's features and measures also provide a public benefit beyond lessening the potential for increased ignitions and off-site fire spread, as discussed herein. To

that end, this analysis provides a comprehensive approach to evaluating the potential for an on-site ignition to cause an off-site ignition and spread-related impacts for a new master-planned community in a Fire Hazard Severity Zone (FHSZ). This report also applies this method to the Project to better inform the SEIR's assessment of the Project's potential fire-related impacts.

A team of fire protection experts was assembled to develop this assessment method utilizing best practices, extensive research, publicly available and Project-specific fire environment data, and years of professional experience to quantify and weigh the various risk factors and fire protection mitigation measures. Resumes of the fire protection team members are provided in Appendix A. The process involved creation of an off-site wildfire[1] risk matrix that assesses risk based on provisions for fire safety and protection features (described in detail herein).

Technical Report – Scope of Study

The scope of study included the following:

1. Characterize the existing site and its surroundings (estimate up to 5 miles) in terms of fire environment.
2. Summarize the Project's fire protection and safety features (required codes, Project proposed [specific], litigation settlement [above and beyond]); Required codes: CBC, CFC, Fire Safe Regulations (Public Resources Code), local ordinances.
3. Research articles, studies, and other sources to support analysis.
4. Conduct advanced fire behavior/fire spread modeling.
5. Discuss/describe Project's multi-layered approach to fire safety and protection.
6. Utilizing the analysis results and findings, develop a systematic method that can be used for a project to determine its off-site ignition risk.

Summary

Following the comprehensive research, development and application of the off-site risk assessment method, it was concluded that the Centennial Specific Plan Project presented a Moderate Off-site Ignition Risk to the adjacent land uses and communities in the region.

[1] CFC 4902 Definitions. WILDFIRE. Any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property or resources as defined in PRC, Sec. 4103 and 4104.

2 Project Background

Description of the Project site and its surrounding areas within a 5-mile radius are provided to assess landscape characteristics and features that may influence the Project's impact on off-site wildfire ignitions. This includes an assessment of the local fire environment and adjacent land uses.

The proposed Project site consists of approximately 12,323 acres of natural and agricultural land and is located in the northwestern portion of the Antelope Valley in an unincorporated area of Los Angeles County (County) (Figure 1, Project Site). The site is located adjacent to Quail Lake and is contiguous to the southern boundary of Kern County (Figure 2, Regional Map). The western boundary of the Project site is approximately 1 mile east of Interstate 5 (I-5). State Route (SR) 138 traverses the southern portion of the Project site in an east-west direction and forms its southern boundary west of Quail Lake. Elevations range from approximately 3,000 feet above mean sea level on the floor of Antelope Valley in the northeastern portion of the site to approximately 4,250 feet above mean sea level in the southwestern portion of the property.

Appendix B includes images and photographs of the site and surrounding area that support the discussion and conclusions presented herein.

- The current site is vacant and includes agricultural and open space, much of which is part of Tejon Ranch's ongoing grazing operation.
- The site includes paved roads (Cement Plant Road, 300th Street, Oso Pumping Plant Road), dirt roads, fences, power poles, and agriculture, effectively compartmentalizing the landscape.
- Vegetation is primarily maintained/grazed non-native grass and weedy growth and grassland with scattered native shrubs and oak woodland.

2.1 Off-site Fire Environment[2]

2.1.1 Fire History

According to the Integrated Reporting of Wildland Fire Information (IRWIN) database[3], there have been 196 reported wildfire ignitions within five miles of the Project site since 2014 (see Figure 3, Fire History). As presented graphically in Figure 4, Historical Off-site Ignition Locations, regional wildfire ignition locations documented in the IRWIN database are **strongly associated with major roadways** including I-5, SR-138, and Pine Canyon Road, with the majority of ignitions occurring along I-5 to the southwest of the Project site.

As depicted in Figure 4, the majority of wildfires within five miles of the Project site occur along the I-5 corridor and other major roadways. This pattern has been observed in other areas of Southern California. In San Diego County, distance to roads contributed significantly to the location of ignition points, with more ignitions closer to roads (Syphard and Keeley, 2015). Wildfire ignitions along roads are generally caused by **vehicles** with broken catalytic converters, dragging tow chains, parking over dry fuels, or directly from car fires spreading into adjacent vegetation. The potential for roadside ignitions is highest when fuels are cured and receptive to ignition from sparking.

[2] See the Project's Wildfire Safety Plan for more details about the Local Fire Environment including history, fuels (vegetation), climate and fire behavior modeling.

[3] https://www.wildfire.gov/application/irwin-integrated-reporting-wildfire-information

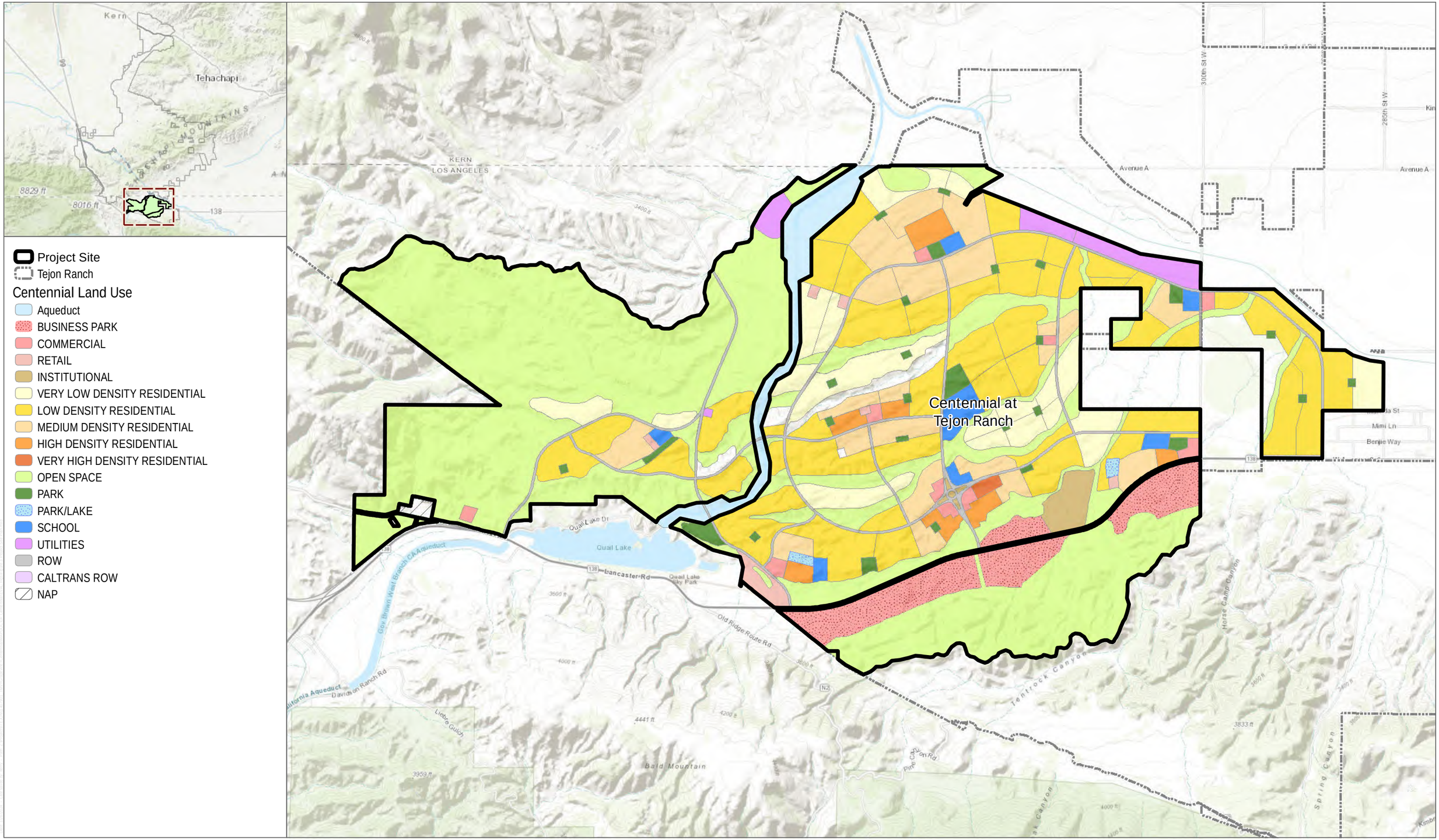
Maintenance or the removal of vegetation from roadsides has been a proven strategy for reducing the potential for roadside ignitions.

According to CAL FIRE's FRAP fire history database, other human-caused ignitions sources in the Project's vicinity include equipment use, arson, powerlines, and smoking. In other parts of the County, **equipment use** is the most common source of wildfire ignitions. Equipment commonly associated with wildfire ignitions includes power saws, mowers, or other equipment with gas or electric motors.

Compared to surrounding areas, the Project **site shows an obvious reduction in wildfire occurrence over time**. According to the FRAP database, 23 wildfires, have occurred on or within 1 mile of the Project site since 1800. The most recent fire burning in the vicinity of the Project site (within 1 mile) was the Gorman Fire, which occurred in May of 2007 and burned west of the property and I-5.

While not yet recorded in the public fire history database, other notable wildfires within the region have occurred in 2024. Most notably, the Post Fire ignited on June 15, 2024, near Gorman Post Road in Gorman, California located roughly 6 miles northwest of the Project site. Fueled by strong winds from the northeast and long-range spotting, the fire spread rapidly to the south, eventually growing to 15,563 acres. Firefighters suggested that fire spread was exacerbated by two back-to-back wet winters which resulted in dense vegetation growth. Two structures were destroyed in the Post Fire, resulting in one civilian injury. The fire was declared fully contained on June 26, 2024. While the Post Fire spread quickly south, it did not cross Interstate-5 or threaten the Project site.

The White Fire ignited on July 13, 2024, roughly 11 miles south of Tehachapi near Twin Lakes. The fire was caused by lightning and eventually spread to 5,646 acres roughly 16 miles northeast of the Project site. The fire was limited to the steeper terrain of the Tehachapi Mountains and did not spread to the Antelope Valley or the Project site. The lack of significant historical CAL FIRE activity on the majority of the Project site is likely **attributed to the removal of fine fuels by cattle grazing**. Limited wildfire history at the Project site is believed to be largely due to the site's terrain, managed fuels, barriers to wildfire spread, and quick wildfire detection and response. Wildfire occurrence off-site is more common, particularly south of the Project site in the Liebre Mountains. However, wildfires encroaching onto the Project site from the south rarely enter the interior of the site due to the position of Highway 138 and its utilization as a fire break. Wildfires that have previously burned within the Project site have been limited in size, with an average area of 284 acres. To date, fire has had a limited effect on the plant communities found on the Project site; grazing, which has been ongoing for over 150 years, has had the primary role in creating the current vegetation community.



SOURCE: BASEMAP-ESRI MAPPING SERVICE 2023; LAND USE-TEJON RANCH 2023

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0 1,950 3,900 Feet

FIGURE 1

Centennial Project Site Plan

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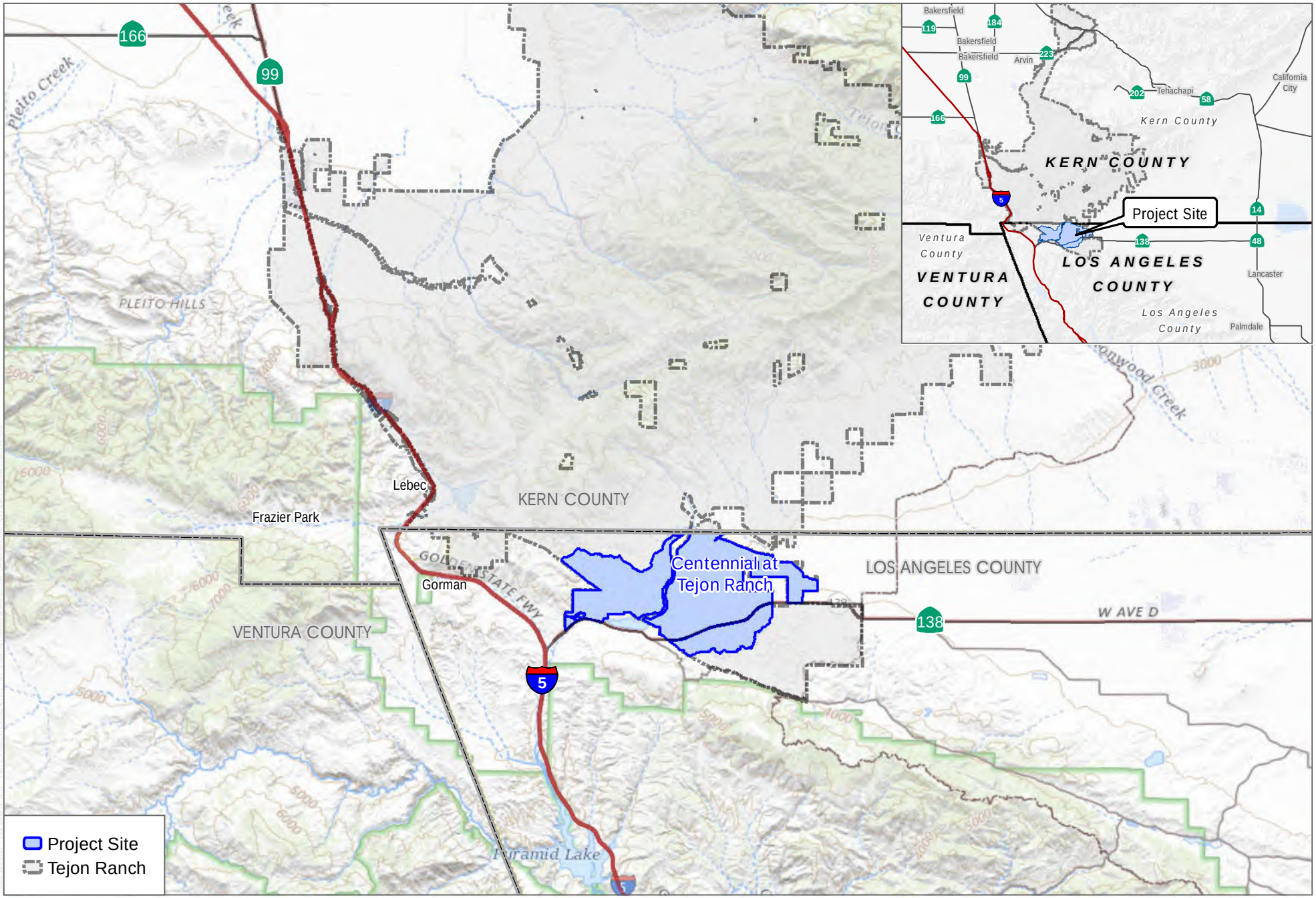

SOURCE: AERIAL-NAIP 2020

FIGURE 2

Regional Project Vicinity

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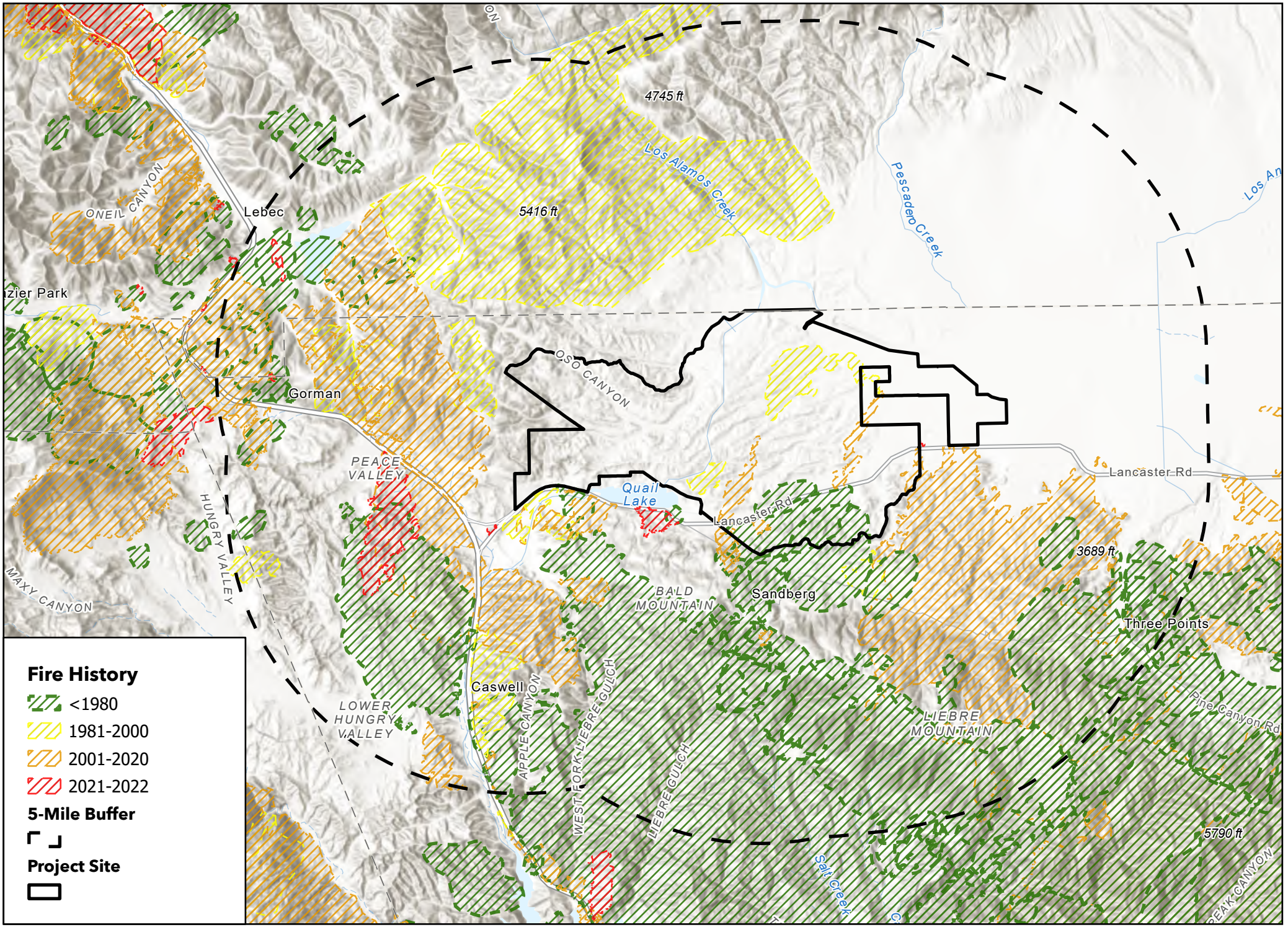

DUDEK

Source: FRAP, 2023

FIGURE 3
Fire History

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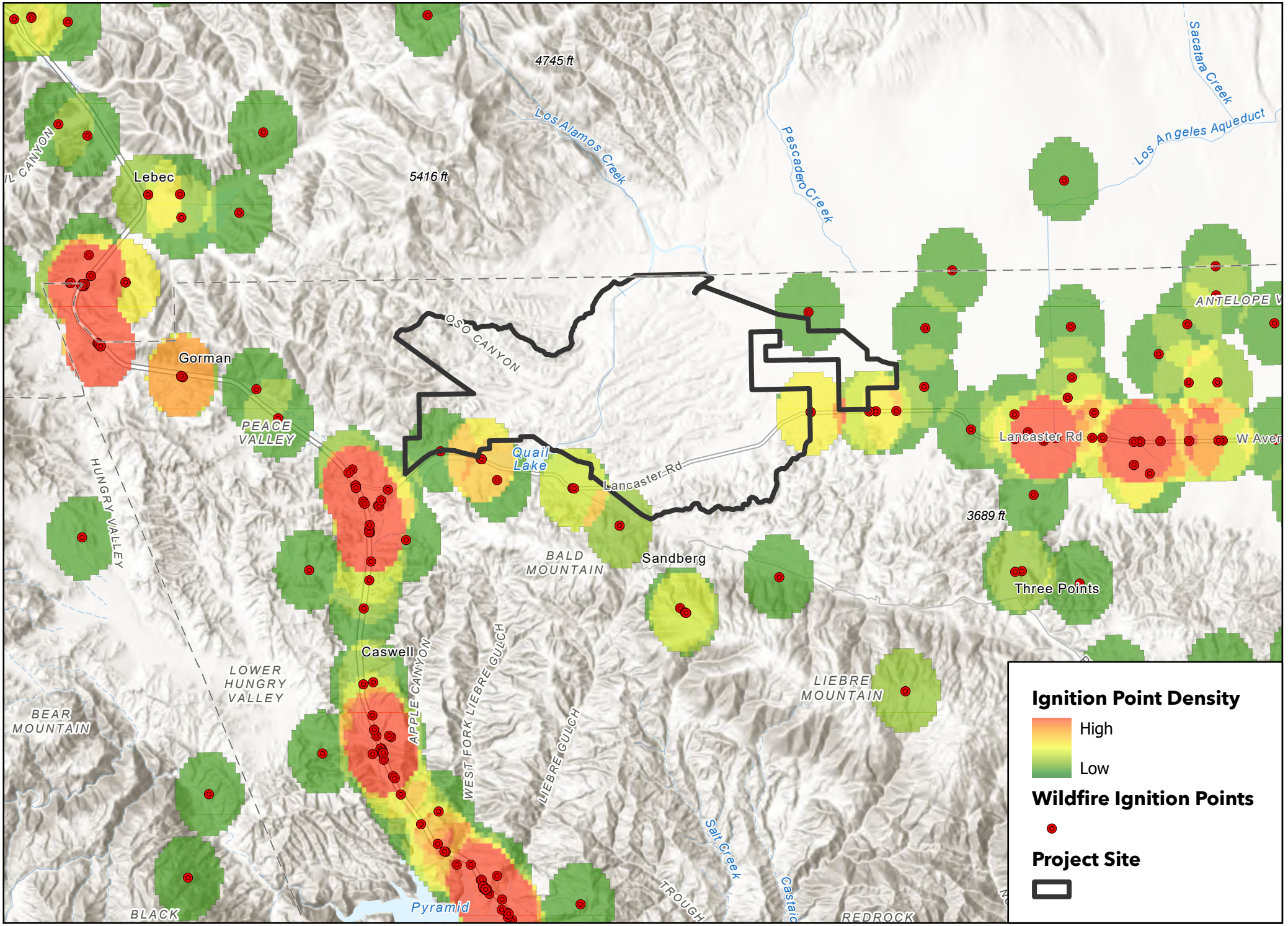

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0 1 2 4 Miles

Source: WFGIS Ignition Data, 2023

FIGURE 4

Wildfire Ignition Locations

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2.1.2 Topography

In general, off-site terrain is heavily influenced by the southern edge of the Tehachapi Mountains to the north and Liebre mountains to the south (see Figure 5, Off-site Topography). Notable topographic features in the Project's vicinity include Liebre Mountain, Bald Mountain, Peace Valley, Pine Canyon, Apple Canyon, Liebre Gulch, and Tejon Pass. Terrain to the east of the Project site is generally flat, comprising the western edge of Antelope Valley. Wildfires burning in off-site areas are likely to be heavily influenced by variations in topography, among other factors. The Project site can be described as occurring in a wide valley absent of the topographical features that contribute to more aggressive fire behavior, as presented in Table 1.

Table 1. Effects of Topographic Features on Fire Behavior

Topographic Feature	Effect
Narrow Canyon	Surface winds follow canyon direction, which may differ from the prevailing wind. Wind eddies/strong upslope air movement expected, which may cause erratic fire behavior. Radiant heat transfer between slopes facilitates spotting/ignition on opposite canyon side.
Wide Canyon	Prevailing wind direction not significantly altered; aspect significant contributor to fire behavior. Wide canyons are not as susceptible to cross-canyon spotting except in high winds.
Box Canyon/ Chute	Air is drawn in from canyon bottom, with strong upslope drafts. No gaps or prominent saddles to let heated air escape. Fires starting at the canyon bottom can move upslope very rapidly due to a chimney-like preheating of the higher-level fuels and upslope winds.
Ridge	Fires may change direction when reaching ridge/canyon edge; strong air flows likely at ridge point; possibility for different wind directions on different sides of the ridge. Ridges experience more wind. Fires gain speed and intensity moving toward a ridge. Fires burning at a ridge can exhibit erratic fire behavior. Strong air flows can cause a whirling motion by the fire. As the wind crosses a ridge it usually has a leeward eddy in which the wind rolls around and comes up the leeward side.
Saddle	Potential for rapid rates of fire spread; fires are pushed through saddles faster during upslope runs. Winds can increase when blowing through saddles due to the funneling effect of the constricted pass. On the other side, winds will slow, but erratic winds potentially occur at the saddle due to eddies.

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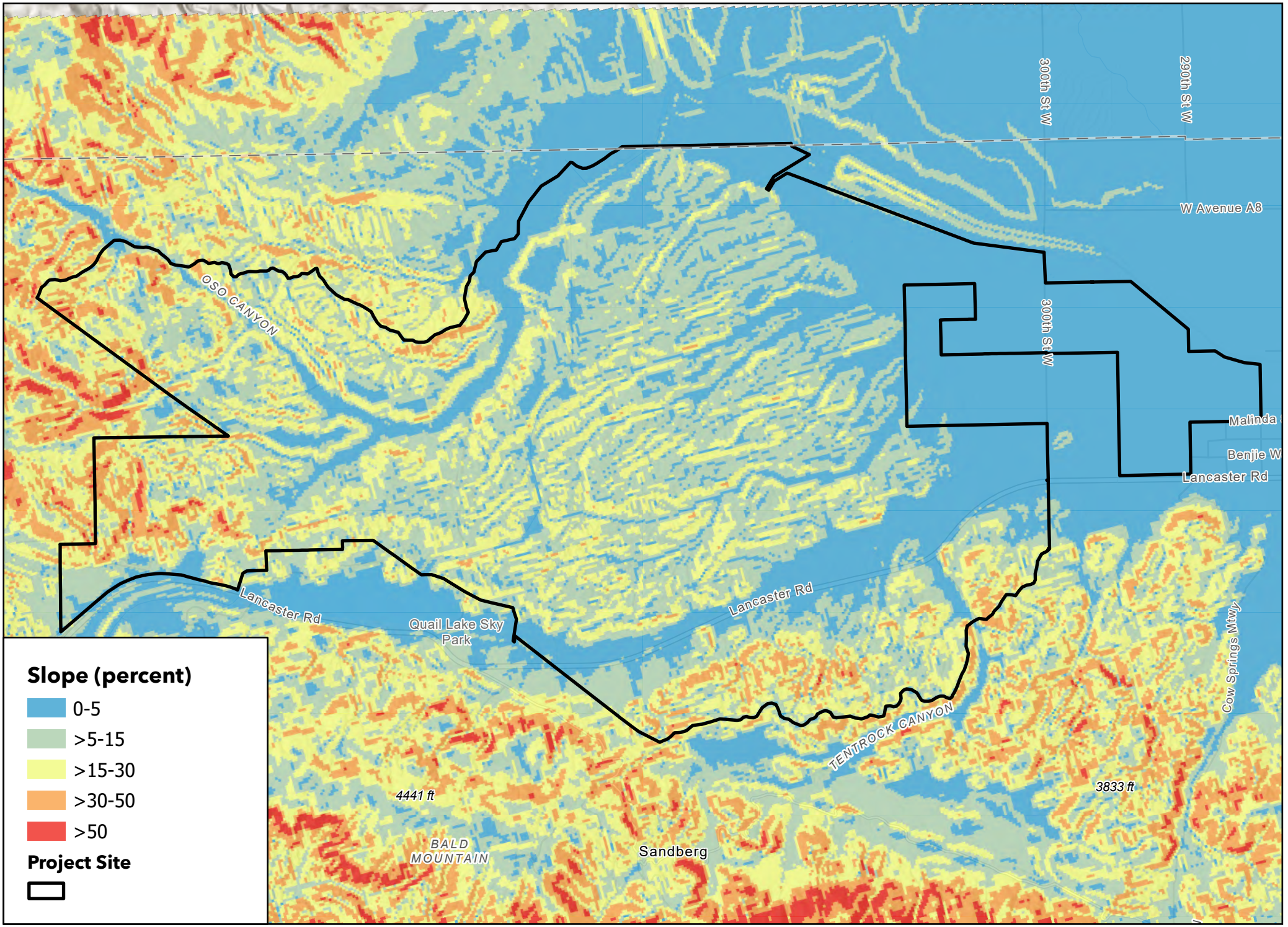

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0 0.5 1 2 Miles

Source: LANDFIRE, 2024

FIGURE 5

Topography

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2.1.3 Vegetation and Fuels

Tejon Ranch remains unfragmented and has been carefully managed with livestock and cattle grazing for nearly 160 years, first by pre-statehood vaqueros, up until today by modern-day cowboys, and has committed to doing so in the future. Actively grazed landscapes, including those of portions of the ranch within the Antelope Valley in the County, assure sustainability and limit the severity of wildfire due to the reduction of grassland fuel loads. The sustainable grazing operation employed at Tejon Ranch effectively reduces the grass fuels on an ongoing basis, which reduces the potential for ignitions and for rapid fire spread.

As presented in Table 2, off-site fuels include grazed grasslands, oak woodlands, scrub vegetation, chaparral, coniferous forests, and extensive agricultural areas to the east. 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 promote ignition or spread as quickly as light, flashy grass fuels.

Table 2. Vegetation Communities within 5 Miles of the Project Site

Vegetation Type (WHR13NAME)	Acres	Percent of Area
Shrub	48,798	42%
Herbaceous	36,404	32%
Hardwood Forest	8,961	8%
Hardwood Woodland	6,366	6%
Agriculture	3,631	3%
Urban	2,907	3%
Desert Shrub	2,542	2%
Conifer Woodland	1,725	1%
Water	1,213	1%
Barren	1,035	1%
Desert Woodland	1,009	1%
Conifer Forest	590	1%
Wetland	265	<1%
Total:	**115,452**	**100%**

Source: FVEG, 2024

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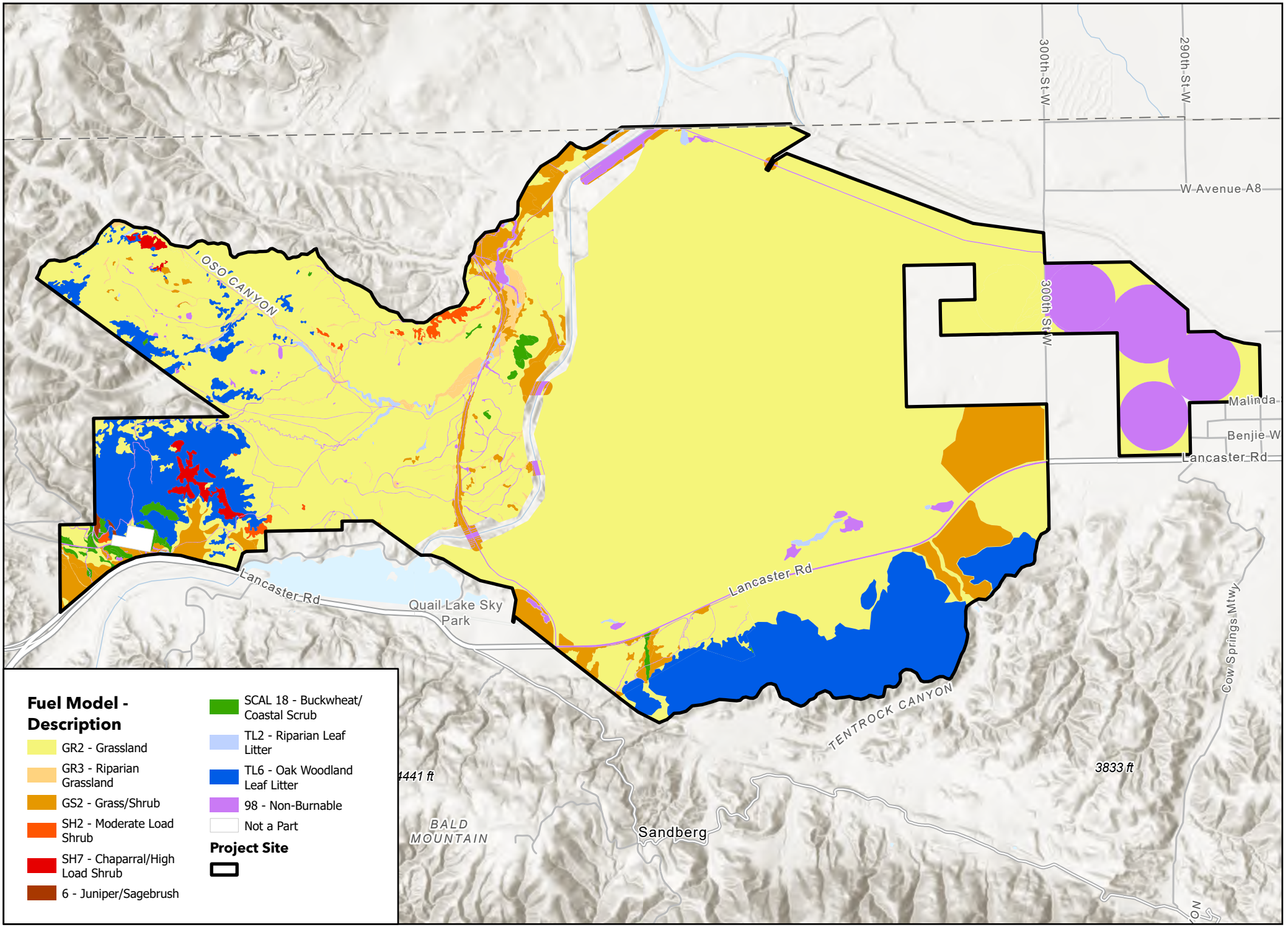

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Source: Bonterra, 2009, Edited 2024

FIGURE 6

Vegetation - Fuel Models

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2.1.4 Climate

Table 3 provides typical (50th Percentile) and extreme (97th Percentile) weather conditions at the Project site that were used for site-specific fire behavior modeling.

Table 3. 50th and 97th Percentile Weather Conditions at the Project Site

Climate Variable	50th Percentile Weather	97th Percentile Weather (w/ Max. Wind)
1 hour fuel moisture	5%	2%
10 hour fuel moisture	6%	3%
100 hour fuel moisture	12%	6%
Live herbaceous moisture	60%	30%
Live woody moisture	70%	60%
20 foot wind speed (mph)	7 mph	47 mph (maximum observed Fall wind speed)
Wind direction	240 degrees	60 degrees
Slope steepness	Variable by location, range: 0% to 95%	Variable by location, range: 0% to 95%

2.1.5 Project Vicinity and Land Uses

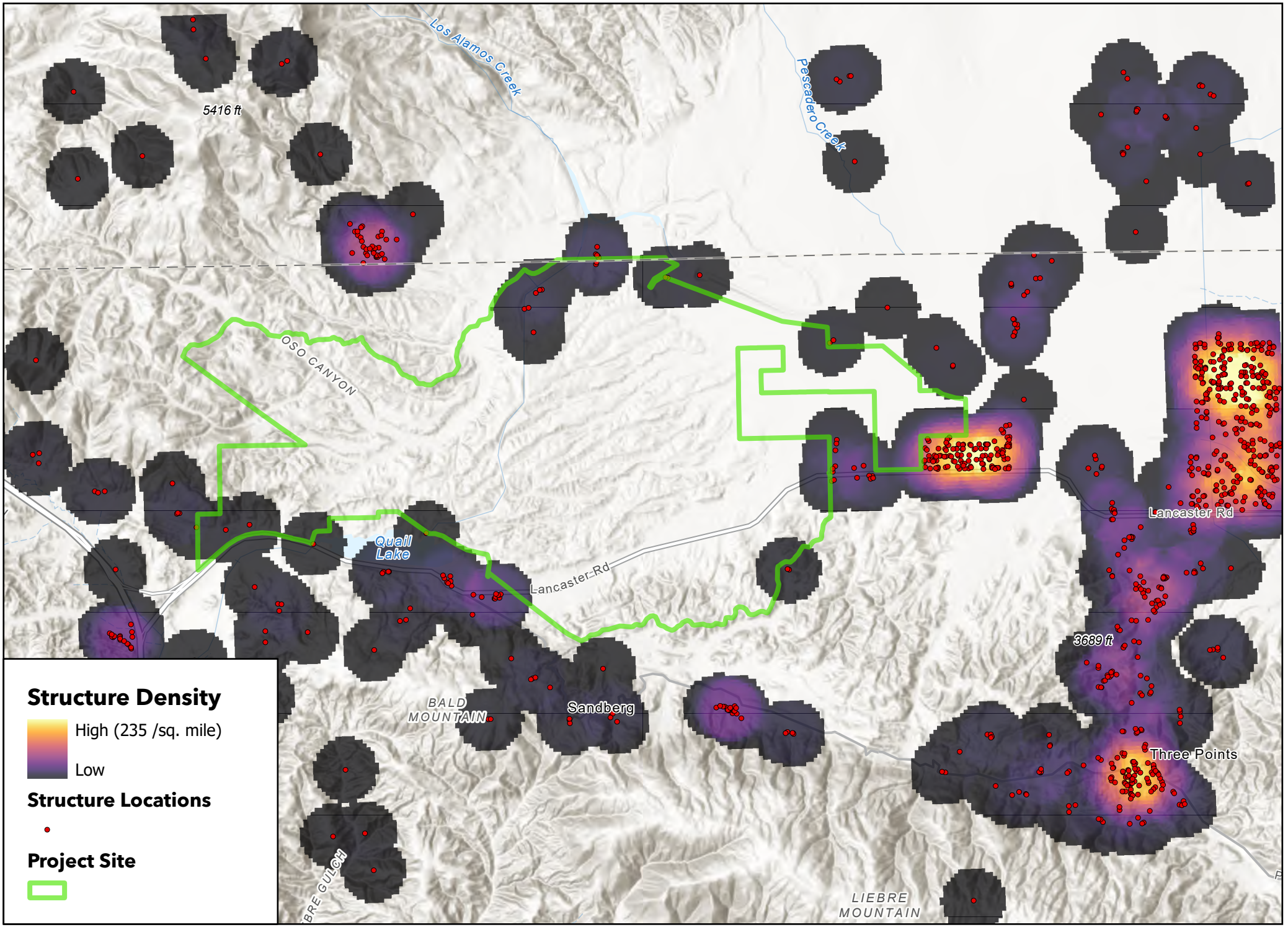
Existing land uses within 10 miles of the Project site were analyzed to identify off-site assets at risk from potential wildfires originating from the Project site. The immediate vicinity of the Project site is generally bound by the Tehachapi Mountains to the north, the Antelope Valley is to the east, the northern edges of the Liebre and San Gabriel Mountains (Angeles National Forest) are approximately one mile to the south, privately owned vacant land is immediately adjacent to the site to the west, and the Los Padres National Forest is approximately seven miles to the west. The Project site is approximately 35 miles north of the City of Santa Clarita in Los Angeles County, approximately 50 miles south of the City of Bakersfield in Kern County via SR-99 and I-5, and approximately 36 and 43 miles west of the cities of Lancaster and Palmdale, respectively, in Los Angeles County via SR-138. The community of Gorman in Los Angeles County is adjacent to the I-5 approximately four miles north of the I-5/SR-138 junction.

The majority of adjacent lands can be categorized as undeveloped or agricultural. Vast open spaces in the Project's vicinity include the Angeles National Forest, Bureau of Land Management lands, Tejon Ranch, Hungry Valley State Vehicular Recreation Area, Los Padres National Forest, and various private landowners. Proximal human development is generally limited to small enclaves along major roadways. Existing communities are rural large-lot residential and lower-density residential and are generally confined to the areas of Lebec, Gorman, Caswell, Sandberg, Three Points, and Neenach. According to the Microsoft Building Footprints database, 1,064 structures currently exist within 10 miles of the Project site, the majority of which are located to the east near Three Points and Neenach, in the opposite direction that wildfire under extreme conditions would spread from a wildfire originating from the Project site. Structure locations and density in the Project's vicinity are presented graphically in Figure 7, Off-site Existing Structures. Other adjacent land uses include but are not limited to the following:

- California Department of Water Resources – the California Aqueduct and Quail Lake

- Pacific Gas and Electric, Southern California Gas Company, and Southern California Edison – major transmission facilities that traverse Tejon Ranch and are constantly monitored and upgraded
- Multiple telecommunications carriers – communications facilities and fiber optic easements traversing Tejon Ranch adjacent to or through future developments
- National Cement – major mining operations
- Agricultural and farming operations

The aerial image in Figure 2 illustrates the Project's immediate surroundings, which are a mix of agriculture, grassland-dominated open space, Quail Lake and aqueduct, rural large-lot residential, lower-density residential, school, I-5 freeway and SR-138, and various disturbed landscapes.



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0 0.75 1.5 3 Miles

Source: Microsoft Building Data, 2023

FIGURE 7

Offsite Existing Structures

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2.1.6 Fire Hazard Severity Zones

CAL FIRE is statutorily required to determine and map FHSZs throughout California. These zones were established based on fire environments and the likelihood of wildfire ignition and spread. The initial mapping process was completed and adopted in 2007. The 2007 fire hazard severity mapping at the Project site included mostly High FHSZs (north, west, and south), an area of Very High FHSZ in the central/north-central portion of the site, and a Moderate FHSZ in the eastern portion of the site.

> Fire Hazard Severity Zone maps evaluate "hazard," not "risk". They are like flood zone maps, where lands are described in terms of the probability level of a particular area being inundated by floodwaters, and not specifically prescriptive of impacts.[4]

CAL FIRE is also statutorily required to update the FHSZ maps on a periodic basis. The first map update in state responsibility areas (SRAs), like that found on the Project site, has recently been updated. The first and second drafts of the updated maps resulted in most of the site being elevated to a Very High FHSZ with small portions of the eastern and northeastern portions mapped as High or Moderate FHSZs. Dudek's analysis of the updated CAL FIRE modeling approach revealed that the inputs, including fuel models/fire behavior and burn probabilities, were not well aligned to the actual conditions on site. After providing details to CAL FIRE, the Project site was remapped by CAL FIRE to include primarily High FHSZs, as depicted in Figure 8. (See Figure 6 for Fuel Models.)

2.2 Project Description

The proposed Project involves the development of a new community with residential, commercial, business park, and cultural and civic/institutional uses. Additionally, the proposed Project includes open space, parks, and infrastructure to support the proposed land uses and future residents.

The Project site encompasses approximately 12,323 acres and would allow up to 19,333 dwelling units on approximately 4,987 acres, approximately 7,363,818 square feet of employment-generating uses (office, research and development, and warehousing or light manufacturing uses) on approximately 597 acres, and approximately 1,034,550 square feet of commercial uses on approximately 102 acres. Proposed sites for civic and institutional land uses (such as schools for higher education, fire and police stations, transit centers, and a library) encompass approximately 110 acres. The Approved Project includes approximately 130,680 sf of Recreation/Entertainment uses (clubhouse, farmers market, childcare facilities, health clubs) on approximately 75 acres. Approximately 5,624 acres (approximately 45.6 percent) of the 12,323-acre Approved Project site are proposed for Open Space for natural resource protection and greenways, and parks for active and passive recreational use. The Project site also includes a vehicular and a non-vehicular circulation system.

The proposed Project would include the implementation of off-site Project features consisting of roadway improvements, connections to existing off-site utility systems, and off-site public facilities. [See Wildfire Safety Plan for more details about the project.]

[4] CalFire OSFM: https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones

2.3 Multilayered Approach to Fire Safety and Protection

2.3.1 Preventing Fire Ignitions

2.3.1.1 Emergency Response Plan

The Project's EIR requires the Project to prepare an Emergency Response Plan (ERP), which shall be updated as needed for each Tentative Map and shall be submitted to the County (California Department of Forestry and Fire Protection and County Fire Department and/or County Sheriff's Department) for review and approval. The Project Applicant/Developer shall be responsible for distributing the current ERP to each purchaser or tenant of each property within the Project site and shall distribute the ERP to all landowners through the Transportation Management Association (Mitigation Measure 3-7).

The plan will utilize existing information from the Los Angeles County Office of Emergency Management, coordinate with County emergency planners, and provide site-specific procedures for various emergency situations including wildfire. As required, the ERP will be available to all homeowners and commercial and resort tenants. There will be ongoing updates, which will be distributed to the community through the community website. As required by the Project's Development Agreement, the property owners shall require future residential and commercial property owners' associations to develop and implement an emergency preparation and response plan, which includes shelter-in-place and evacuation plans and also addresses first aid and emergency electric power supplies. At the initial point of property sale and annually thereafter in Property Owner Association website notices, the property owners shall provide educational information about the health and safety benefits of emergency preparation and response supplies for earthquakes and other potential disasters, such as a 7-day supply of potable water and food as well as solar-powered batteries for communication and refrigeration. The property owners and Property Owner Association website notices may also identify emergency response supply and battery vendors providing discounts or other preferential terms to Project site occupants (Development Agreement, Exhibit G, Section 12.3).

With regard to wildfire emergencies, the following components should be incorporated into the ERP:

- Building and facility protection (as defined in the Project's Wildfire Safety Plan (Dudek, 2024))
- Grounds protection (fuel modification zone [FMZ] purpose)
- Fire prevention during Red Flag conditions
- Emergency supplies
- Telephones/communications
- Fire Safe Council information
- Incident command list
- Emergency response notebook
- Annual review and update
- Emergency notification procedures
- Advisement of potential fire danger
- Emergency relocation/evacuation plan
- Animal relocation/evacuation plan

In addition to the ERP, the Project shall provide one or more of the following communication formats for dispersing wildfire (and other) hazard educational information in a timely manner:

- Establish a reverse 9-1-1 system capable of contacting every listed telephone number in the community by computer at a rate of at least 250 calls per minute.
- Establish a community website that can be used for providing wildfire education materials on an ongoing basis and that can be used to provide wildfire alert information on short notice.

2.3.1.2 Homeowner Association Wildfire Education Program

Project residents and occupants would be provided ongoing education regarding wildfire and the Settlement Agreement FPP and Wildfire Safety Plan (Dudek, 2024) requirements. This educational information must include maintaining the landscape and structural components according to the appropriate standards designed for this community. Informational handouts, a community website page, mailers, Fire Safe Council participation, inspections, and seasonal reminders are some methods that would be used to disseminate wildfire and relocation awareness information. The Los Angeles County Fire Department (LACoFD) would review and approve all wildfire educational material/programs before printing and distribution.

2.3.1.3 Fuel Modification Zones

The anticipated fire behavior for each area of the Project's phases was used to determine appropriate structure setbacks and fuel modification zone widths. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the wildland–urban interface (WUI)-exposed structures. FMZs were originally developed by CAL FIRE to protect natural resources from urban area fires and over the years have become essential to setting urban areas back from wildland areas, with a dual role of protecting structures and people while buffering natural areas from urban ignitions and reducing the potential for urban fires to spread into wildland areas.

Each FMZ will incorporate three zones: a setback zone, an irrigated zone, and a thinning zone. The total width of the FMZ will be either 100, 150, or 200 feet, depending on the anticipated fire behavior. Landscaping on private lots directly adjacent to the WUI will include standard County fuel modification requirements. Flammable plant species will be restricted, spacing standards implemented, and basic low-fuel requirements will be applicable. A community landscape committee will be implemented to review and approve proposed landscaping in these areas.

Fuel modification will also occur along roadways to mitigate roadside wildfire ignition risk. A 20-foot FMZ along sides of roads adjacent to open spaces will be implemented. Roadways are a particularly common source for wildfire ignitions due to high usage and vehicle-caused fires (catalytic converter failure, overheated brakes, dragging chains, tossed cigarette, etc.) (Romero-Calcerrada et al. 2008). Reducing natural fuels along roadways and replacing them with irrigated and ignition-resistant landscaping substantially reduces the potential for wildfire ignition and spread. It is also likely that roadside maintenance activities by the state and County would continue and/or be enhanced in the Project's vicinity and would remove the flashy fuels most prone to ignitions on an annual basis.

The impacts of perimeter FMZs on slowing the off-site spread of wildfires originating on site was modelled using the FlamMap Minimum Travel Time tool and embedded FARSITE fire growth modeling in order to evaluate fire progression. FlamMap and the embedded FARSITE software requires a minimum of five separate input files that represent field conditions in the analysis area, including elevation, slope, aspect, fuel model, and canopy cover.

Each of these data files was obtained from the LANDFIRE (Landscape Fire and Resource Management Planning Tools) data distribution site. LANDFIRE is a shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior and provides landscape-scale GIS data layers, including those representing elevation, slope, aspect, fuel model, and canopy cover.

Fuel models in perimeter FMZ areas were edited to reflect vegetation conditions corresponding to the various FMZ standards. Off-site wildfire spread is modelled to slow substantially when accounting for the effects of perimeter FMZs during both average and extreme weather conditions. Graphical presentations of these results are provided in Figure 9, Off-site Fire Progression (50th Percentile Weather) and Figure 10, Off-site Fire Progression (97th Percentile Weather).

2.3.1.4 Structures

Ignition-resistant construction will be used for all of the buildings, including homes, in compliance with the LACoFD requirements for Very High Fire Hazard areas, per the 2022 California Fire Code (CFC) adopted by LACoFD, and also Chapter 7A of the 2022 California Building Code (CBC) (the most restrictive requirement shall apply). All buildings will include the construction features listed therein for WUI Fire Protection. All structures must comply with CBC requirements based on type of occupancy, size, and number of stories.

All habitable and combustible structures over 200 square feet will have approved interior fire sprinkler systems. The construction requirements apply to the main structure and to ancillary buildings and structures. The applicable codes at time of construction will govern design and construction of the structures on the Project site as determined by the architect, LACoFD, and the County Building Official.

2.3.1.5 Construction Period Ignition Risk Reduction

Construction activities are often associated with vegetation ignitions because activities that can create sparks, heat, and/or flame may occur in the process of clearing site vegetation, grading, trenching, and various hot-work associated with constructing the infrastructure and buildings found within a typical development. The Project's risk would include both on-site and off-site (roads and utilities) construction activities. The risks associated with construction-related vegetation ignitions are mitigated through application of relevant portions of the LACoFD Fire Code and construction best practices (Lordson 2020; National Safety Council 2016). These best practices would be implemented for all phases of construction, in addition to protections and restrictions during the periods when the risk of wildfire is at its highest. Construction contractors working in WUI areas would be expected to implement fire prevention and safety best practices at all times during construction, and they would routinely conduct daily safety meetings as reminders to site personnel about the highest-priority safety measures. According to the Project Wildfire Safety Plan (Dudek, 2024), the types of precautions that would be in place include:

- Clear brush and other combustible materials from immediate work area and pre-wet areas where there are known potential ignition sources.
- Have water tenders on site during initial vegetation grubbing.
- Ensure quick access to appropriate fire suppression hand tools and fire suppression equipment, including fire extinguishers, water trucks, and water tank trailers
- Perform equipment checks to reduce potential for a malfunction that could create an ignition source. Lock out faulty equipment for repair prior to use on site.

- Reduce run time of common ignition sources such as trucks, heavy equipment, generators, and welders, using them only as much as needed to complete the job.
- Keep construction equipment and materials on site as little as possible in fire-prone areas. This will reduce loss if the construction storage area is affected by nearby fire. This includes removing equipment during weekends or off-work hours.
- Restrictions during Red Flag Warning weather.
- Hot works restrictions and fire watch during and following hot work activities.
- Designation of a site safety supervisor responsible for education and enforcement of fire safety rules.
- Coordination with LACoFD for presence during highest-risk activities.
- Notify local fire authorities of potential higher-risk work.
- Develop and use "Stop Work" guidelines that include weather monitoring, work type, and work locations. These should be easily communicated to work crews, clients, and owners' groups.

The results of these and other fire prevention, fire safety, and fire protection requirements during construction have been found to minimize the potential for vegetation ignitions and have been used extensively on large construction sites similar to the Project's on- and off-site construction areas in wildfire-prone environments throughout California (Dudek 2022).

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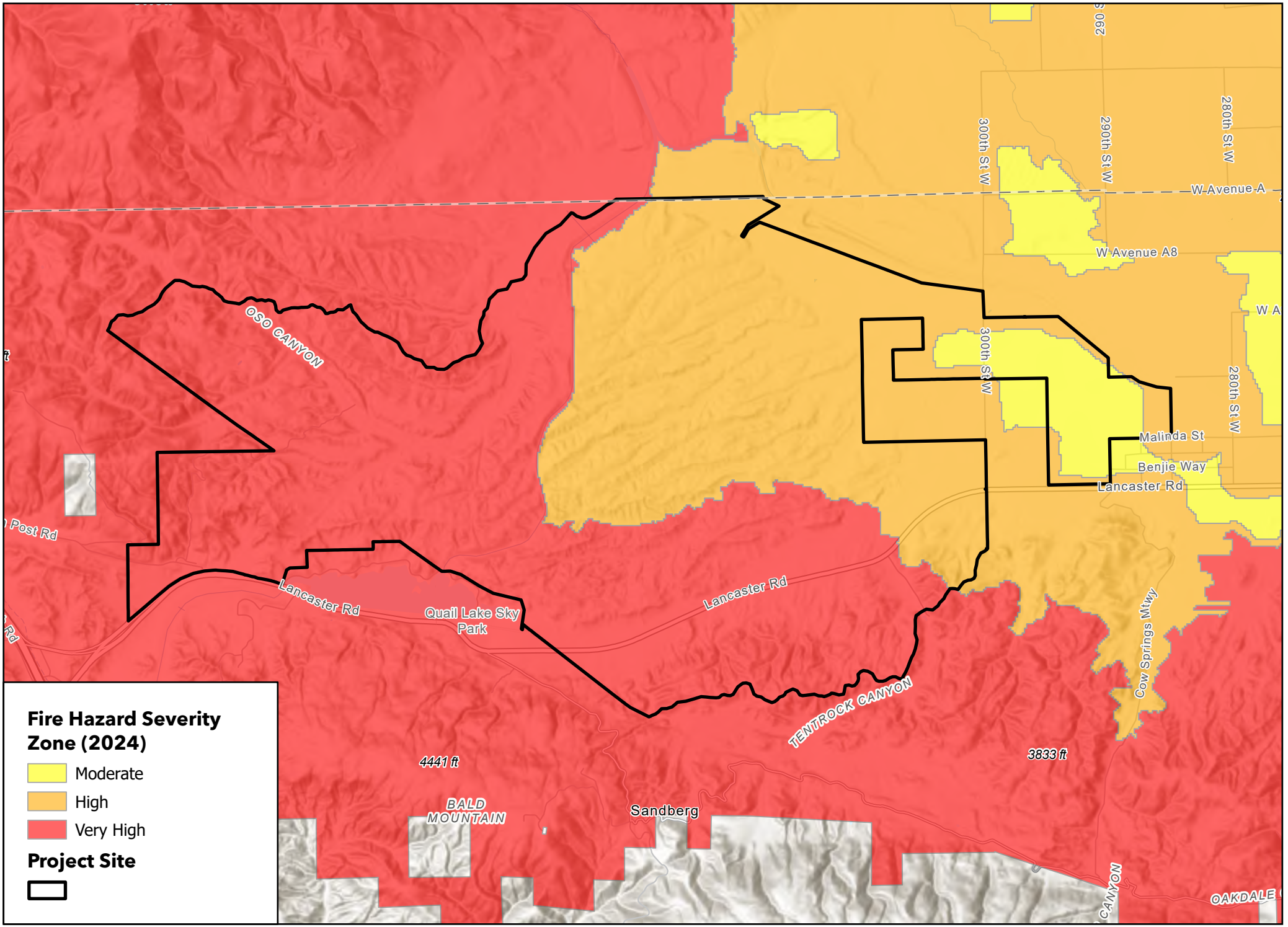

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0 0.5 1 2 Miles

Source: OSFM, 2024

FIGURE 8
Fire Hazard Severity Zones

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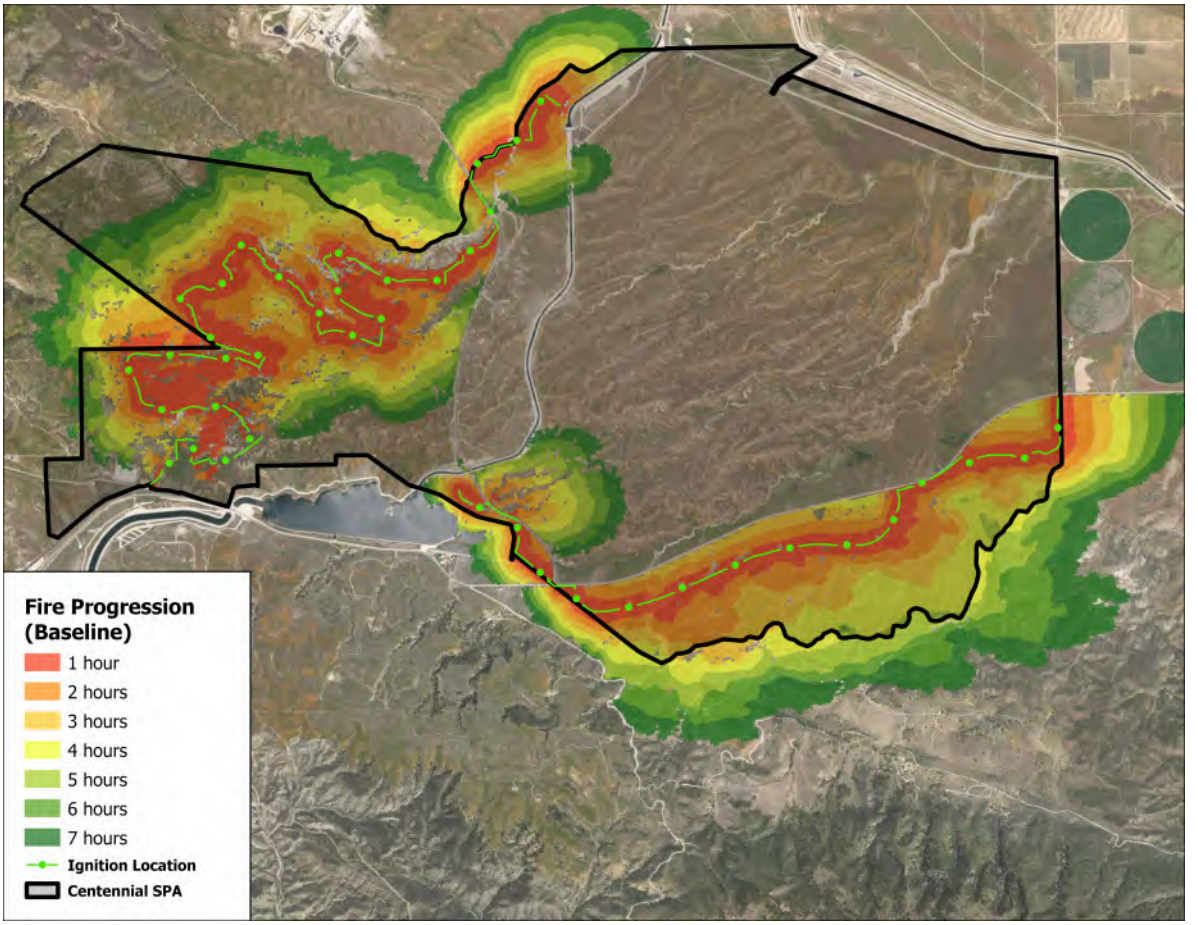

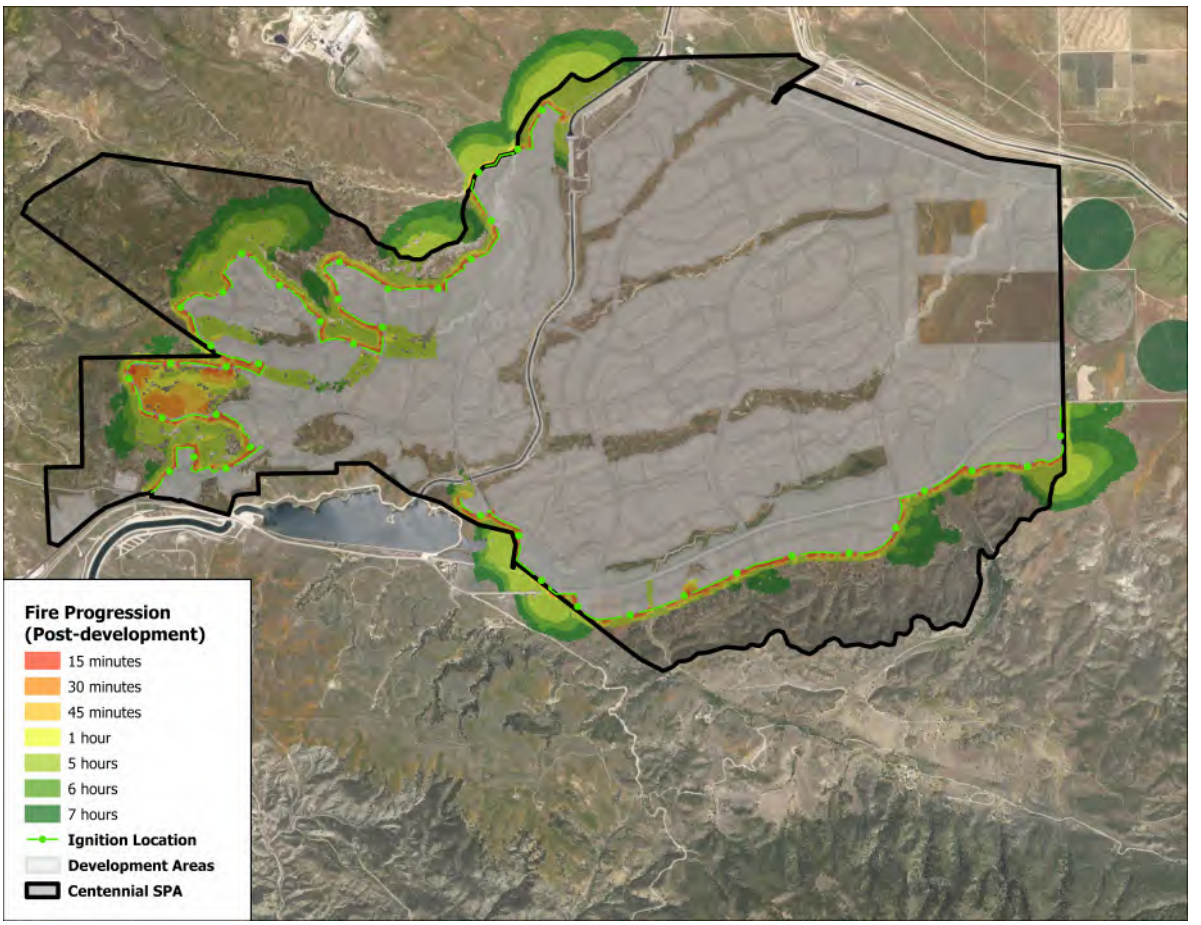

SOURCE: BASE MAP- ESRI MAPPING SERVICE

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0 .75 1.5 Miles

FIGURE 9

Off-site Fire Progression

50th Percentile Weather

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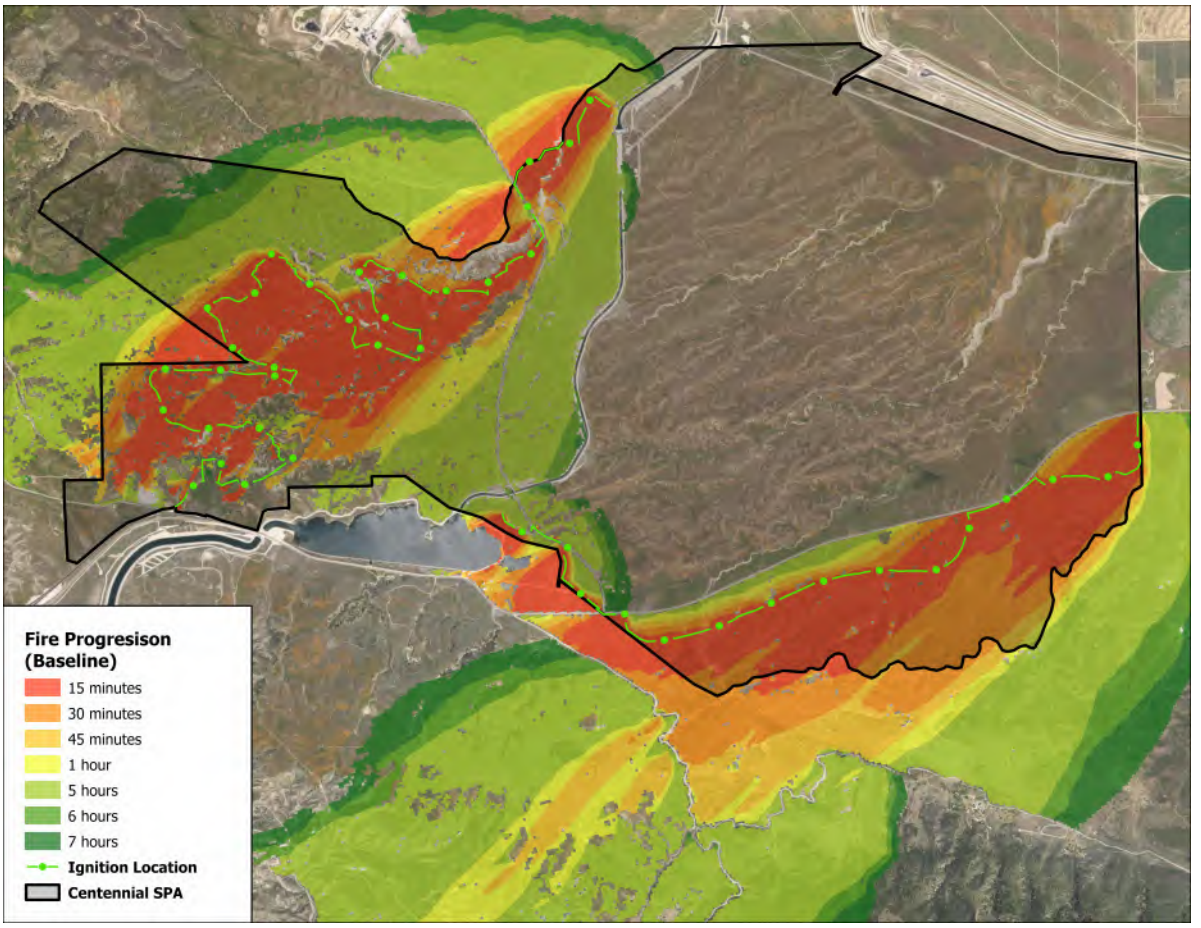

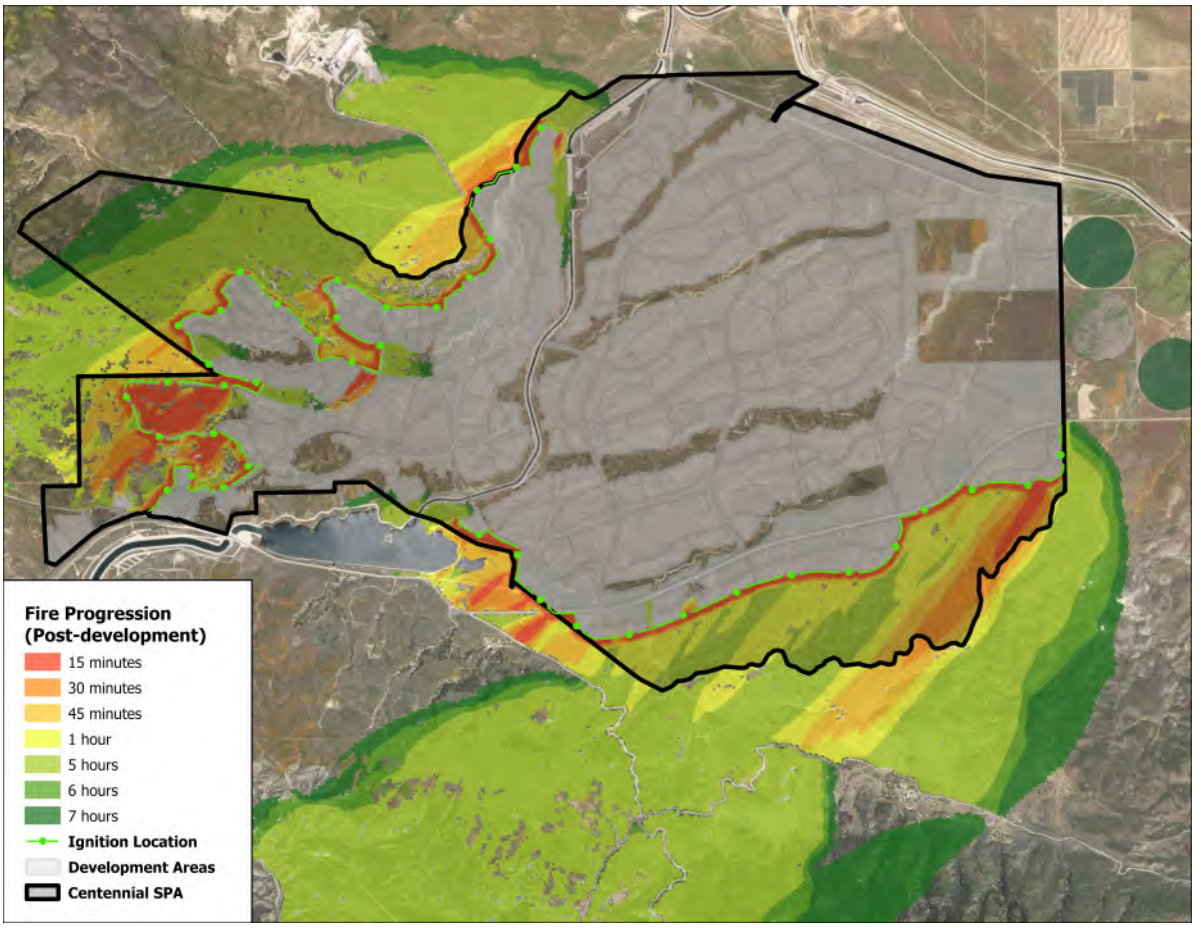

SOURCE: BASE MAP- ESRI MAPPING SERVICE

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0 .75 1.5 Miles

FIGURE 10

Off-site Fire Progression

97th Percentile Weather

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2.3.2 Emergency Response to Ignitions

2.3.2.1 On-site Fire Stations

The **Project will provide at least three, and up to four, on-site fire stations** and will thus provide a robust response capability to the Project site and the region, in which there are currently long emergency response delays due to the rural nature of the area. This response capability includes fast response throughout the Project site and surrounding open space areas and a heavy response (number of engine companies) that can respond within a short timeframe. Attacking fires in their incipient stages is critical to fire suppression and controlling fire spread, especially for wildfires moving into off-site open spaces. Thus, the Project's provision of significant firefighting resources will greatly improve the ability to control and suppress all fires in the Project area, both on-site and off-site, compared to existing conditions.

2.3.2.2 Water

Water will be provided via a fire-code-consistent delivery system including hydrants placed at County spacing requirements and fire flow meeting pressure and duration standards. The water supply for fire protection will be a looped public water system provided by the local water district and shall be designed and installed to their standards. The water delivery system will be designed to minimize damage and service interruptions as a result of seismic activity. A "Can and Will Serve" letter will be obtained from the water purveyor. If a private water system is utilized, it must comply with National Fire Protection Association (NFPA) Standard 24.

The water supply to the fire sprinkler systems shall be designed to water purveyor, LACoFD, and NFPA 13 standards. Design, coverage, and plans will be subject to LACoFD approval. Sprinkler systems in designated houses should have approved systems with a four head calc, or as otherwise required by the Fire Marshal. The final design criteria and sprinkler standard used (13-D, 13-R or 13) shall be subject to County fire marshal approval.

Large water bodies on site, including Quail Lake and the California Aqueduct, may also be utilized as water sources for aerial fire suppression efforts, facilitating a rapid and effective initial attack.

2.3.3 Wildfire Safety Plan and Settlement Agreement

The following provides a summary of the Settlement Agreement as it pertains to enhanced fire mitigation measures for the Project.

- Fire Mitigation
  - Requires establishment and funding of two fire mitigation funds:
    - On-site fire risk mitigation. FPP: $500,000/yr funding to provide for implementation of the EIR-required FPP, which identifies community fire hazard reduction measures including building, design, and fuel management requirements.

1. Off-site fire risk mitigation. Centennial shall establish a Good Neighbor Firewise Fund, which will provide grants to needs-based applicants to be awarded by the CMG to aid communities with a population of less than 100,000 within 15 miles of the boundaries of Tejon Ranch to reduce off-site fire risks, increase fire prevention, protection and response measures, and avoid adverse impacts of fire, for the

Project's residents and neighboring communities. The 100,000-population limit will be adjusted commensurately with population changes in Los Angeles, Kern and Ventura Counties as documented by each Census. Centennial shall fund the Good Neighbor Firewise Fund in the inflation-adjusted amount of $500,000 annually. CMG will review applications and award the grants to applicants based on a majority vote of the CMG Board. The grants shall be in support of the following actions:

a. Updating planning documents and zoning ordinances, including general plans, community plans, specific plans, local hazard mitigation plans, community wildfire protection plans, climate adaptation plans, and local coastal programs to protect against the impacts of wildfires;
b. Developing and adopting a comprehensive retrofit strategy;
c. Funding fire-hardening retrofits of residential units and other buildings;
d. Reviewing and updating the local designation of lands within the jurisdiction as very high fire hazard severity zones;
e. Implementing wildfire risk reduction standards, including development and adoption of any appropriate local ordinances, rules, or regulations;
f. Establishing and initial funding of an enforcement program for fuel and vegetation management;
g. Performing infrastructure planning, including for access roads, water supplies providing fire protection, or other public facilities necessary to support the wildfire risk reduction standards;
h. Partnering with other local entities to implement wildfire risk reduction;
i. Updating local planning processes to otherwise support wildfire risk reduction;
j. Completing any environmental review associated with the listed activities;
k. Covering the costs of temporary staffing or consulting needs associated with the listed activities;
l. Implementing community-scale risk reduction programs to become Firewise USA sites;
m. Implementing resiliency plans such as resiliency centers with stable electricity supplies (e.g., microgrid, solar, and battery equipment) available to residents during times of power shutdowns or other emergencies; and
n. Other fire-related risk-reduction activities that may be approved by the CMG Board.

- Centennial Monitoring Group (CMG)
  - Independent nonprofit entity established to monitor compliance with agreement and implementation of terms
  - The Project to fund CMG operations annually, starting at $300,000/yr and adjusting as CMG implementation workload varies
  - Will receive and disburse Good Neighbor Firewise Fund grants

In addition, the Project shall implement the Wildfire Safety Plan (WSP), which shall be updated any time the Project files a tract map to include any new or modified state or County fire prevention, protection, and response requirements, and will, through covenants, conditions, and restrictions, ensure that each phase of the Project's development is at all times in compliance with then-prevailing standards and fire codes.

a) Prior to the filing of the first application for a building permit for dwelling units at the Project, Centennial shall cause the creation of a master Homeowners Association ("HOA") for all dwelling units at Centennial to fund the ongoing implementation, including education, inspections, enforcement, and corrective action, of

the FPP. Such HOA shall be authorized to assess each dwelling unit at the Project an ongoing, permanent fee, tax, or assessment in the total cumulative amount for the Project of no more than $500,000 per year, inflation adjusted, with a presumptive pro-rata allocation of $26.00 per dwelling unit ("On-site WSP Assessment"). The HOA shall disperse funds consistent with, and to further the implementation of, the WSP.

b) Centennial shall ensure, pursuant to the WSP, that the master Homeowners Association for Centennial will hire a qualified third-party compliance inspector, approved by the Los Angeles County Fire Department, to conduct a fuel management zone inspection and submit a Fuel Management Report to the County before June 1 of each year certifying that vegetation management activities throughout the Project site have been timely and properly performed.

c) Every 2 years after the first dwelling units are occupied, Centennial and County will meet with the purpose of reviewing evacuation policies and Centennial will demonstrate that they are clearly understood and communicated with residents. Centennial will also work with the HOA to promote creation of Firewise USA communities within the Project.

The detailed and specific actions and responsibilities outlined in the WSP and the Settlement Agreement result in a package of on- and off-site fire safety that is unprecedented. The fire protection, prevention, and suppression measures combine to present a robust fire hazard reduction strategy that contributes significantly to minimizing the Project's off-site ignition risk ratings.

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3 Review of Related Research

3.1 Purpose of Section

This section explores and summarizes scientific research that supports the Wildfire Off-Site Ignition Risk Matrix and the conclusions of this analysis.

People vary in their preference for where they choose to live, and there will continue to be a demand for homes in the WUI or within wildland areas. To safely meet this demand, decision makers should encourage design, mitigation, and construction standards that improve the protection of the life and safety of residents and reduce the potential for structural loss from wildfires (Moritz and Butsic 2020). In addition, development standards, mitigation standards, and project design features in wildfire-prone areas should also aim to reduce the potential for on-site ignitions and wildfire spread into off-site areas.

While components of land use planning including project design, and wildfire risk mitigation measures have been effectively proven to reduce risks to structures and their inhabitants from wildfire, these design and mitigation features also have an inverse impact of reducing the likelihood of on-site wildfire ignitions and their spread into off-site areas. This section provides a description of relevant research related to wildfire risk mitigation and creates a nexus describing how these mitigations also impact the likelihood of off-site wildfire ignitions.

The vast majority of structural damages and destruction in the state due to wildfires occur in the WUI, which is where human development is located within or adjacent to wildland vegetation. Various attributes of the WUI, particularly housing density, vegetative cover, and proximity to large patches of wildland vegetation, have proved extremely predictive of the potential for building loss in the United States (Caggiano et al. 2020). Thus, development in fire-prone areas should implement design and mitigation measures or actions to further reduce that risk and the risk of off-site ignitions and wildfire spread.

Reducing potential for loss requires a holistic approach that involves a diversity of stakeholder groups and disciplines (Calkin et al. 2013) and must be considered at multiple scales (Mell et al. 2010). Land use planners should aim to minimize exposure of development to wildfire based on the physical and sociopolitical factors at a given site (Gonzales-Mathiesen and March 2014; March and Rijal 2015). As discussed throughout this section, the implementation of measures intended to reduce a development's exposure to encroaching wildfires also reduces the potential for ignitions originating in development areas and spreading off site.

It should be noted that most predictive models of wildfire behavior are based on vegetative fuels, but the buildings in a WUI with sparse to no wildland fuels can also be significantly impacted (Maranghides and Mell 2012; Skowronski et al. 2016). Thus, risk reduction approaches, both on-site and off-site, and including the framework presented in this report, should account for multiple risk reduction factors at multiple spatial scales, recognizing that a "one-size-fits-all" approach may not meet the needs of each individual development (Syphard et al. 2021).

3.2 Risk Assessment Framework

Risk assessment is critical to identifying the likelihood of wildfire, predicting exposure of communities to radiant heat and embers, and guiding mitigation efforts to overcome said exposure (Calkin et al. 2013). Different fire hazard

and risk assessments are utilized in various locales at various scales, including at the national scale (Radelhoff et al. 2005), regional scale (Oregon Wildfire Risk Explorer 2018, CAL FIRE 2023, Southern Group of State Foresters 2023) and local scale (Maranghides and Mell 2012). While it is conventional to assess a development's risk from encroaching off-site wildfires, the risk assessment framework presented in this report seeks to understand a development's contribution to new wildfire ignitions and their potential to spread off-site.

This report utilizes the following formula to quantify a development's potential to contribute to off-site wildfire ignition risk:

Fire Hazard + Ignition Risk – Mitigation = Risk

This methodology has precedence in a previous study (Dicus et al. 2014, Leyshon 2015). As here, the previous study utilized California Fire Hazard Severity Zones (FHSZs) as the basis for fire hazard and explored mitigation actions to reduce the potential for structural loss (risk) in various communities of San Diego County that varied in housing density, age, and demographics.

3.3 Hazard Analysis

> "Hazard" is based on the physical conditions that create a likelihood and expected fire behavior without considering mitigation measures such as home hardening, recent wildfire, or fuel reduction efforts. "Risk" is the potential damage a fire can do to the area under existing conditions, accounting for any modifications such as fuel reduction projects, defensible space, and ignition resistant building construction.[5]

Note that fire "hazard" is not the same as fire "risk." **Risk is the likelihood that a fire in a given area will cause damage to human life, structures, or infrastructure**. Thus, even if there is a potentially low fire hazard in a given area (expected low flame lengths), a home might still be at high risk of ignition if the physical characteristics of the property would facilitate structural ignition (e.g., flammable vegetation next to a home with wood siding).

Fire hazard was selected as the methodology starting point as it reflects the "default" existing condition of the landscape and site. To convey relative fire hazard across California, CAL FIRE categorizes all lands in which the State has primary fire protection responsibilities into one of three specific FHSZs: Moderate, High, or Very High. These categories are based upon the probability of a wildfire occurring (a product of historic fire occurrence) and the likely behavior of the fire following ignition (a product of the expected mature vegetation at the site, extreme fire weather, and slope steepness).

By design, the state does not consider any planned actions that reduce the potential fire hazard in a given area when designating a specific hazard rating. Instead, FHSZs are based on worst-case conditions, including extreme fire weather in mature (and untreated) vegetation. FHSZs are not designated with the intention to prohibit development but are instead meant to be used as a tool to illustrate the relative fire potential if no steps are taken to reduce the threat in a given area and to trigger the more restrictive construction requirements for buildings, roads, water, and other fire protection and safety features.

[5] CalFire OSFM: https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones

3.4 Ignition Risk Analysis

This off-site **ignition risk** analysis evaluates how development could impact potential fire ignitions. Even though ignition probability is inherently built into FHSZs via past fire history, changes to the landscape through development could change the probability of ignition via human activities.

While the proportion changes regionally across California, the vast majority of wildfires in California are started by human activities and are near developed areas (Syphard et al. 2007; Balch et al. 2017), or near human infrastructure (Syphard and Keeley 2016). Historically, the WUI expansion has been linked with increasing ignition probability (Faivre et al. 2014, Radeloff et al. 2018, Syphard et al. 2019), but wildfires in those studies occurred almost exclusively in older, existing communities that had little mitigation to lower the risk of loss to property. Since 2008, when the California Building Code was expanded to include Chapter 7A, Materials and Construction Methods for Exterior Wildfire Exposure, all new construction in WUI areas have included the "hardening" features outlined in that new code section.

3.4.1 Project Density, Population, and Roads

Ignition frequency in California has been tied to population density, with intermediate levels of population density and intermediate distances to WUI areas being observed as having the highest frequencies (Syphard et al. 2007, 2009). In intermediate-density development, homes are often located on larger parcels (See Exhibit 2, Intermediate-Density Development) and include varying levels of ignition resistance and landscape/fuel modification provision and maintenance. Therefore, this type of development results in a higher wildland exposure level for all homes and does not provide the same buffers from wildfire encroaching onto the site or starting at a structure and moving into the wildlands as a higher density, clustered master-planned community (Syphard et.al. 2019) (UCANR 2020). In general, as wildland areas are developed, ignitions increase until continued development reduces wildland fuels to the point where subsequent wildfires are largely excluded (Keeley and Syphard 2018). **Higher-density, interface, master-planned communities** are considered highly ignition resistant, often exclude readily ignitable vegetative fuels throughout, and provide a perimeter FMZ. This type of new development requires fewer fire resources to defend and can therefore minimize the likelihood of on-site fires spreading off site (APA Multihazard Planning Framework for Communities in the WUI, 2018; UCANR 2020.

The **extent of road networks**, which is commonly associated with housing density, has been associated with human-caused ignitions in numerous studies (Syphard et al. 2008; Naryanaraj and Wimberly 2012; Faivre et al. 2014; Li and Banjerjee 2021; Chen and Jin 2022). In California, the importance of road networks on human-caused ignitions seems to vary regionally, with the North Coast, Central Coast, and much of the Southern California regions showing the greatest potential for ignitions along roadways (Chen and Jin 2022). However, it should be noted that vehicle-caused fires have decreased in recent years, which may be a result of improved roadside fuel treatments or by improved warning lights indicating overheating of a car (Keeley and Syphard 2018), which possibly reduced expulsion of catalytic converter debris, which was considered to be a significant roadside ignition source (Bertagna 1999). **Roadside vegetation management** strongly reduces the likelihood of wildfires originating along existing and newly constructed roadways (Monlina et. Al. 2019).

Of interest, Naryanaraj and Wimberly (2012) found that the forest roads in areas of lower population densities seem to actually reduce predicted fire size. Road networks in these areas were deemed to increase suppression access and subsequent initial attack success, the effect of which was greater than the impact of increased fire ignitions. Roads throughout large land areas increase suppression capability by facilitating access by responding firefighters. It would

follow that land areas that are closely managed and prohibit unauthorized access, resulting in very infrequent use compared to public lands, would have much lower potential road-related ignitions than public access forest areas. Therefore, the benefits from the access roads in terms of fire suppression would be higher on managed lands because the number of fire ignitions per mile of road would be significantly lower than the roads evaluated in the study.

3.4.2 Fire Department Access

If on-site ignitions were to occur, rapid emergency response limits the time available for wildfires to spread into off-site areas. Because the response time needed to arrive to a fire ignition location significantly impacts initial attack success, the **proximity and access of firefighting resources** to a local community should appreciably impact the potential for loss to the built environment. Indeed, CAL FIRE aspires to keep 95% of wildfire ignitions to less than 10 acres. In general, the sooner fire resources can engage in suppression activities, the more likely a fire will be contained before it threatens developed areas. The same is true for wildfires originating along the edges of development areas, as rapid response limits the potential for off-site ignition and damages. Response time to arrival at the fire site, therefore, is dependent on multiple factors including **rapid fire detection, sound roadways (i.e., wide and relatively flat), and placement of fire department resources** that are strategically located to developed areas. Thus, land use planning should incorporate the availability, capacity, location, and travel times of emergency services (Gonzales-Mathiesen and March 2014; March and Rijal 2015).

That said, fire prevention is a shared responsibility between first responders and residents, and thus adequate fire suppression capabilities are not a substitute for sufficient mitigation efforts (Collins 2004). Also, it must be understood that initial attack is sometimes hindered even if response is almost immediate, especially under wind-driven events such as Santa Ana winds due to increased safety hazards and the inability to conduct aerial fire suppression. Therefore, pre-event mitigations are critically important to buy time in the event initial attack is delayed and to provide a passive protection that will function without outside intervention.

3.4.3 Overhead Powerlines

As noted, ignitions per capita have significantly declined in recent decades with the exception of powerline ignitions, which are becoming increasingly problematic in California and in other similar parts of the world (Collins et al. 2016; Keeley and Syphard 2018). Indeed, since 2015, six of the most destructive and deadly wildfires in California have been ignited via electrical power lines (Tilden 2022), which are occurring largely during high wind events (Syphard and Keeley 2015). Thus, **improving power line safety** would likely decrease both the number and consequences of wildfires in the WUI (Collins et al. 2016).

In addition to overhead powerlines increasing the potential for ignition, they also serve as a threat to both first responders and residents during a wildfire when wooden poles catch fire and subsequently fall onto roadways or other critical areas. Further, power loss due to burned distribution lines can cause water utility systems to lose pressure (Whelton et al. 2023), significantly impacting water availability for firefighting efforts (EPA 2019).

3.4.4 Site Location

The physical attributes of a development's location will impact the potential for human-caused wildfire ignitions. For example, **slope steepness** has been correlated with wildfire ignitions and spread in numerous studies (Syphard et al. 2008; Faivre et al. 2014; Li and Banerjee 2021; Li and Banerjee 2021; Chen and Jin 2022). Further, **vegetation type** (Syphard et al. 2008) and **precipitation levels** (Chen and Jin 2022), which influence moisture in

vegetation, have also been shown to influence potential for human-caused ignitions in the WUI. For example, certain vegetation types have higher likelihoods of ignitability due to their fuel characteristics. Flashy fuels, such as annual grasslands, have a higher surface-to-volume ratio than other vegetation types such as chapparal and therefore may dry out quickly and spread wildfire at faster rates. In the Santa Monica Mountains specifically, Syphard et al. (2008) found that wildfire ignitions were more likely to occur in non-native grasslands compared to other vegetation types such as northern mixed chaparral and coastal sage scrub.

3.4.5 Power Supply Reliability

Power supply for fighting wildfires is primarily related to the **potential impact on water supply** in areas without adequate gravity flow to sustain the minimum water pressure needed. As noted above, reliable water availability improves initial attack success and, therefore, helps to reduce the potential for structural loss in a given community. Power loss can cause water utility systems to lose pressure (Whelton et al. 2023), significantly limiting water availability for firefighting efforts (EPA 2019). Thus, **reliable power supply** in a development should be considered an initial component to reduce potential for a large, destructive wildfire.

3.5 Ignition Risk Mitigation Analysis

Certainly, even with diligent efforts to prevent wildfire, not all ignitions can be averted. Thus, mitigation and preparatory efforts will reduce the risk of life/safety impacts to residents and loss of structures, both on- and off-site, even if fire suppression is precluded in a given area. If fighting wildfire is considered to be a battle to protect lives, buildings, and infrastructure, then preemptive **mitigation measures** must be incorporated so as to shape the proverbial battlefield to best enable success. Hence, the next step of the risk assessment methodology is to analyze the proposed protection features and design elements and their effectiveness in mitigating the risk.

3.5.1 Housing Density and Development Design

Location and pattern of development significantly influence where wildfires are most likely to cause structural loss (Keeley et al. 2013) and, thus, it is critical that sound land use planning in the WUI incorporate these factors into the design of a given development (Gonzales-Mathiesen and March 2014; March and Rijal 2015). In addition to being less susceptible to impacts from encroaching wildfires, it can be concluded that higher-density, interface developments are also less likely to cause off-site wildfires. Reductions in vegetative fuels interspersed between development areas and continuous FMZs limit the capacity for wildfire spread within communities and from developed to undeveloped areas.

For example, a high-density, interface development would have minimal vegetation to ignite within the development itself since the structures are so close together (see Exhibit 1, High-Density Development). Conversely a low-density development (estate lots, or areas of intermixed open space) would have much more vegetation within the development that could be ignited (see Exhibit 3, Low-Density Development). A wildfire starting in the on-site vegetation could then communicate to adjacent off-site vegetation, that ultimately could threaten a nearby community.

Exhibit 1. High-Density, Interface Development. Example of master-planned community that is ignition resistant, excludes readily ignitable vegetative fuels throughout, and provides a perimeter FMZ. This type of new development requires fewer fire resources to defend and can minimize the likelihood of on-site fires spreading off site.

Exhibit 2. Intermediate-Density Development. Example of semi-rural, intermediate-density development. Homes are located on larger properties and include varying levels of ignition resistance and landscape/fuel modification provision and maintenance. Compared to a master-planned community, this type of development results in a higher wildland exposure level for all homes and does not provide the same buffers from wildfire encroaching onto the site or starting at a structure and moving into the wildlands.

Exhibit 3. Low-Density Development. Example of rural/large-parcel development where homes are interspersed amongst wildland fuels, are of varying ages, and include varying levels of FMZ setbacks. Homes are exposed on most or all sides to flammable vegetation, properties rely solely on owners for maintenance, are often far distances from the nearest fire station, and have minimal buffer from on-site fire spreading to wildlands.

3.5.2 Building Construction

Buildings themselves can be a contributory fuel; house-to-house spread may occur in WUI fires, particularly in older, non-ignition-resistant buildings (Maranghides and Mell 2012; Syphard et al. 2014; Kramer et al. 2019; Knapp et al. 2021; Maranghides 2022; Pludow and Murray 2023). Indeed, wildfire can cause extensive damage, even in areas with relatively little wildland vegetation (Kramer et al. 2019). While the studies cited above consider structure losses from wildfires encroaching upon communities, code-compliant building construction can be determined to also reduce the likelihood of fires igniting on-site from spreading structure-to-structure and then into off-site areas.

Because of the high fire intensity of burning buildings and their extended burning time compared to vegetative fuels (hours vs. minutes), higher-density development would seem at first glance to be at odds with mitigating fire losses. However, **structures built to meet new wildfire building codes** (i.e., Chapter 7A of the California Building Code and section R337 of the California Residential Code) are significantly less ignition prone than older buildings, especially when located next to other ignition-resistant buildings (Knapp et al. 2021).

Buildings constructed to meet exterior wildfire exposure standards (Chapter 7A of the California Building Code and Section R337 of the California Residential Code) can help to reduce the potential of a fire originating within the

structure escaping its confines and transmitting fire into off-site areas. In addition, if a structure were to ignite, these construction methods could reduce the potential of a fire communicating to adjacent structures or becoming a conflagration with multiple structures involved. **Additional structural hardening measures** (e.g., dual-pane, dual-tempered windows) can further reduce the potential for structure fires to spread into off-site areas.

Thus, expansion of code-compliant human development into the WUI does not necessarily increase risk of home loss during a wildfire but instead may actually serve to buffer older fire-prone developments (Dicus et al. 2014; Leyshon 2015), acting as a fuel break, potentially enabling firefighters to slow spread or control the fire's progression. Code compliant clustered developments convert readily ignitable vegetative fuels into hardened landscapes that act to buffer higher risk communities from high hazard vegetation.

3.5.3 Eliminating Structure-Adjacent Vegetation and Maintaining Defensible Space

3.5.3.1 Near-Structure (close proximity)

Near-structure vegetation exposes structures to radiant heat, flame impingement, and ember accumulation, which poses a substantial threat to structures (Dicus et al. 2009; Maranghides and Mell 2009; Syphard et al. 2012; Caton et al. 2017; Westhaver 2016; Maranghides et al. 2022; Manzello and Suzuki 2023). Thus, to reduce fire exposure to buildings, **near-structure vegetation should be eliminated** (Cohen 1999; Quarles et al. 2010; Mathiesen and March 2014; March and Rijal 2015; Hakes et al. 2017; Thomas et al. 2017).

Via modeling, experiments, and case studies, Cohen (1999) demonstrated that there should be from **10 to 40 meters of fuel modification** between wildland vegetation and buildings to minimize the impacts from radiant heat or direct flame impingement. Syphard et al. (2014, 2017) recommended **reducing near-structure vegetation to 40% woody cover** and also completely **eliminating vegetation that touches a structure** (due to likely flame impingement). Similarly, Leyshon (2015) and Uribe (2021) found that the most important area to **reduce combustible materials on a given property was the immediate 1.5 meters surrounding a building**. Because of the increasing evidence that wildland and non-wildland combustible materials (including ornamental vegetation, mulches, or storage) may readily cause structure ignition, California has recently updated its defensible space regulations in SRAs to completely eliminate combustible materials and minimize direct flame impingement in the so-called "Zone-0" (in addition to the existing 30-foot and 100-foot fuel management zones, CFC 4906.3.1), which is the immediate 5 feet surrounding a structure.

Trees or large shrubs (even if largely ignition-resistant due to distance from ground to foliage or high in moisture), **should also be eliminated** because deposition of leaves, needles, or twigs can accumulate next to or on top of a house, which would then serve as a ready receptor for airborne embers.

Fire threat on a given property increases through time without continued maintenance because vegetation regularly grows and deposits dead debris onto or next to structures (Moritz and Butsic 2020). Further, plants tend to dry out with age if not adequately irrigated and will thus burn with greater intensity. Many residents, particularly renters, commonly lack the means or motivation to mitigate elevated fire hazard (Collins 2004). Thus, focus should be placed on **diverse mechanisms to incentivize residents to ameliorate property elements** that may lead to home loss; the specific approach should vary based upon the demographics specific to a given community (Leyshon 2015).

Enacting **measures that minimize vegetation adjacent to buildings** would have the beneficial effect of reducing the potential for structure fires to ignite vegetation and facilitate spread to off-site areas.

3.5.3.2 Defensible Space

An important component of wildfire risk mitigation is the **provision of fire-resistant landscapes and modified vegetation buffers**. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire, whether it originates on-site or off-site, by strategically placing thinning zones and irrigated zones adjacent to each other on the perimeter of the WUI-exposed structures. FMZs not only help protect new communities and structures from external wildfire risks, but FMZs also reduce the risk of fire originating from such new communities or structures and spreading to surrounding natural resources/habitat areas (Braziunas et al. 2021; Cochrane et al. 2012; Price et al. 2021).[6] FMZs thereby provide a dual benefit of **buffering communities and structures from encroaching wildfires** while separating the new community and structures (and potential introduction of new ignition sources associated with the new community) from surrounding open space, fuel sources, or habitat areas (Bhandary and Muller 2009; Braziunas et al. 2021; Cochrane et al. 2012; Fox et al. 2018). Research has also indicated that the likelihood of ignitions occurring in a given location is significantly influenced by the existing vegetation/fuel available (Elia et al. 2019). In addition to protecting structures, fuel treatments and defensible space, when utilized in conjunction with place-based fire-hardened design, also **act as a buffer for natural areas and surrounding communities** (Safford et al. 2009; Scott et al. 2016).

3.5.4 Structure Placement in the Landscape

As described in the following sections, the position of structures on the landscape (and relative to each other) influences the risk of structure loss from wildfires and off-site ignition risks (Alexandre et al. 2015; Knapp et al. 2021), and thus project locations should consider the overall context and landscape impacts on exposure in the design of a given development (Gonzales-Mathiesen and March 2014; March and Rijal 2015). How the position and placement of structures influences their risk is discussed in more detail in the following sections.

3.5.4.1 Avoiding Ridges and Steep Slopes

For example, locating buildings on highly variable topography or at the **top of ridges should be avoided** because wildfire intensity increases if moving uphill (Syphard et al. 2012; Syphard et al. 2019; Syphard and Keeley 2020). Further, **steep slopes and rugged terrain will negatively impact fire department access and response time** and can imperil residents during evacuation.

If a wildfire were to originate from a community, its spread rate into off-site areas may be increased if steep slopes are nearby. Steep terrain typically results in faster upslope fire spread due to the pre-heating of uphill vegetation. Flat areas typically result in slower fire spread in the absence of windy conditions. Topographic features such as saddles, canyons, and chimneys (land formations that collect and funnel heated air upward along a slope) may form unique circulation conditions that concentrate winds and funnel or accelerate fire spread. For example, fire generally moves slower downslope than upslope. Terrain may also buffer, shelter, or redirect winds away from some areas based on canyons or formations on the landscape. Saddles occurring at the top of drainages or ridgelines

[6] Historically, the California Department of Forestry and Fire Protection originated as a conservation agency and implemented brush management, like fuel modification and fire breaks to protect natural resource areas from fires originating in developed areas, such as the Ponderosa Way, an 800-mile fire break in the Sierra Nevada Mountain Range.

may facilitate the migration of wildfire from one canyon to the next. Various terrain features can also influence fire behavior, as summarized in Table 1.

3.5.4.2 Avoiding Wind Corridors

Similarly, **development should not be located in known wind corridors** (Syphard et al. 2012), the avoidance of which could be one of the most effective long-term strategies to prevent wildfire losses and off-site ignitions and wildfire spread (Syphard et al. 2022). When located in wind corridors or in terrain that facilitates fire movement, mitigations must be as proportionally extreme as the potential for wildfire.

3.5.5 Powerlines

Multiple strategies can be employed to mitigate ignitions via electrical powerlines. The California Public Utilities Code 8386 requires that electrical corporations "construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment." Certainly, one of the most prevalent mitigation activities is the clearing of vegetation around and under powerlines and poles, which occurs continuously throughout the state. Further, new technologies have been developed recently that immediately detect power surges in a specific electrical distribution line and then immediately deenergize it so as to avoid sparks that could ignite vegetation or debris beneath it. It should be noted that all public and private power companies are required to develop and annually update a Wildfire Mitigation Plan, which describes requirements for mitigating wildfire ignition risks associated with electrical power infrastructure.

Recently, major electrical utility companies, including Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E) have enacted Public Safety Power Shutoffs, where electrical lines are deenergized in specific areas that are deemed to present a significant risk of causing a wildfire ignition. Power outages from these Public Safety Power Shutoffs have proved to be negatively impactful, costly, and widespread in some areas. Indeed, one study on Public Safety Power Shutoffs in California identified approximately 12 million person-days of outages in 2019 (Abatzoglou et al. 2020), the costs of which were estimated to be $10 billion (Wara 2019).

Electrical utilities are recognizing the potential threat that overhead distribution lines cause to public safety, power disruption, and cost of replacement, and are thus mitigating potential for ignition to power poles in fire-prone areas. One such effort includes converting wood poles to steel poles, which significantly reduces the risk of pole ignition and subsequent failure. However, even when overhead poles are steel, wildfire ignitions can still be facilitated by powerlines if lines come in contact with other lines, vegetation, or floating debris during a high-wind event.

Arguably, the most effective mitigation to minimize ignitions from powerlines would be to place them underground. While these efforts certainly cause additional installation and short-term costs and may result in some environmental disturbance during their installation, they effectively eliminate the potential for ignitions from electrical utilities. New developments that choose to underground powerlines significantly reduce the likelihood of off-site ignitions caused by electrical infrastructure.

Thus, the most effective mitigation measure would be to place electrical utilities underground. While undergrounding powerlines may cause additional costs and provide some environmental disturbance, they largely eliminate damage to electrical utilities. Further, they also eliminate potential entrapment of residents during evacuation from burned poles falling onto roadways.

3.5.6 Development with Adequate Ingress/Egress

Safe ingress and egress includes time for fire detection, alarm, emergency response, pre-movement, and evacuation (Ronchi et al. 2017, 2019; Mitchell et al. 2023). Thus, planners should **facilitate efficient access and ingress of emergency services** as well as egress of evacuating residents (Gonzales-Mathiesen and March 2014; March and Rijal 2015). Longer distance to traffic flow and safe areas can cause gridlock, imperil evacuees, and increase emergency response times. Thus, **close proximity of developed areas to code-compliant major roadways** provides more options and contingencies to both residents and first responders and may reduce overall congestion by reducing travel distances and simplifying routes to the nearest safety zone (Conn et al. 2016).

Similarly, **additional points of ingress/egress into/out of a development** provide for multiple alternatives to leave a fire-threatened community and could reduce traffic congestion. Per Public Resources Code 4290, maximum dead-end lengths only depend on parcel size and do not take into account other factors such as land use, demographics, road system adequacy for proposed development, fire hazard level, and location of exits that may not be safe in the event of fire. Therefore, ingress/egress points should consider ultimate land uses, vegetation, expected wind speeds, topography, and subsequent evacuation time in a given locale (Conn et al. 2016).

Ensuring that **ingress and egress roadways are code compliant** allows for safe evacuation and efficient emergency response. If wildfires near development areas were to occur, rapid emergency response provides the best opportunity for an effective initial attack and quick wildfire suppression. Early wildfire suppression lowers the chances of wildfires growing out of control and damaging adjacent developments.

Rapid emergency response is a critical component in an effective initial attack. The potential for wildfires originating in development areas to spread off-site is greatly reduced when emergency responders have quick and efficient means of ingress.

3.5.7 Proximity to Emergency Services

As previously noted, sound land use planning should incorporate the availability, capacity, location, and travel times of emergency services (Gonzales-Mathiesen and March 2014; March and Rijal 2015). Again, **close proximity to fire department resources** better enables initial attack success, which subsequently reduces exposure of people and buildings to wildfire and improves ease of escape to off-site areas. Time to fire arrival is dependent on multiple factors including rapid fire detection, sound roadways (i.e., wide and relatively flat), and placement of fire department resources that are located strategically to developed areas.

3.5.8 Limiting Parking in WUI Developments

Limitations on roadside parking can better facilitate ingress/egress during a wildfire because they effectively guarantee a given road's unobstructed width. Limitations on parking can be enforced in local zoning ordinances or in subdivision design (Mowery et al. 2022).

Parking restrictions can be **permanent** in nature or enacted **during time periods in which fire ignition potential is heightened**. For example, the County enacted parking restrictions during a predicted Santa Ana wind event in October 2023 to proactively clear roads and better facilitate evacuation and emergency response should a wildfire occur (Mays 2023). Rapid emergency response improves the likelihood of quick wildfire extinguishment and may prevent a wildfire's off-site spread.

3.5.9 On-site Water Supply/Storage

As earlier noted, developments should provide for reliable water supply (Moritz and Butsic 2020), which can improve firefighting effectiveness. Proper water supply should include appropriate location, supply, connectivity, and signage (Gonzales-Mathiesen and March 2014; March and Rijal 2015).

Guaranteeing adequate water supply improves the potential success of wildfire suppression efforts. In addition to **ensuring code-compliant water supply and fire flow**, **additional on-site aerial fire-suppression water supplies** (dip sites) or **other aboveground water access points** can act as added mitigation and increase opportunities for rapid wildfire extinguishment.

3.5.10 Firebrand Hazard Discussion

Airborne embers, commonly referred to as firebrands, are burning materials which become airborne and carried for some distance in an airstream (Babrauskas 2020). Firebrands can serve as ignition sources through a phenomenon defined as spotting. Spotting occurs when firebrands are lofted into the air and ignite small fires called spot fires ahead of the main fire front when landing on a receptive fuel bed. Wildfire spotting is multi-faceted and occurs at varying levels of severity. Main drivers of wildfire spotting include (NWCG, 2021):

- Firebrand Source, Size, and Amount
- Firebrand travel distance
- Probability of ignition where firebrands land

Firebrands pose significant risk to communities. In extreme cases, California chapparal has been found to cause ignitions up to four miles away from the main fire front. However, these risks can be mitigated through the implementation of fire-resistant construction methods, properly maintained landscaping, Fuel Modification Zones, and ignition resistant landscaping (NIST, 2022, Tacaliti, 2023). While the majority of home losses in the WUI are due to firebrands (NIST, 2021), a review of structural loss data highlights that modern master-planned communities are extremely unlikely to be destroyed by wildfires (CBIA, 2022). Of all wildfires in California since 2017, less than 1% of structures lost were structures built after 2010 (CBIA, 2022). Structural hardening requirements mandated through Chapter 7A of the California Building Code and implementation of adequate defensible space at the community and parcel scale are designed to effectively mitigate structural ignition risks from firebrands.

The following section discusses wildfire hazards caused by firebrands. Factors influencing firebrand production, transport, and ignition are highlighted, emphasizing the importance of fire-resistant construction methods and defensible space.

3.5.10.1 Firebrand Generation

In extreme cases, fire spread by firebrands can become the dominant form of fire spread and overwhelm fire suppression efforts. In order for firebrands to pose a hazard, they must have had sufficient initial size to sustain enough heat during transport to ignite a receptive fuel bed (Babrauskas 2020). Firebrand size is influenced by an array of factors including fuel type, fire intensity, and wind speed (Adusumilli and Blunck, 2023, Suzuki and Manzello, 2022). However, the complex nature of firebrand production and spread remains relatively unstudied. Limited research exists regarding processes of firebrand generation and its relation to the source materials which

produce firebrands (Manzello and Suzuki, 2023). The vast majority of available firebrand research is focused on transport of firebrands, with little research focused on the burnout process of firebrands following generation and transport (CBC, 2022).

Currently, no computed models exist for predicting firebrand generation. Instead, research into the topic relies on experimental studies. In general, greater fire intensity is found to generate more firebrands (Thomas et al. 2021). Fuel load, or the total amount of combustible fuels, has been found to related to the severity of firebrand production. The total number of burning firebrands has been observed to increase alongside an increase in the height of trees or shrubs (Adusumilli et al., 2021).

3.5.10.2 Firebrand Transport

Firebrand transport is the most commonly studied component of firebrands. This is likely because the processes behind firebrand transport are the simplest to model. In addition, understanding maximum firebrand transport provides important information for firefighters and emergency managers during wildfires. Models predicting maximum firebrand transport or spotting distance account for factors such as fuel type, tree height and crown width, wind speed, spotting location (ex. Ridgetop, valley) (Albini 1979, Chase 1981, Rothermel 1983, Albini 1983, Chase 1984, Morris 1987). Before firebrands can travel downwind in the atmospheric air current, they first must be lofted into the air. Ember lofting leads to firebrands and is influenced by fire intensity, fuel loading, and terrain features (NWCG, 2021). Once airborne, firebrand transport distance is mainly driven by wind speed and firebrand size (Manzello and Suzuki, 2023).

3.5.10.3 Firebrand Ignition

Several properties influence a firebrand's ignition potential upon landing. Firebrand characteristics such as mass and size, thermal degradation or burnout, and environmental conditions (i.e. weather) greatly influence the potential for new ignition caused by firebrands (Bearinger et al., 2020). For example, firebrands may burnout completely in the atmosphere, or, after landing, undergo glowing combustion and die out, smolder, or transition into flaming and grow into a larger fire (Manzello et al, 2021). While the relationship between firebrand characteristics and ignition potential is understudied, several factors are known to mitigate structure losses from firebrands in the WUI. It is known from general understanding of thermodynamics that the condition of the receptive fuels, both urban and natural, is a significant predictor of new ignitions from firebrands.

Ensuring code compliant defensible space surrounding structures has been found to mitigate structure losses from firebrands in the WUI. Defensible space is often created in the form of Fuel Modification Zones, which create buffers between natural vegetation and structures. In many jurisdictions, Fuel Modification Zones within 30 feet of structures are required to be irrigated, further limiting the potential for firebrand ignitions. New research has shown that vegetation, decorations, and additional flammable material attached to the house are of the most important factors contributing to structure ignition from firebrands (IBHS, 2023). Research has shown that firebrands more easily collect around the edges of structures and can significantly contribute to structure ignitions if fuels are readily ignitable (IBHS, 2023). In response to these findings, CAL FIRE has created a new defensible space zone, Zone 0, which requires the first 5 feet from structures to be void of combustible materials.

The condition of building materials themselves greatly determines structure losses from firebrands (NIST, 2022). Studies suggest that building construction is as if not more important than defensible space in determining structure losses in the WUI (Syphard et al. 2017). As mentioned previously, firebrands are responsible for the majority of structure losses in the WUI. Chapter 7A of the California Building Code has been developed through

partnership with experimental research into structure losses. Incorporating the building construction and design requirements outlined in Chapter 7A (ex. Roof type and assembling, exterior decking, siding materials, etc.) have been proven to mitigate structure losses from firebrand ignitions (NIST, 2022).

3.6 Firebrand Production From Urban Fuels

The following sections discuss the potential for firebrand production from structure fires in modern master-planned communities, noting the effectiveness of building design features and fire safety measures in reducing the risk producing firebrands from onsite wildfires. Historical data on wildfires caused by structure fires are also presented, identifying common characteristics associated with wildfire incidents caused by structure fires.

3.6.1 Historical Wildfires Caused by Structure Fires

CAL FIRE maintains fire history data throughout the state and includes ignition causes when available (CAL FRAP, 2023). According to the historical fire record, wildfires caused by structure fires account for only <1% percent of all wildfires where the cause is known. Wildfires by cause in California is summarized below in Table 4.

Table 4. Wildfire Occurrences in California by Cause

Fire Cause	Frequency	Percent of All Causes
1 - Lightning	3483	22%
9 - Miscellaneous	3458	22%
2 - Equipment Use	1325	8%
7 - Arson	945	6%
5 - Debris	757	5%
10 - Vehicle	534	3%
11 - Powerline	444	3%
4 - Campfire	391	3%
3 - Smoking	337	2%
8 - Playing with fire	192	1%
18 - Escaped Prescribed Burn	103	1%
6 - Railroad	78	<1%
15 - Structure	**27**	**<1%**
19 - Illegal Alien Campfire	17	<1%
16 - Aircraft	15	<1%
13 - Non-Firefighter Training	11	<1%
12 - Firefighter Training	5	<1%

Note: Does not include wildfires with Unknown cause
Source: CAL FIRE FRAP, 2023

Through a detailed assessment of these fires, clear patterns and characteristics related to community design and the surrounding landscape are identified. These include:

- Wildland Urban Intermix style development with substantial vegetation surrounding structures.
- Limited setback from wildland vegetation with structures located in close proximity to unmaintained natural vegetation.
- Adjacent wildland vegetation often resembles heavy fuels. Vegetation surrounding structures is rarely herbaceous.
- Surrounding terrain is often steep with structures located on steep slopes.
- Structures are often positioned atop slopes.
- Development can be described as rural, with structures located far from existing communities or fire stations.
- Structure age is considered old.

Appendix C provides a graphical depiction of historical wildfires caused by structure fires. These occurrences exemplify many or all of the characteristics identified above. It is important to note that the Centennial Project is set apart from these characteristics and features a clustered master plan design with code compliant design features that minimize the potential for onsite structure fires to result in offsite ignitions. Centennial's development footprint does not include unmaintained vegetation near structures. Structures will be constructed in accordance with the latest building code requirements for fire safety and each structure will be equipped with automatic interior fire sprinklers. Development edges feature one, continuous interface between development and offsite grassland fuels buffered by annually maintained Fuel Modification Zones. Planned development pads are not located on steep terrain or on ridgelines. Further, Centennial will include three onsite fire stations with an optional fourth as determined necessary by LACoFD to ensure rapid response to potential onsite structure fires. **As described, Centennial does not include factors that increase the potential for offsite ignitions caused by onsite structure fires.**

3.6.2 Mitigation Summary

Studies have shown that land use decision making, defensible space, homeowner preparation, and ignition prevention can complement traditional management practices in reducing wildfire ignitions (Schwartz and Syphard 2021; Syphard et al. 2017). Because most fires are caused by humans, ignition reduction is a powerful management strategy (Syphard and Keeley 2015). **Examples of effective ignition risk mitigation measures** include:

Development location, design, and density

- The inherent nature of a project's site may have characteristics that affect wildland fire behavior and off-site ignition risk. Assessing and mitigating these factors can help to reduce potential ignitions and wildland fire behavior. For example, developments should be placed away from steep slopes, ridgelines, and known wind corridors.
- Lower-density developments, such as WUI development, should be avoided. Instead, high-density developments with one continuous interface between the built environment and vegetative fuels are preferred. This style of development reduces vegetative fuels between developments, thus limiting the potential for ignition within development areas.

Vegetation Management and Defensible Space

- Research has also indicated that the likelihood of ignitions occurring in a given location is significantly influenced by the existing vegetation/fuel available (Elia et al. 2019). Therefore, manipulating existing vegetation is a critical component of off-site ignition risk mitigation. Defensible space, often referred to as an FMZ, not only helps protect new communities and structures from external wildfire risks but also reduces the risk of fire originating from such new communities or structures and spreading to surrounding natural resources/habitat areas.
- In addition to FMZs surrounding structures, roadside FMZs have also proven effective in reducing ignition risks along roadways, a common ignition source in southern California.

Underground Powerlines

- Common ignition sources in southern California are related to powerlines, and many destructive fires across the state have been caused by powerlines (Keeley and Syphard 2018). However, this risk can be mitigated by placing powerlines underground.

3.7 Supporting Research Summary

The research cited in this section supports the Wildfire Off-Site Ignition Risk Assessment Matrix and the conclusions of this analysis.

- Development standards, mitigation standards, and project design features in wildfire-prone areas aim to reduce the potential for on-site ignitions and wildfire spread into off-site areas.
- While components of land use planning including project design and wildfire risk mitigation measures have been effectively proven to reduce risks to structures and their inhabitants from wildfire, these design and mitigation features also have an inverse impact of reducing the likelihood of on-site wildfire ignitions and their spread into off-site areas.
- The reports cited provide a description of relevant research related to wildfire risk mitigation and creates a nexus describing how these mitigations also impact the likelihood of off-site wildfire ignitions.
- Reducing potential for loss requires a holistic approach that involves a diversity of stakeholder groups and disciplines (Calkin et al. 2013) and must be considered at multiple scales (Mell et al. 2010).
- Land use planners should aim to minimize exposure of development to wildfire based on the physical and sociopolitical factors at a given site (Gonzales-Mathiesen and March 2014; March and Rijal 2015).
- The implementation of measures intended to reduce a development's exposure to encroaching wildfires also reduces the potential for ignitions originating in development areas and spreading off-site.
- Risk reduction approaches, both on-site and off-site, and including the framework presented in this report, should account for multiple risk reduction factors at multiple spatial scales, recognizing that a "one-size-fits-all" approach may not meet the needs of each individual development (Syphard et al. 2021).

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4 Wildfire Off-site Ignition Risk Assessment Matrix

4.1 Introduction

At the request of the Tejon Ranch, Dudek assembled a team to research and develop **an approach to evaluate the potential of a new master-planned community to cause off-site wildfire ignitions and ember cast**. This effort is in response to the Project's litigation that specifically included rulings on potential off-site ignitions and is also influenced by a variety of factors including the October 2022 California Attorney General Guidance on Wildfire and Evacuation Planning (California OAG 2022), the lack of California Environmental Quality Act (CEQA) thresholds targeting off-site ignitions, and Office of the State Fire Marshal revisions of FHSZ Maps (typically increasing the footprint of Very High FHSZs).

Concern about project wildfire risks is often focused on a project's introduction or increase of people to an area; by attracting more people, the presumption is that proposed development would result in a higher likelihood of wildfire ignitions. While wildfire impacts to older, established communities have been notably documented, the authors of this study could not find research directly linking ignition-resistant master-planned communities developed in accordance with modern fire code standards with increased fire ignitions or frequency. Chapter 3 of this report provides published documentation that **high density master-planned communities constructed using modern ignition resistant development techniques actually minimize the likelihood of an on-site fire transitioning to off-site areas**.

This report describes a risk assessment matrix that can be utilized for development projects located in fire hazard severity zones, including the Project, as part of an EIR document to address the potential for off-site ignitions and impacts. However, **the present focus of the methodology centers on the proposed Project** and the characteristics therein. Essentially, modeling or other tools are used to analyze ignition risk[7] and reveal the potential impacts that proposed development projects may have on adjacent lands or communities.

- Challenge: Determining potential wildfire ignition increases from new communities, including the Project, and potential impact on existing residents, structures, and communities
- Goal: Develop defensible method for evaluating off-site ignition potential from the Project (or any project), addressing the significance question
- Objectives:
  - Utilize new method to inform the Project's EIR Wildfire Section
  - Create an off-site wildfire risk matrix that assesses risk based on:
    - Fire hazard
    - Ignition risk
    - Fire protection/mitigation measures
  - Address California Attorney General Guidance on CEQA Wildfire Risk Mitigation

[7] "Risk" is the potential damage a fire can do to the area under existing conditions, accounting for any modifications such as fuel reduction projects, defensible space, and ignition-resistant building construction (CAL FIRE 2023).

4.2 Risk Assessment Equation

The overall risk assessment is **based on a model developed in 2015** (Leyshon) that starts with the hazard of a site based on the FHSZ rating and then subtracts the mitigation for the site to arrive at a risk score for the site.

Hazard - Mitigation = Risk

For purposes of determining the potential off-site risk for a development, the Leyshon equation was modified to add an Ignition Risk factor to represent the potential for on-site ignitions; the sum is reduced by the risk mitigation measures a proposed project is providing. The result then represents the potential Off-site Risk.

Hazard + Ignition Risk – Mitigation = Off-site Risk

1. The first term in the equation is **Hazard**. A given site's overall wildfire hazard may be analyzed using a variety of models and approaches. Because California relies on CAL FIRE's FHSZ modeling as the best available science, it is prudent to incorporate that model into this assessment of off-site ignition risk. Therefore, the FHSZ ratings are incorporated as the potential wildfire **Hazard** and simplified using the following ranking:

Hazard: CAL FIRE FHSZ; Very High (3); High (2); Moderate (1)

2. The second term in the equation is **Ignition Risk**. Ignition Risk is associated with a variety of site and project factors that either increase or decrease the potential for a vegetation ignition. The various factors are incorporated as the potential **Ignition Risk** and simplified using the following ranking:

Ignition Risk: High risk factor (3); Moderate risk factor (2); Low risk factor (1)

3. The third term in the equation is **Mitigation**, which, based on natural or project-provided features can reduce the overall risk, which the mitigation measures are designed to do whether they are code-based, above and beyond the code, or naturally occurring.

- Structural Mitigation Variables: hardening features, period of urban development, house size
- Non-structural Mitigation Variables: defensible space, housing density, distance from wildland vegetation
- Natural: bodies of water, non-burnable landscape

The measures are incorporated as **Mitigation** and simplified using the following ranking:

Mitigation: High reduction of ignition risk (3); Moderate reduction of ignition risk (2); Low reduction of ignition risk (1)

After establishing the risk assessment equation as the applicable **Formula**, then the terms of the equation are identified (hazard, risk, and mitigation **Factors**) which leads to populating the risk assessment **Matrix,** and subsequently a **Ranking** system in order to apply the **Matix** to a development and assess its potential off-site ignition risk.

Formula —> Hazard/Risk/Mitigation Factors —> Matrix —> Ranking —> Application

4.3 Off-site Ignition Risk Assessment Method

4.3.1 Wildfire Hazard Assessment

For purposes of this analysis, the CAL FIRE FHSZ classification system will be relied upon for the de facto hazard[8] designation for a project or area. The CAL FIRE hazard rating reflects the inherent natural physical conditions of the site that create a likelihood of fire ignition and expected fire behavior and burn probability for a potential wildfire that may be ignited within the project vicinity. **Listed below are the CAL FIRE FHSZs and their corresponding hazard ranking**, which would be identified for the project being evaluated and entered into the assessment equation. Projects located in a FHSZ will be assigned a hazard rating as classified by CAL FIRE: Moderate, High or Very High.

Fire Hazard Severity Zone	Hazard Ranking
Moderate	1
High	2
Very High	3

The ranking is not a measurement but rather a comparison of the different zones one to another. The FHSZ classification is determined by referring to the CAL FIRE Office of the State Fire Marshal map designation. A lower ranking represents a lower level of risk.

4.3.2 Wildfire Ignition Risk Assessment

4.3.2.1 California Attorney General Best Practices Guidelines

As stated in a recent guidance document by the California Attorney General's Office (California OAG 2022), development in fire-prone areas increases the likelihood that more fires will ignite. The guidance document was designed to assist lead agencies in complying with CEQA when considering whether to approve projects in wildfire-prone areas. The document further states that many of California's largest and most destructive fires have been caused by human activities. According to this guidance, there are **three reasons why residential developments in the WUI increase the risks of wildfire**: (1) there is an increase of wildfire ignitions due to the **increased presence of people**, and increase of ignitions becoming wildfires because of homes placed among flammable vegetation; (2) building housing units in the WUI **places more people in harm's way**; (3) fires in **remote locations require significant fire-fighting resources** and mobilization of fire-fighters.

Table 5 summarizes the various elements of a project's design and ranks them by category based on the Attorney General's Office guidance document's assessment of features and characteristics that result in increased or decreased ignition risk. The ranking was determined by comparing the elements with each other, analyzing whether each element was more or less of a risk than other elements, and does not represent an actual measurement or scoring. Instead, the ignition risk factors are assessed as more impactful, or less impactful, than other factors and ranked accordingly, just as the FHSZs are "ranked" as Moderate, High and Very High. A lower ranking represents a lower risk; a higher ranking represents a higher risk.

[8] "Hazard" is based on the physical conditions that create a likelihood and expected fire behavior over a 30- to 50-year period without considering mitigation measures such as home hardening, recent wildfire, or fuel reduction efforts (CAL FIRE 2023).

Table 5. Ignition Risk: Wildfire Ignition Risk Assessment for Development Projects[1]

Wildfire Ignition Risk Variables	Ignition Risk Impact Factor*	Ranking
Wildfire Risk Variables Related to the Project's Design		
Variable A. Project Density		
Choose either A1 or A2, but not both; select A3 if applicable.	A1. Low or intermediate density: not concentrated, fragmented, isolated clusters (more exposure to wildland vegetation)	2
	A2. High density: concentrated (disrupts fire spread)	1
	A3. Remote or disconnected from existing development (difficult fire department access)	3
Variable B. Project Location in the Landscape		
Select all that apply.	B1. Aboveground power lines (power lines located in a wind corridor may become a source of ignition)	3
	B2. Structures sited in rugged terrain or on top of steep hills (may increase wildfire risk)	2
Variable C. Water Supply and Infrastructure		
Select all that apply.	C1. The project's water supply and infrastructure are adequate for firefighting needs	0
	C2. There is a potential for loss of water pressure during a fire that may decrease available water supply	1
	C3. There is a potential for loss of power that may eliminate the water supply	2
	Sum of Ignition Risk Assessment Ranking	**13**

1 Based on California Atorney General Guidance.
Note: *Ignition Risk Assessment: High risk factor (3); Moderate risk factor (2); Low risk factor (1); Not a risk factor (0).

Sum of Ignition Risk Factors Ranking	Ranking for Matrix
Sum of 0 to 1: Not a risk factor	0
Sum of 2 to 5: Low risk factor	1
Sum of 6 to 10: Moderate risk factor	2
Sum of 11 to 14: High risk factor	3

Notes:
1 Select the applicable risk impact factors based on the project's density, location, and water supply variables.
2 Select the corresponding value on the table.
3 Sum the values.
4 Select the appropriate matrix ranking based on the sum of risk factors.
5 Enter the Wildfire Ignition Risk Assessment ranking on the Wildfire Ignition Risk Matrix.

Table 6. Applicable Fire and Building Code Sections that Influence Potential Off-site Ignition Risk

Code Section	Code Description	Risk Factor or Mitigation Measure
CFC Sec. 4901.1 Scope	CFC Chapter 49 contains the minimum requirements to mitigate conditions that might cause a fire originating in a structure to ignite vegetation in the WUI Area, and conversely, a wildfire burning in vegetative fuels to transmit fire to buildings and threaten to destroy life, overwhelm fire suppression capabilities or result in large property losses.	WUI mitigation strategies help to reduce the potential of a fire igniting within the Project site's landscaping or spreading outwardly off-site through the landscaping if a structure was to ignite.
CFC Sec. 4907 Defensible Space	The purpose of CFC 4907 is to manage hazardous vegetation and fuels to reduce the severity of potential exterior wildfire exposure to buildings and to reduce the risk of fire spreading to buildings.	Defensible space helps to reduce the potential of a fire igniting in vegetative fuels around buildings and structures or outwardly spreading off-site.
CRC Sec. R337; CBC Ch. 7A; CBC Sec. 903; CFC Sec. 903, Building construction	The purpose of these code sections is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any FHSZ to resist the intrusion of flame or burning embers projected by a vegetation fire and thereby contribute to a systematic reduction in conflagration losses.	Buildings constructed to exterior wildfire exposure standards can help to reduce the potential of a fire originating within a structure from leaving the property and even escaping its confines (sprinkler system, fire resistant exterior walls, dual paned windows, fuel modification, etc.). In addition, if a structure were to ignite, these construction methods could reduce the potential of a fire from communicating to adjacent structures or becoming a conflagration with multiple structures involved (sprinkler system, fire resistant exterior walls, dual paned windows, fuel modification, etc.).
CFC Sec. 4903, Project Site	The purpose of CFC 4903 is to determine the acceptability of fire protection and life safety measures designed to mitigate wildfire hazards presented for the property (proposed Project site). [This code section authorizes the fire code official to require the preparation of a fire protection plan. The plan is prepared to determine the acceptability of fire protection and life safety measures designed to mitigate wildfire hazards which would then be reviewed and approved by the fire code official.] (CFC 4903.1).	The inherent nature of a Project's site may have characteristics that affect wildland fire behavior. The Project's design itself may impact wildland fire ignition and behavior. Assessing and mitigating these factors can help to reduce potential ignitions and ultimately wildland fire behavior.
CFC Sec. 4903, Surroundings	The purpose of CFC 4903 is to determine the acceptability of fire protection and life safety measures designed to mitigate wildfire hazards presented for the property [proposed Project site] (CFC 4903.1).	The inherent nature of the land surrounding a proposed project may have characteristics that affect the ignition and behavior of wildland fire. The current land uses and management practices may have an impact as well. Assessing these factors can help to determine the likelihood and potential fire

Table 6. Applicable Fire and Building Code Sections that Influence Potential Off-site Ignition Risk

Code Section	Code Description	Risk Factor or Mitigation Measure
		behavior of a wildland fire if it were to ignite from within a proposed project and spread to its surroundings, compared to the existing conditions without the proposed Project.

Notes: CFC = California Fire Code; Ch. = Chapter; WUI = wildland–urban interface; FMZ = fire management zone; Sec. = Section; CRC = California Residential Code; CBC = California Building Code; FHSZ = Fire Hazard Severity Zone.

4.3.3 Wildfire Ignition Risk Mitigation Assessment

Table 7 provides a description of California Attorney General guidance mitigation measures that are used to evaluate a project's potential for igniting fires that spread off-site into adjacent wildlands.

Table 7. Mitigation: Wildfire Ignition Risk Mitigation Measures

Wildfire Ignition Risk Mitigation Measure[1]	Category	Ranking for On-site Ignition Risk	Ranking for Off-site Ignition Risk[2]
Siting projects to maximize the role of low-flammability landscape features to buffer the development from fire spread	Project siting	2	2
Limiting development along steep slopes and amid rugged terrain (decreases exposure to rapid fire spread and increases accessibility for firefighting)	Project siting	2	1
Placement of development close to existing or planned ingress/egress and designated evacuation routes (for efficient evacuation while allowing emergency access and rapid fire suppression)	Project siting	1	1
Placement of projects close to adequate emergency services	Project siting	3	2
Increasing housing density and consolidated design, relying on higher-density infill developments as much as possible	Housing density	3	2
Avoidance and minimization of low-density exurban development patterns or leapfrog-type developments	Housing density	3	0
Decreasing the extent and amount of "edge" or interface area that is adjacent to undeveloped wildlands	Housing density	3	2

Table 7. Mitigation: Wildfire Ignition Risk Mitigation Measures

Wildfire Ignition Risk Mitigation Measure[1]	Category	Ranking for On-site Ignition Risk	Ranking for Off-site Ignition Risk[2]
Construction of additional points of ingress and egress and modification of evacuation routes	Ingress/egress	2	0
Undergrounding power lines	Infrastructure	3	3
Requiring fire-hardened communication to the project site	Infrastructure	1	0
Parking limitations to ensure roads are not clogged with parked vehicles	Infrastructure	1	1
On-site water supply/storage to augment ordinary supplies	Infrastructure	2	2
Fire hardening structures and homes to requirements provided in Chapter 7A of California Building Code (CBC) and Section R237 of the California Residential Code (resistance to heat, flames, and embers)	Construction features	2	1
Creation of buffer zones and defensible space within and adjacent to the development	Vegetation management/FMZ/ defensible space	3	2
Ensuring that vegetation will not touch structures or overhang roofs	Vegetation management/FMZ/ defensible space	2	1
Structure legal obligations so that defensible space measures are retained over time	Vegetation management/FMZ/ defensible space	1	0[9]
Enhanced communication to the project population about emergency evacuation plans and evacuation zones[10]	Training	1	0

[9] Legal obligations would only apply to the project or its future residents and not to off-site lands or neighbors. Therefore, the obligations would only be able to directly address on-site risk factors. The risk of an on-site ignition spreading to off-site is always a possibility, but legal obligations would not have a significant impact in that regard.

[10] While evacuation communication may not on its face seem to play a role in reducing ignition risk, the practice of regular communication keeps residents engaged in the preparedness process and more aware of wildfire hazards/risks and their role in prevention and response. See the points below from the U.S. Fire Administration.

- When residents are informed about potential wildfire threats early, they have time to prepare their homes, gather essential items, and make informed decisions about evacuation, reducing the likelihood of rushed actions that could lead to accidental ignition.
- Active communication with residents helps build awareness of fire risks, encourages proactive measures like defensible space creation, and fosters a sense of preparedness within the community.
- By regularly communicating evacuation procedures and the consequences of not evacuating promptly, residents are more likely to heed warnings and take necessary actions to protect themselves and their property.

Table 7. Mitigation: Wildfire Ignition Risk Mitigation Measures

Wildfire Ignition Risk Mitigation Measure[1]	Category	Ranking for On-site Ignition Risk	Ranking for Off-site Ignition Risk[2]
Mitigation Rating Sum		35	20

Notes: FMZ = Fire Management Zone.

1 Potential mitigation measures and design alternatives that may reduce wildfire risk impacts (not exclusive).

2 Potentially impacting existing structures in proximity to the new development.

Rankings (derived by comparing the listed mitigation measures against each other using a scale from 0 to 3): 3 = High reduction of ignition risk; 2 = Moderate reduction of ignition risk; 1 = Low reduction of ignition risk; 0 = NA.

Sums of On-site Mitigation Measures	Ranking for Matrix
Sum of 0 to 3: No significant reduction of ignition risk	0
Sum of 4 to 13: Low reduction of ignition risk	1
Sum of 14 to 24: Moderate reduction of ignition risk	2
Sum of 25 to 35: High reduction of ignition risk	3

Sums Of Off-Site Mitigation Measures	Ranking for Matrix
Sum of 0 to 2: No significant reduction of ignition risk	0
Sum of 3 to 7: Low reduction of ignition risk	1
Sum of 8 to 13: Moderate reduction of ignition risk	2
Sum of 14 to 20: High reduction of ignition risk	3

Notes:

1 Select the applicable wildfire ignition risk mitigation measures based on the project's design (siting, density, ingress/egress, infrastructure, construction, and FMZ).
2 Select the corresponding ranking on the table for on-site or off-site ignition.
3 Sum the rankings.
4 Select the appropriate matrix ranking based on the risk factor ranking categories.
5 Enter the wildfire ignition risk mitigation measures ranking on the Wildfire Ignition Risk Matrix.

4.4 Application of the Wildfire Off-site Ignition Assessment Matrix

Based on the variables and ranking parameters for each risk factor and mitigation measure an experienced professional fire protection planner can evaluate a project from an overall wildfire risk and mitigation perspective to assess the project in terms of its potential to result in off-site ignitions that may threaten off-site habitats and communities. Exhibit 4 provides the complete matrix.

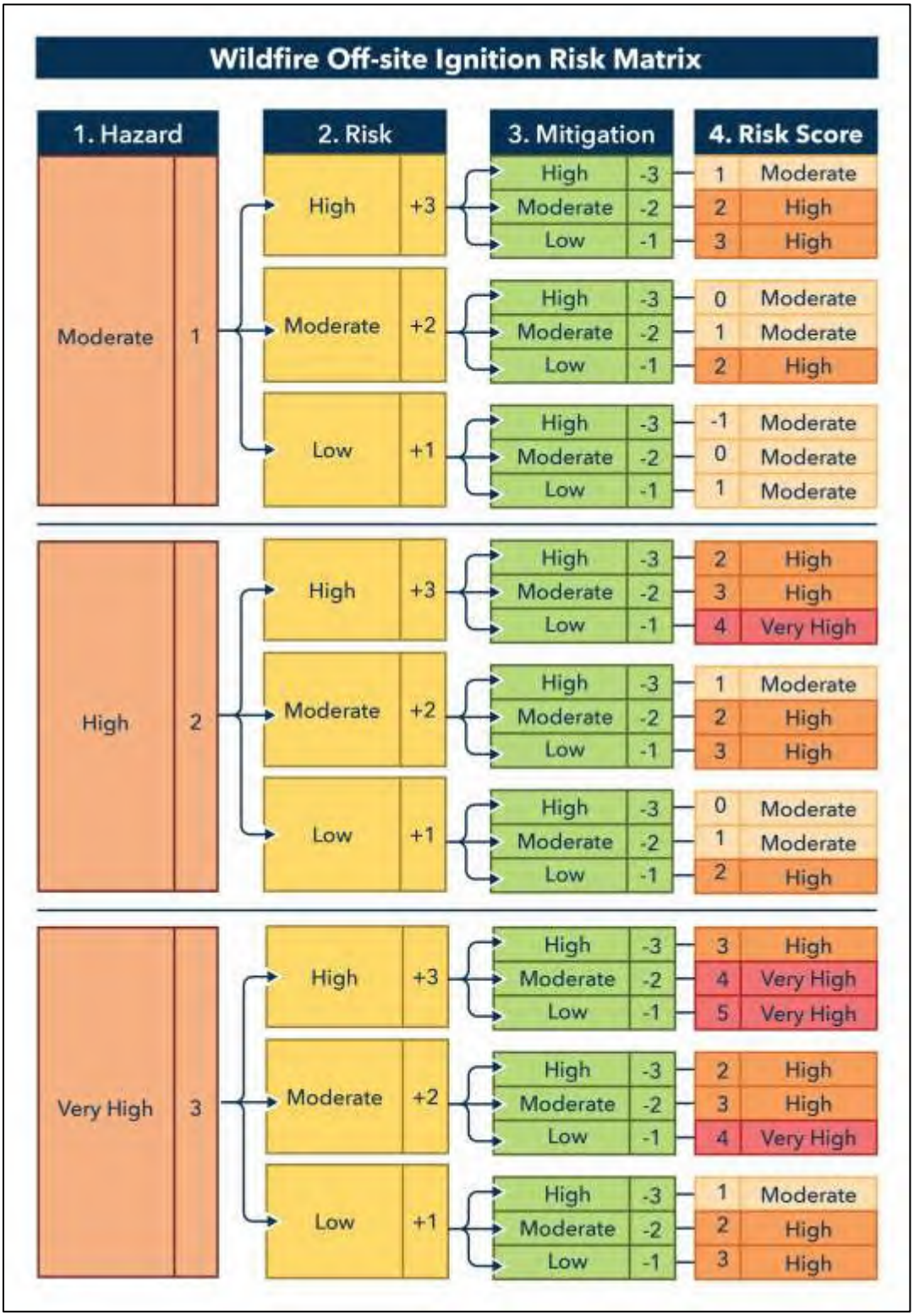


Exhibit 4. Wildfire Off-site Ignition Risk Matrix

Notes: CAL FIRE = California Department of Forestry and Fire Protection; FHSZ = Fire Hazard Severity Zone.
* Risk = Hazard + Ignition Risk – Mitigation

Once the matrix is used to identify the appropriate Hazard, Ignition Risk and Mitigation rankings for the project, the rankings can then be entered as terms into the risk equation to determine the Off-site Risk ranking and the corresponding Off-site Risk Level.

Hazard + Ignition Risk – Mitigation = Off-site Risk

The risk results can be classified into the following categories:

Ranking	Off-site Risk Level
WORL ≤ 1	Moderate
1 < WORL < 4	High
WORL ≥ 4	Very High

WORL = Wildfire Off-site Risk Level

Moderate risk represents an acceptable level of risk based on the risk vs. mitigation evaluation.

High risk represents a potential cause for concern and the possible need for additional mitigation measures to reduce to a Moderate level unless a specific site condition or overriding determination is justified and found acceptable to the local fire authority.

Very High risk would be unacceptable and subject to additional mitigations to reduce the potential ignition risks to Moderate or High with overriding acceptance from the fire authority.

4.5 Application of the Wildfire Off-site Ignition Assessment Matrix to the Centennial Project

Based on the site-specific analysis and considering the various input factors for the fire environment, the Project's hazard, ignition risk and mitigation measures, the overall Project Wildfire Off-Site Ignition Risk Level is considered by the Dudek team to result in a Moderate level, as shown below.

Hazard + Ignition Risk – Mitigation = Off-site Risk

Step 1. Hazard Ranking: Very High Fire Hazard Area = **3**

Fire Hazard Severity Zone	Hazard Ranking
Moderate	1
High	2
Very High	3

Step 2. Risk Factor Ranking: Moderate = **1**

Table 8. Centennial Specific Ignition Risk: Wildfire Ignition Risk Assessment for Development Projects[1]

Wildfire Ignition Risk Variables	Ignition Risk Impact Factor*	Ranking
Wildfire Risk Variables Related to the Project's Design		
Variable A. Project Density		
Choose either A1 or A2, but not both; select A3 if applicable.	A1. Low or intermediate density: not concentrated, fragmented, isolated clusters (more exposure to wildland vegetation)	2
	A2. High density: concentrated (disrupts fire spread)	1
	A3. Remote or disconnected from existing development (difficult fire department access)	3
Variable B. Project Location in the Landscape		
Select all that apply.	B1. Aboveground power lines (power lines located in a wind corridor may become a source of ignition)	3
	B2. Structures sited in rugged terrain or on top of steep hills (may increase wildfire risk)	2
Variable C. Water Supply and Infrastructure		
Select all that apply.	C1. The project's water supply and infrastructure are adequate for firefighting needs	0
	C2. There is a potential for loss of water pressure during a fire that may decrease available water supply	1
	C3. There is a potential for loss of power that may eliminate the water supply	2
	Centennial Project Sum of Ignition Risk Assessment Ranking	4

1 Based on California Atorney General Guidance.
Note: *Ignition Risk Assessment: High risk factor (3); Moderate risk factor (2); Low risk factor (1); Not a risk factor (0).

Sum of Ignition Risk Factors Ranking	Ranking for Matrix
Sum of 0 to 1: Not a risk factor	0
Sum of 2 to 5: Low risk factor	1
Sum of 6 to 10: Moderate risk factor	2
Sum of 11 to 14: High risk factor	3

Notes:
1 Select the applicable risk impact factors based on the project's density, location, and water supply variables.
2 Select the corresponding value on the table.
3 Sum the values.
4 Select the appropriate matrix ranking based on the sum of risk factors.
5 Enter the Wildfire Ignition Risk Assessment ranking on the Wildfire Ignition Risk Matrix.

Step 3. Mitigation Level Ranking: High = **3**

Table 9. Centennial Specific Mitigation: Wildfire Ignition Risk Mitigation Measures

Wildfire Ignition Risk Mitigation Measure[1]	Category	Ranking for On-site Ignition Risk	Ranking for Off-site Ignition Risk[2]
Siting projects to maximize the role of low-flammability landscape features to buffer the development from fire spread	Project siting	2	2
Limiting development along steep slopes and amid rugged terrain (decreases exposure to rapid fire spread and increases accessibility for firefighting)	Project siting	2	1
Placement of development close to existing or planned ingress/egress and designated evacuation routes (for efficient evacuation while allowing emergency access and rapid fire suppression)	Project siting	1	1
Placement of projects close to adequate emergency services	Project siting	3	2
Increasing housing density and consolidated design, relying on higher-density infill developments as much as possible	Housing density	3	2
Avoidance and minimization of low-density exurban development patterns or leapfrog-type developments	Housing density	3	0
Decreasing the extent and amount of “edge” or interface area that is adjacent to undeveloped wildlands	Housing density	3	2
Construction of additional points of ingress and egress and modification of evacuation routes	Ingress/egress	2	0
Undergrounding power lines	Infrastructure	3	3
Requiring fire-hardened communication to the project site	Infrastructure	1	0
Parking limitations to ensure roads are not clogged with parked vehicles	Infrastructure	1	1
On-site water supply/storage to augment ordinary supplies	Infrastructure	2	2
Fire hardening structures and homes beyond what is required in applicable building codes	Construction features	2	1

Table 9. Centennial Specific Mitigation: Wildfire Ignition Risk Mitigation Measures

Wildfire Ignition Risk Mitigation Measure[1]	Category	Ranking for On-site Ignition Risk	Ranking for Off-site Ignition Risk[2]
(resistance to heat, flames, and embers)			
Creation of buffer zones and defensible space within and adjacent to the development	Vegetation management/FMZ/ defensible space	3	2
Ensuring that vegetation will not touch structures or overhang roofs	Vegetation management/FMZ/ defensible space	2	1
Structure legal obligations so that defensible space measures are retained over time	Vegetation management/FMZ/ defensible space	1	1
Enhanced communication to the project population about emergency evacuation plans and evacuation zones[11]	Training	1	0
Mitigation Rating Sum		35	21

Notes: FMZ = Fire Management Zone.

1 Potential mitigation measures and design alternatives that may reduce wildfire risk impacts (not exclusive).

2 Potentially impacting existing structures in proximity to the new development.

Centennial Specific Sum of On-site Mitigation Measures	Ranking for Matrix
Sum of 0 to 3: No significant reduction of ignition risk	0
Sum of 4 to 13: Low reduction of ignition risk	1
Sum of 14 to 24: Moderate reduction of ignition risk	2
Sum of 25 to 35: High reduction of ignition risk	3

Centennial Specific Sum Of Off-Site Mitigation Measures	Ranking for Matrix
Sum of 0 to 2: No significant reduction of ignition risk	0

11 While evacuation communication may not on its face seem to play a role in reducing ignition risk, the practice of regular communication keeps residents engaged in the preparedness process and more aware of wildfire hazards/risks and their role in prevention and response. See the points below from the U.S. Fire Administration.

- When residents are informed about potential wildfire threats early, they have time to prepare their homes, gather essential items, and make informed decisions about evacuation, reducing the likelihood of rushed actions that could lead to accidental ignition.
- Active communication with residents helps build awareness of fire risks, encourages proactive measures like defensible space creation, and fosters a sense of preparedness within the community.
- By regularly communicating evacuation procedures and the consequences of not evacuating promptly, residents are more likely to heed warnings and take necessary actions to protect themselves and their property.

Sum of 3 to 7: Low reduction of ignition risk	1
Sum of 8 to 13: Moderate reduction of ignition risk	2
Sum of 14 to 20: High reduction of ignition risk	3

Notes:
1 Select the applicable wildfire ignition risk mitigation measures based on the project's design (siting, density, ingress/egress, infrastructure, construction, and FMZ).
2 Select the corresponding ranking on the table for on-site or off-site ignition.
3 Sum the rankings.
4 Select the appropriate matrix ranking based on the risk factor ranking categories.
5 Enter the wildfire ignition risk mitigation measures ranking on the Wildfire Ignition Risk Matrix.

Enter the assigned ranking from each step into the risk assessment formula and sum.

3 (Hazard) + 1 (Ignition Risk) – 3 (Mitigation) = 1 (Off-site Ignition Risk)

Complete Step 4 by referring to Table 10 (Wildfire Off-site Fire Risk Categories).

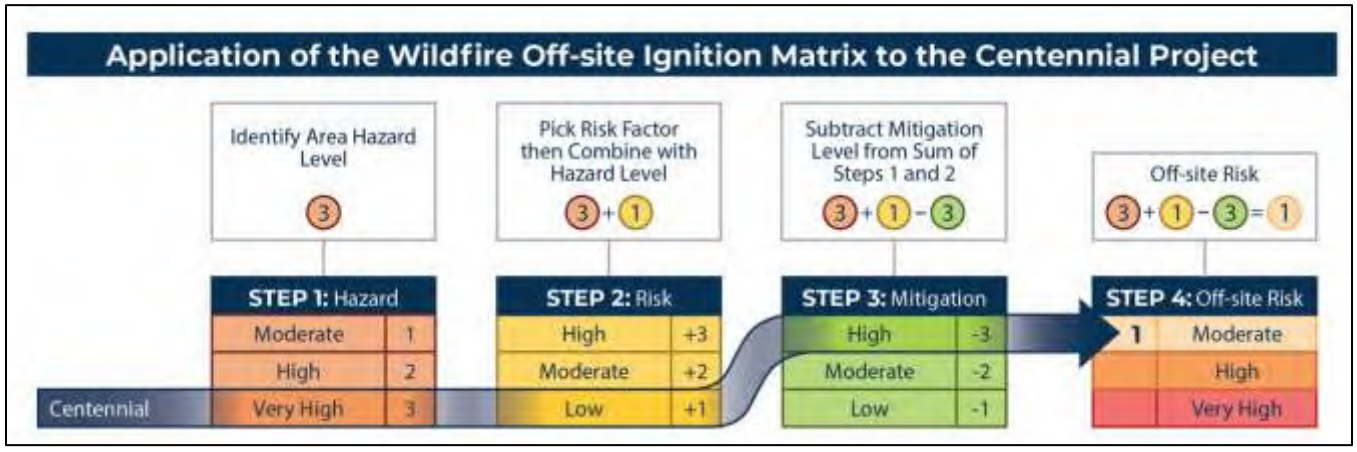
Step 4. Wildfire Off-site Ignition Risk Level: 1 = Moderate

Table 10. Wildfire Off-site Fire Risk Categories.

Ranking	Off-site Risk Level
WORL ≤ 1	Moderate
1 < WORL < 4	High
WORL ≥ 4	Very High

WORL = Wildfire Off-site Risk Level

The figure below provides a graphical representation of following the four steps to determine the Wildfire Off-site Ignition Risk Level.



Off-site Risk Ranking	Wildfire Off-site Risk Level
Ranking (1) ≤ 1	Moderate Risk

Moderate risk represents an acceptable level of risk based on the risk vs. mitigation evaluation. Note the description below from the USDA Forest Service[12] regarding moderate fire danger:

*When the fire danger is "moderate" it means that fires can start from most accidental causes, but the number of fire starts is usually pretty low. If a fire does start in an open, dry grassland, it will burn and spread quickly on windy days. Most wood fires will spread slowly to moderately. Average fire intensity will be moderate except in heavy concentrations of fuel, which may burn hot. Fires are still not likely to become serious and are often easy to contro*l.

Cal Fire[13] provides an explanation on the differences between the various fire hazard ratings:

Classification of a wildland zone as Moderate, High or Very High fire hazard is based on the average hazard across the area included in the zone, which have a minimum size of 200 acres. In wildlands, hazard is a function of modeled flame length under the worst conditions and annual burn probability. Both these factors generally increase with increasing hazard level, but there may be instances where one value is Very High and the other is low, pushing the overall hazard into a more intermediate ranking. On average, both modeled flame length and burn probability increase by roughly 40-60% between hazard classes. Classification outside of wildland areas is based on the fire hazard of the adjacent wildland and the probability of flames and embers threatening buildings.

As described above, this indicates that a moderate ranking would be significantly lower flame lengths and burn probabilities than high or very high, thus with the proposed mitigation measures for the project's building in these areas, an acceptable level of risk.

[12] USDA Forest Service, National Fire Danger Rating System, https://www.fs.usda.gov/detail/inyo/home/?cid=stelprdb5173311

[13] Cal Fire, Fire Hazard Severity Zones FAQs, https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones

5 Findings and Conclusion

Findings

Methodology development

Developing a method for determining the potential off-site ignition risk associated with a new development project involved considerable research, application of experience, and adoption of frameworks already in use in various forms. The evaluation process and method evolved over the course of several months during development, from an overly complex series of matrices utilizing numerous factors and limited to use by seasoned wildfire planning experts to a method and process that is based on the most commonly used guides for new community planning, i.e., the CFC, CBC, and/or the California Attorney General's Office Wildfire Guidance Best Practices. The evaluation process presented herein represents the culmination of the Dudek fire protection planning team's efforts, and while it would not be appropriate for use by an inexperienced person for evaluating a project's overall off-site ignition risk, it is considered useable by WUI-familiar fire prevention officers, fire protection planners, fire inspectors, fire-protection-focused foresters and landscape architects, and others, if they have demonstrated their experience evaluating wildfire hazards and mitigating them through proven and justified methods.

The method has been developed so that it provides a narrow possibility of achieving a Moderate off-site fire ignition risk if a project is located within a Very High FHSZ. In this case, a project would need to meet a very high bar for mitigating wildfire hazards as the only path to achieve a Moderate final ranking. It is far more common for projects to result in a High or Very High off-site ignition risk result than Moderate, unless the project provides a strategic, targeted set of mitigation measures addressing the primary ways that fire could ignite and move to off-site fuels.

Data support

The off-site ignition risk evaluation of the proposed Project included reliance on a vast amount of site-specific information, fire environment data, fire behavior and spread modeling, and extensive mitigations that will be provided above and beyond the strict code requirements. This information was available for this effort because the Project applicant made considerable investment to evaluate wildfire risk and needed protections as part of its planning process. As such, the Project bases its off-site risk analysis on supporting information provided within the (1) Project WSP; (2) Project Construction Fire Prevention Plan (3) Fuel Modification Plan; and (4) a Project Wildfire Evacuation Study. In addition, extensive analysis and modeling was conducted as part of an FHSZ remapping comment exercise, based on which CAL FIRE corrected their initial remapping of the site, downgrading much of the site from High and Very High to Moderate and High.

Project Ignition Risk Rating

Based on Dudek's technical review of the site and surrounding areas and development of a comprehensive wildfire ignition risk and risk reduction method, it is our opinion that the Project's off-site ignition risk of Moderate, as determined by the presented method, is accurate and supported.

Risk Reduction Measures

The following sections discuss off-site wildfire risk and mitigations that reduce the potential risk associated with the Project, a properly designed and carefully mitigated project.

Potential Changes in Off-site Wildfire Risk

Commercial and residential development brings more people, as well as construction and routine occupancy activities, to a project site. Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels unless proper prevention measures are in place. As described throughout this analysis, the Project includes comprehensive measures to prevent, protect, and contain on the Project site any potential on-site accidental ignitions. This section of the report is focused on the potential for increased risks of accidental off-site ignitions associated with commercial and residential construction and occupancy of the future Project, including the risk from airborne embers, a leading cause for structural loss and wildfire spread.

Additionally, there has been concern over structural fires from urbanized areas creating airborne burning embers, which can be transported large distances (in excess of 1 mile) downwind of a fire event. If the ember(s) remain viable, i.e., capable of igniting receptive fuels, a new fire can be ignited, and if that fire is within naturally occurring vegetation and the weather conditions are such that fire spread is facilitated, a wildfire may occur. This situation could lead to encroachment of wildfire on existing communities and residents. However, this potential has been contemplated and addressed during the Project wildfire hazard and risk analysis within the Project's EIR and Wildfire Safety Plan (Dudek 2024). The Project's layered design, construction, and maintenance requirements create a system of fire prevention and protection that minimizes the possibility of ember generation, which in turn minimizes the potential for off-site ember ignitions.

Mitigation Measures

Taken together, the fire prevention, suppression, and response measures incorporated into the Project and mandated by applicable regulatory requirements serve to adequately protect both on-site and off-site resources in the event of an on-site fire ignition, the most significant of which are as follows:

1. **Wide FMZ around the perimeter of the Project.** The Project's FMZ varies in width between 100 and 200 feet and would be improved with specified fire-resistant plant species at low fuel densities and subject to ongoing HOA-funded and applied maintenance. FMZs are also provided along all on-site roads and, as feasible, off-site roads. The strategic design and placement of FMZs works to disrupt fire spread, reduce fire intensity, and facilitate fire suppression within a landscape (Braziunas et al. 2021). This is true regardless of the direction a vegetation fire may be burning, whether toward a community or from within a community. The risk of a structure being destroyed is significantly lower when defensible space is implemented on both shallow and steep properties (Syphard et al. 2014). Even if just half the landscape is treated, the percentage of houses exposed to fire can decrease from 51% to 16% (Braziunas et al. 2021). Moreover, when FMZs are designed properly, they not only protect homes but also the surrounding environment. For example, when the Tahoe Basin experienced the Angora Fire in 2007, fuel treatments had the dual effect of saving homes and increasing forest survival (Safford et al. 2009). In areas where fuel management had been carried out prior to the Angora Fire, home loss was significantly reduced in the adjacent community, and 85% of the trees survived, as compared to the 22% that survived in untreated areas (Safford et al. 2009). Fuel management treatments also facilitated the ecological benefit of reduced fire severity, including higher post-fire soil litter cover, higher herbaceous plant cover, higher species diversity, and lower levels of invasive beetles (Safford et al. 2009). At a minimum, managing defensible space can reduce risk across multiple scales by dampening fire risk and reducing the impact of fire, and in turn reducing annual fire risk (Braziunas et al. 2021).

2. **Continued grazing of Project's open space.** Open spaces within the Project's interior and open edges will experience continual grazing following development of the Project. This will maintain the site's flashy fuels outside of developed and landscaped areas and will contribute to reduced fire hazard.
3. **Ignition-resistant structures.** All Project structures will be built to the CBC or California Residential Code ignition-resistant requirements that have been developed and codified as a direct result of after-fire save and loss assessments. Each facet of a building's exterior construction and appendages are addressed within Chapter 7A of the CBC and Section R337 of the California Residential Code, with a primary focus on requiring structures that can withstand heat, flame, and embers. The way to reduce a project's likelihood to cause a fire that may spread on- or off-site is to reduce the likelihood that the project's structural elements will ignite (Maranghides and Mell 2012; Calkin et al. 2014; Mockrin et al. 2020). There are two primary concerns for structure ignition: (1) radiant and/or convective heat; and (2) burning embers (NFPA 1144 2008 and IBHS 2008). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the WUI built to these codes have proven to be very ignition resistant, which significantly decreases the likelihood of home-to-home fire spread and minimizes ember production that could ignite the surrounding environment.
4. **Interior fire sprinklers.** All Project structures, of any occupancy type, will be protected by an automatic, interior fire sprinkler system. All automatic internal fire sprinklers would be installed in accordance with NFPA 13, 13D, or 13R and LACoFD installation requirements. Interior fire sprinklers are very successful at assisting responding firefighters by either extinguishing a structural fire or containing the fire to the room of origin and delaying flashover. This benefit also reduces the potential for an open space vegetation ignition by minimizing the possibility for structure fires to grow large and uncontrollable, resulting in embers that are blown into wildland areas.
5. **Ignition-resistant, planned, and maintained landscape.** All landscaping of Project common areas will be subject to strict fire-resistant plant types with those closest to structures requiring irrigation to maintain high plant moistures, which equates to difficult ignition and reduced fire spread. These areas are closest to structures, where ignitions would be expected to be highest but will be prevented through ongoing maintenance efforts.
6. **Undergrounding of power lines.** Power lines are a common concern with respect to human-caused wildfires (Syphard and Keeley 2015). These fires are often started by the arcing between lower-voltage supply lines during high-wind events. The Centennial Specific Plan and applicable County regulations require the Project to underground all electric utility lines, and new aboveground power lines are prohibited on the Project site. These restrictions will significantly reduce, if not eliminate, the likelihood that power lines serving the Project will cause on-site or off-site fires.
7. **On-site fire stations.** The Project will provide at least three, and up to four, on-site fire stations and will thus provide a robust response capability to the Project site and the region, where there are currently long emergency response delays due to the rural nature of the area. This response capability includes fast response throughout the Project site and surrounding open space areas, and a heavy response (number of engine companies) that can respond within a short timeframe. Attacking fires in their incipient stages is critical to fire suppression and controlling fire spread. Thus, the Project's provision of significant firefighting resources will greatly improve the ability to control and suppress all fires in the Project area, both on site and off site, compared to existing conditions.
8. **Water availability and fire flow.** The Project is required to provide water meeting fire flow for each of the Project's proposed land uses. Thus, water will be available to firefighters at any of several hundred (or more) fire hydrants distributed throughout the community. Water is a key to fighting most urban fires and keeping

them from inadvertently spreading on or off site. Water is also critical for fighting wildfires and keeping them small in size.

9. **Fire access roads.** The Project is required to provide access roads for firefighting apparatus. Project roads provide code-consistent access throughout the community. Better access to wildland areas would result in faster wildfire response and continuation of the fire agencies' successful control of wildfires at small sizes. Such access would also allow firefighters to better prevent the spread of on-site fires to off-site locations.

   The methodology used to assess the Project's potential impacts related to wildfire conformed to industry standard protocols and accepted data sets. The Project agreed to commitments designed to mitigate off-site fire risk in the Climate Resolve agreement, which would provide for Project and regional efforts to reduce wildfire risk. As confirmed by LACoFD at the hearing at which the Project was finally approved, developments, like the Project, that implement modern land use planning and hazard mitigation strategies can be safely sited in WUI areas without significant risk to the community or the surrounding environments. At Project approval, the Project's fire protection features went above and beyond applicable codes. Moreover, the Project approvals require the Project to comply with stricter fire code standards as they are updated in the future. Project compliance with such regulatory mandates will ensure that the community's structures will have the ability to survive a wildland fire with little intervention of firefighting forces. Moreover, the Project's fire safety design will adequately reduce its potential to cause structure fires that could result in off-site fire starts by incorporating modern, fire-safe construction materials and by significantly increasing fire services response capacity to the Project site and surrounding area. As such, the Project will adequately reduce on-site and off-site impacts associated with wildfire risk.

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Appendix A

Fire Protection Team Resumes

Michael Huff, RCA

PRINCIPAL

Michael Huff is founder and manager of Dudek's Urban Forestry/Fire Protection Planning team with 29 years' experience as a forester and fire protection planner. Mr. Huff specializes in management of community-wide and project-specific fire protection plans (FPPs), wildland–urban interface (WUI) fire management plans, wildfire hazard reduction projects, California Environmental Quality Act (CEQA) supporting technical documents, Oak Woodland impact and mitigation plans, urban and community forest management plans, forest and tree inventories, impact analysis studies, and tree hazard evaluations. Mr. Huff possesses considerable project issue resolution experience and focuses on working within the regulations to provide creative, cost-saving solutions to his clients. He routinely participates in public hearings, strategy sessions, and provides public presentations.

Education

Northern Arizona University
BS, Forest Management, 1992

Certifications

Registered Consulting Arborist (RCA), No. 640

Certified Arborist, No. WE-4276A

San Diego County Department of Planning and Land Use-Approved Fire Protection Planner

Laguna Beach Fire Department-Approved Fire Protection Planner

Certified Wildland Fire Ecologist

Professional Affiliations

American Society of Consulting Arborists

National Fire Protection Association – International

California Fire Chief's Association – Fire Prevention Officers

Sample Project Experience

Development

Otay Ranch Village 13 FPP, Baldwin & Sons/Moller, San Diego County, California. Managed this mixed-use master planned community Fire Protection Plan project. The project includes 1,938 residential units along with commercial, school, fire station, open space, recreational areas, and related infrastructure. The project is located within a very high fire hazard severity zone, and the FPP analyzed the site's hazards, determined overall risk, and mitigated that risk through project design features. The project included development of fuel modification zones, emergency response times, evacuation planning, and ignition resistant building construction specifications.

Point Molate Mixed Use Development, Argent Development, Richmond, California. Managed, wrote, reviewed, and coordinate the preparation of two emergency planning documents to satisfy project conditions of approval for the Point Molate project in Richmond, California. A Wildfire Emergency Response Plan that evaluated the potential wildfire risk for the proposed Point Molate mixed use community was prepared and made recommendations for addressing risk and providing for resident and fire department response. A second document, the Multi-Hazard Emergency Response Plan, was prepared to address the most likely natural- or human-caused disasters and the project's planned actions in response. This plan includes responses to earthquakes, tsunami, flooding, and other disasters and provides a framework for how the project would respond. Both emergency response plans include analysis and discussions of available response evacuation routes, discuss the potential for sheltering in place, and lay out mitigating measures that would be employed prior to these emergency situations as part of a pre-planning and readiness program. Presented at several public hearings to answer questions regarding the site's overall safety.

Otay Ranch Village 14/Adara FPP, Jackson Pendo Development, San Diego County, California. Managed this mixed-use master planned community. This 1,119 residential unit project includes a school, village center, fire station, related infrastructure, and open space/recreation areas. The project is located within a very high fire hazard severity zone and required comprehensive analysis of the site's potential hazards and overall wildfire risk. Dudek conducted analysis according to the San Diego County Fire Protection District guidelines that include fire behavior modeling, fire history analysis, emergency response travel time analysis, establishment of fuel modification zones, and requirements for code compliance and community fire safety.

Paraiso Springs Resort Fire Protection Planning, Paraiso Springs Resort, LLC., Soledad, Monterey County, California. Managed this hot springs resort project and provided authorship of a fire safety plan, evacuation plan, and an environmental impact report (EIR) wildfire section. Dudek's fire protection planning team performed a comprehensive review of the site's fire environment and developed approaches to address the hazards and reduce risk to acceptable levels. Provided support at several public hearings and answered questions regarding the site's safety for the planned use.

Confidential Ranch Fire Protection Planning, Confidential Client, San Diego County, California. Provides fire safety planning for a 25,000 plus acre ranch. Safety planning includes advisement on vegetation management, site activity restrictions during red flag warning weather conditions, improvements for fire fighter access, on-site fire response resources, and high-tech fire detection. In addition, coordination with fire agencies and familiarization with site resources, high risk areas, and assets is included in the scope.

Otay Ranch Villages 2, 3, 4, 6, 8, 9, and 10 Mixed-Use Projects, various clients, Chula Vista, California. Managed several Fire Protection Planning projects for Otay Ranch villages while coordinating with the Chula Vista Fire Department, project engineers, planners, landscape architects, and others; analyzing each site's risk potential; and customizing protection measures and features to result in fire safety projects receiving fire department acceptance. Among the tasks completed for the various projects are fire behavior modeling, emergency travel time response modeling, site plan reviews, site/field evaluations, digital data acquisition and review, and development of appropriate mitigating measures.

Sunset Crossroads FPP, MC Group, Riverside County, California. Managed this project which includes 5.3 million square feet of industrial and commercial space. The project is located within a high fire hazard severity zone. The project included developing appropriate measures to address the site's fire risk and confirming code compliance for access, building construction, emergency response, water availability, and related fire safety and protection requirements. In addition, Dudek prepared the wildfire section of the project's EIR, utilizing the results of the FPP to inform analysis regarding the four CEQA significance trigger thresholds.

The Junipers Age-Restricted Residential Development, Lennar Homes, San Diego, California. Managed the preparation of a comprehensive FPP and Evacuation Plan for this 550-unit project. Dudek's fire specialists performed extensive analysis of the fire environment and documented the project's compliance with enhanced fire safety requirements. In addition, Dudek provided extensive analysis of the ability to evacuate the area based on existing conditions and post-project, enhanced conditions, noting that the project provides additional options and capacity, resulting in a safer area than the current condition.

Hummingbird Nest Ranch FPP, Five S Properties, Ventura County, California. Prepared an FPP for this unique project that consists of a large ranch proposing site development to allow for on-site large events. The project's very high fire hazard severity zone location required careful consideration of the types of events and the restrictions and additional measures that would be required to enable the plan to proceed with an acceptable safety risk.

Murai Subdivision FPP, ColRich, San Marcos, California. Managed this 89 single-family unit project in San Marcos that resides within a high fire hazard severity zone. The project included constrained site characteristics that required development of prescriptive measures, including landscape and building hardening beyond code requirements to meet the intent of the code.

Murrieta Hills FPP, Pulte Homes, Murrieta, California. Managed and guided analysis, wrote the FPP, and coordinated with local fire personnel on this 750-unit residential master plan. The project required a code modification regarding dead-end road length with justifying measures to meet the intent of the code. Dudek performed a comprehensive analysis of the fire environment and prescribed a redundant system of protections to provide safe vehicle evacuation through the community to available evacuation routes while enabling emergency ingress. The project is within a very high fire hazard severity zone, and the site's wildfire risk was evaluated and addressed through site-specific design features.

Newland Sierra Master Planned Community FPP and Evacuation Plan, Newland Communities, San Diego County, California. Managed a team of fire protection planners to prepare this comprehensive FPP. The plan followed San Diego County Guidelines to evaluate the potential fire risk and address it such that an acceptable level of risk was achieved. Deer Springs Fire Protection District and San Diego County accepted the plan and approved the project. Provided reviews and authorship of the EIR wildfire/hazards sections, responded to comments, and spoke at public meetings to resolve questions and misinformation regarding the project's fire safety and provisions.

Sky Ridge Community Fuel Modification Zone Inspections, D.R. Horton, San Bernardino, California. Provided oversight and managed this project that included inspection of existing fuel modification zones in a very high fire hazard severity zone. Dudek's fire protection specialists inspected the perimeter fuel modification zones and documented issues. A report indicating where issues were noted and how they could be mitigated was prepared.

Emerald Heights Fire Safety Inspections, Emerald Heights Property Management, Escondido, California. Dudek provided two rounds of fire safety inspections of the Emerald Heights community. The inspections focused on perimeter fuel modification zones, evacuation route road-side vegetation management, and internal green space species inclusion and maintenance practices. Dudek prepared summary reports and attended community meetings to discuss the results and findings and to further define the recommended actions to improve fire safety.

Hidden Valley Ranch FPP, Shea Homes, Escondido, California. Managed this 179 single-family residential development project FPP. The project included customized fuel modification zones and incorporation of maintained avocado groves as part of the defensible space area.

Costco FPP and EIR Wildfire Chapter, Costco Corporation, Murrieta, California. Managed and guided an FPP for a planned Costco in a WUI area, specifically providing protection features for a reduced fuel modification zone area. Provided quality assurance/quality control (QA/QC) for the project's EIR wildfire chapter.

Hitch Ranch Residential Development FPP, Comstock Homes, Camarillo, California. Managed the preparation of an FPP for this 328 single-family home community. Dudek evaluated the site fire risk, product type details, access, water and fire flow, and provided mitigation for project components that were not code conforming.

Fairview Residential Development FPP, D.R. Horton, Bonsall, California. Provided project management, fire district coordination and interface, section preparation, review, and final QA/QC for the Fairview project. The project is a 73-unit detached condominium project that included outdoor living rooms. Special considerations were required to achieve code intent regarding fuel modification zones and setbacks.

Hidden Oaks Country Club FPP and Fuel Modification Plan, Hidden Oak Country Club, Chino Hills, California. Managed and prepared an FPP and Fuel Modification Plan for this 35-unit residential project in Chino Hills. Proposed approaches to resolve access issues and move the project forward. Fuel modification zones exceeding the local fire authority requirements were proposed due to the site's unique fire risk.

Stoneridge Commerce Center FPP, Richland Properties, Riverside County, California. Managed the preparation of a comprehensive FPP for the Stoneridge Commerce Center, which includes 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. Provided client coordination, QA/QC review of all submittals, and budget and timeline management.

Wildland Fire Management Plan, Nature Reserve of Orange County, California. Managed and was primary author of a wildland fire management plan for the 36,000-acre preserve located on the Irvine Ranch from Laguna Beach and extending to Anaheim Hills. The project included extensive stakeholder outreach and coordination of the 38 stakeholder agencies. Goals of the plan were to minimize fire ignitions, protect natural resources, protect private property assets neighboring the Reserve, and prepare a guidance document that was implementable and included realistic measures for reducing fire frequency and impacts.

Oak View Estates, Third-Party Fire Plan Review, Michael Baker International (for City of Bradbury), Bradbury, California. Managed a residential project in the very high fire hazard severity zones of Bradbury and provided final review of a consultant-prepared FPP and QA/QC of the comment letter.

Third-Party Review of Assembly Bill 68–Accessory Dwelling Unit Law, City of Bradbury, California. Managed a team of retired fire prevention officers' review of Assembly Bill 68 as it applies to Bradbury. Was final author of the letter report indicating issues with the law and how it may impact Bradbury's residents' fire safety. Provided two City Council updates, including the final results presentation.

Fairmont Fire Station Fire Fuel Load Modeling Report, City of San Diego, California. Managed the preparation of a Fire Fuel Load Modeling Report and Brush Management Plan for a proposed fire station site within a high fire hazard severity zone. The project included evaluation of the fire hazards and overall risk and appropriate measures, including brush management and vertical, non-combustible walls, to protect the station from wildland fire.

Monarch Hills Residential Development, Richland Real Estate Fund, LLC, Fontana, California. Managed the preparation of an FPP for the 472-unit project in Fontana. Provided fire protection analysis along with coordination with the Fontana Fire Department towards completion of the project's FPP. The project is within a very high fire hazard severity zone and included several potential site plan issues that Dudek helped resolve through site plan changes and alternative materials and methods.

The Ranch at Laguna Beach Fire and Evacuation Planning, Laguna Beach, California. Provided an evaluation of fire safety at the site's event venue and golf course. Located at the ocean end of Aliso Canyon in Orange County, the interior portions of the project are located in areas considered very high fire hazard severity zones in Laguna Beach. The event venue would host large gatherings and required evaluation for fire safety and moving people quickly out of the area. Dudek's analysis provided steps that would increase efficiency during evacuations, prepare the site for the types of fires that could occur in the area, and reduce risk to acceptable levels.

West Oaks Residential Project FPP, Integral Communities, Carlsbad, California. Managed the preparation of an FPP for this 209-unit development. Site constraints required a creative approach to fuel modification zones, their configuration, allowable plant species, and required maintenance.

LaMoree Residential Development FPP, Integral Communities, San Marcos, California. Led Dudek's fire protection planners in the evaluation of this 8-unit project within a fire hazard severity zone. The FPP addresses the site's unique fire risk and provides for structural hardening, water supply, access, fuel modification, and emergency response.

Fanita Ranch Master Planned Community Project FPP and Evacuation Plan, HomeFed Corp., Santee, California. Managed the preparation of this comprehensive FPP. The project is a 2,638-unit development with a village core, fire station, school, agriculture, parks, trails, and related infrastructure. The FPP is a robust document that identifies the potential wildfire risk at the site and then defines and provides specifications for addressing the risk to acceptable levels. The project's evacuation plan provides future residents with a toolkit for preparedness and awareness so they are familiar with the potential evacuation declarations and actions they may need to take.

Post-Wildfire Landscape Assessments, AIG Insurance, Santa Barbara, Poway, and Rancho Santa Fe, California. Managed several projects involving the post-wildfire landscape assessments and loss valuations. The projects included landscape inventory with GPS technology, assessments of plant material for damage level and anticipated recovery, and appraised loss value calculations.

North River Farms, Integral Communities, Oceanside, California. Managed this residential development project FPP that included conversion of agricultural fields in a high fire hazard severity zone along the San Luis Rey River to a community of 689 lots with retail, fire station, parks, and infrastructure. The project required evacuation planning and prescription of appropriate fire safety features customized for the site. In addition, emergency response modeling was conducted and determined that existing stations could not serve the project in sufficient travel times, and an on-site station was proposed that included a reduced staffing model for a temporary period.

Harmony Grove Village South Fire Protection and Evacuation Plan, Harmony Grove Village South Partners, LLC., San Diego County, California. Project manager, lead fire protection planner, and primary author of this comprehensive FPP for a 554-unit project. The project required a modification for dead-end road length, and a package of 27 features was developed for justifying the modification as meeting the intent of the code. Worked with County fire planners, Rancho Santa Fe Fire Protection District fire prevention officers, and third-party fire operations experts to gain confirmation that the project would be safe and meets the code intent. The project can be considered a shelter in place community due to its robust wildfire hardening and improved evacuation capabilities.

Rio Estrella Residential Development FPP, California West Communities, Bonsall, California. This 93-lot subdivision encircling the Bonsall Elementary School included fire hazards requiring mitigation through design features. Mr. Huff coordinated with the North County Fire Protection District to address reduced fuel modification zones by requiring additional structural hardening and fire protection features. The project's FPP documented the site's risk and how it is addressed and guides future maintenance.

Ocean Breeze Residential Development Wildfire Evacuation Plan, Helios Property Solutions, Bonsall, California. Dudek provide a comprehensive evacuation plan for this 396 single-family home development in a very high fire hazard severity zone. The evacuation plan calculated the project area's evacuation timing currently and with the project and laid out steps the project would take to result in a prepared and aware population. The evacuation plan also contemplated the ability to refuge residents and area citizens on-site at various locations if there was not time to evacuate. Mr. Huff managed the project, wrote the evacuation plan, and presented it at the local planning group.

Valiano Residential Community Evacuation Plan, Integral Communities, San Marcos, California. Managed and was primary author of an evacuation plan for this 325-unit residential project. The evacuation plan focused on determining the project's ability to evacuate given available evacuation routes and planned enhancements. The road capacities were evaluated against the project's population numbers to determine the timing to move all residents out of the area. The evacuation plan was accepted by the local fire agency.

Lake Point FPP, Integral Communities, Chula Vista, California. Managed and authored this FPP for this mixed-use, multi-family condominium project in Chula Vista. The FPP evaluated wildfire, fire access, water and fire flow, and fire response, amongst other fire safety details, and provided recommended enhancements to improve the project's safety and defensibility.

Portola Parkway Residential Development FPP, Baldwin & Sons, Lake Forest, California. Dudek prepared a comprehensive FPP and fuel modification plan for this project in a very high fire hazard severity zone. Mr. Huff developed a habitat-based approach to the fuel modification zones, incorporating cactus wren (*Campylorhynchus brunneicapillus*) habitat in the form of prickly pear cacti to result in a functional equivalent fuel modification zone with habitat benefits. The FPP included evaluation of all fire environment hazards and development of unique and site-specific measures and design features to provide for public safety.

Olympic Pointe FPP, Integral Partners, Chula Vista, California. Managed this project's FPP to provide a fire safe community for the 423 planned units. The project is located within a high fire hazard severity zone and required analysis of the fire environment and related risk factors to determine if it required any additional measures for fire safety. The FPP provides a detailed documentation of the site's hazards and overall risk and how it is mitigated to acceptable levels.

Cheyenne Residential Development, MLL Investments, Santee, California. Prepared an FPP with alternative materials and methods for fire protection due to constrained fuel modification zones. The project is located within a very high fire hazard severity zone, and the FPP documents and analyzes the risk and provides appropriate features to mitigate the risk to acceptable levels.

PETCO Headquarters Wildfire Risk Assessment, PETCO, San Diego, California. Performed a site assessment of the headquarters' grounds to determine the potential wildfire vulnerability and provide recommendations to reduce the potential threat. Among the recommendations were active maintenance of unmaintained fuels on slopes, enforcement of smoking policies and use of butt receptacles, and regular maintenance of palm tree petticoats throughout the site.

Oak Tree and Woodland Inventory and Evaluations, NBC Universal, Hollywood, California. Participated in the inventory, mapping, and evaluation of oak trees and oak woodland on the Universal Studios Site in Hollywood. Proposed development on the site required preparation of an EIR, and Dudek's oak woodland management plan is a technical appendix of that document. Dudek provided impact analysis along with a comprehensive mitigation program.

Oak Tree Evaluations and Arborist's Reports, City and County of Santa Barbara, California. Managed and participated in several native oak tree arborist's reports in the City and County of Santa Barbara. The projects are primarily related to single-family residence construction within an oak woodland or near oak trees. Arborist's reports that addressed existing conditions, anticipated impacts, and mitigation measures according to local policies and ordinances were prepared.

Landscape Oak Tree Health Assessments and Recommendations, Sycuan Indian Reservation, San Diego County, California. With his team, evaluated declining oak trees for their health and prognosis throughout portions of the parking lots at the Sycuan Indian Reservation's Casino. Noted that pre-construction tree protections were minimal and that has led to the current decline. Mitigation measures designed to stabilize the tree decline and improve health, where possible, were provided in an oak tree arborists report.

Native Forest Preservation and Management Plans, Rutter Development, Eastbridge Partners, and The Irvine Company, Orange County, California. Managed multiple projects, including wildland oak and other native tree inventory, mapping, and assessment; project impact analysis, mitigation, revegetation, and monitoring plan preparation; and agency coordination and interaction. Projects include Saddle Creek/Saddle Crest, Rancho Potrero Leadership Academy, and Sakaida Nursery–all located in Orange County; Canyon Crest–City of Brea; Martin Ranch–City of San Bernardino; Areas 1, 2, 3, and 4–Eastern Orange County; and Mountain Park, City of Anaheim Hills. Most of these projects include large populations of native coast live oak trees, some of which are impacted by development.

Great Oak Management Plan, Golf Course Oak Tree Relocation Assessment, Pechanga Indian Reservation, Riverside County, California. Managed and performed technical analysis of the Great Oak management plan project at the Pechanga Indian Reservation. The Great Oak is the largest coast live oak (*Quercus agrifolia*) in California. Among the findings, Noted that the tree is younger than formerly estimated, the tree is in good condition, and the proposed plans to provide increased tourist access require a set of management guidelines to minimize impacts. In addition, over 2,000 native oak trees were inventoried, mapped, and assessed for relocation potential related to the footprint of a proposed golf course. Many of the oak trees were boxed and relocated during construction of the golf course. Of note, Dudek inventoried the only native valley oak known from Riverside County, and it was preserved based on our recommendations.

Native Oak Tree Inventory and Impact Analysis, Tierra Development, Santa Clarita, California. Provided on-site evaluation of native oak trees and prepared an oak tree report according to Santa Clarita and Los Angeles County tree protection ordinances. Based on the proposed project, several of the scrub oak on site would be impacted, and as such, a mitigation program providing equivalent offset was provided within the oak tree report.

Oak Tree Protection, Via Roble Affordable Housing Site, Trinity Housing Group, Escondido, California. Identified for preservation a stately and mature oak tree that had been encroached upon by a mobile home park. The tree is the focal point of the affordable housing project in downtown Escondido. Provided tree protection measures; monitored the tree during demolition of existing, and construction of new, structures; and provided public relations presentations regarding the tree.

Oak Tree Inventory and Evaluations, Various Clients, Southern California. Performed large- and small-scale evaluations of oak trees in communities throughout Orange, San Diego, and Riverside counties. The oak trees have typically been incorporated into development landscaping, and due to horticultural issues, were not performing well. Provided maintenance specifications and tree-by-tree recommendations for improving tree health.

Oak Tree Impact and Mitigation Report, Vista Hacienda, Vista, California. Provided a complete oak tree study on the site identifying tree locations related to the proposed project footprint, potential impacts, measures to reduce or avoid impacts, and proportional mitigation for impacts. An arborist's report was prepared for the project and included as a technical appendix of the project's EIR.

Sycamore Ranch, William Lyon Homes, Fallbrook, California. Oak trees preserved by project developers were in failing health but were desired for golf course features. Provided specific recommendations for improving tree health and monitored the trees over the course of nearly two years. The trees' condition improved throughout the course of the project, and they remain important landscape features on the Sycamore Ranch Golf Course.

Lincoln Ranch, Lincoln Properties, Murrieta, California. The site for a proposed new residential development in the City of Murrieta in Riverside County had extensive mature native trees. Inventoried, assessed, and appraised a total of 260 native trees were according to International Society of Arboriculture standards. The trees' positions were digitally captured and descriptive data digitally stored with the use of Trimble Pro-XL, a global positioning and data collection system. This digital data was then electronically transferred to AutoCAD for creation of tree base maps. The trees are located in an agricultural area proposed for development. The appraised value of the 260 trees is $815,000. GPS positioning allows the project developer to design grading plans that do not disturb the valuable native tree resources on site.

Vista Valley Country Club Oak Tree Evaluation, Vista Valley Country Club, Vista, California. Provided assistance with the golf course trees as many of the feature oaks were declining. Recommendations were made to reduce tree decline rates and provide for future forest as senescent trees were lost.

Oak Tree Impact Evaluation, Hidden Meadow Golf Course, Escondido, California. Evaluated the potential impacts from a proposed project on an existing golf course. A total of 160 native oaks were within the vicinity of the project. Determined that none of the trees would experience direct impacts and that anticipated indirect impacts could be mitigated to insignificant.

Oak Tree Health Evaluation, Rainbow Propane, Rainbow, California. Evaluated 40 native oak trees and provided the project owner with a summary report. The trees ranged from good to dead with most trees falling within the poor or fair categories. Many of the trees had been impacted by wildfire or were declining due to root or trunk rot.

EIR Technical Appendices Oak Tree Report, Greystone, Calimesa, California. Prepared a tree management plan in support of a planned community development EIR in Calimesa. The site included several hundred native oak trees, some of which were within the proposed project footprint and required appropriate mitigation measures. Dudek prepared a mitigation plan that meets local and state requirements to support the project's construction.

Great Park Tree Inventory and Assessments, Former El Toro Marine Corp Air Station, Irvine, California. Participated in tree inventory and data collection for several thousand trees located on the former El Toro Marine Corp Air Station. The Station was designated the site for the Orange County Great Park and many of the mature trees throughout the base and the base housing were identified by Dudek for preservation or relocation. Dudek provided oversight and monitoring of the trees for relocation and preservation through build-out of the park.

Tree Inventory, Impact Analysis, Mitigation Plan Arborist Report, Acacia Creek, Covina, California. Provided urban forestry services pertaining to potential impacts to mature trees and native oak trees within an impact sphere of the project's planned expansion. Dudek provided specifications to project engineers and planners for measures to avoid native oak impacts through grading alterations and provided a mitigation plan acceptable to the City of Covina for anticipated tree impacts. The resulting tree management plan was included in the project's overall mitigation measures and conditions of approval.

Community Forest Management Plan, Turtle Rock Pointe Homeowners' Association, Irvine, California. Provided tree inventory, tree mapping, and a comprehensive management plan detailing necessary facets of tree population management. Among the components of the management plan were species diversity, tree maintenance, trim cycle management, pest and disease management, water management, tree removal and replacement, and infrastructure conflicts.

Sunrise Residential Project Emergency Response Analysis, Integral Communities, San Marcos, California. Managed this project and prepared an analysis of the project's location and nearest fire station response times. Modeling included use of Network Analyst in a geographic information system (GIS) platform to determine the total travel time for each project lot. The goal was to show that the lots could be responded to within the San Marcos Fire Protection District's internal response time standards.

Meadowood Emergency Response Travel Time Analysis, Pardee Homes, Fallbrook, California. Managed this GIS analysis of response travel times to all project lots using customized models and response speeds to determine how many of the project's lots are within a 5-minute travel time from the nearest stations. The project included utilizing various approaches and methods and various routes and providing a visual, GIS created graphic to illustrate results.

Community Tree Management Plan, Turtle Rock Garden Homes, Irvine, California. Provided tree inventory, tree mapping, and a comprehensive management plan detailing necessary facets of tree population management. Among the components of the management plan were species diversity, tree maintenance, trim cycle management, pest and disease management, water management, tree removal and replacement, and infrastructure conflicts.

Tree Inventory and Arborist's Report, Stewardship Foundation, Escondido, California. A proposed senior living center on a vacant, treed parcel required the inventory, mapping, impact evaluation, and mitigation plan preparation within an arborist's report. Provided a comprehensive plan to avoid high quality trees, relocate trees that were worth relocating, and remove trees that were considered of low quality or little benefit.

Whittwood Mall Beautification Project, EPT Landscape Design, Whittier, California. Evaluated several hundred mature trees for their relocation desirability. The trees comprised much of the initial mall landscaping and are now, some 40 years after planting, slated for removal as part of a mall revitalization project. Approximately 110 of the trees were identified as relocation candidates.

Arboricultural Assessment, Inventory, Impact Analysis, and Mitigation, Leo Baeck Compound, Los Angeles, California. Managed this project which included site facility expansion. Numerous mature landscape and native trees occur throughout the site and would be impacted by the expansion. Dudek's report findings concluded that tree removal was consistent with applicable regulations subject to suitable mitigation, which was defined in the project's arborist's report.

Third-Party Review of Arborist Report for proposed Home Depot Project, Fontana, California. Reviewed the arborist report prepared by another arborist and commented on inadequacies. Recommendations included the following: include greater detail on protection measures; include greater detail on replacement tree sizes and planting techniques; perform closer evaluation of preserved windrow trees due to their tendency to become less stable when adjacent trees are removed; and include greater detail on parking lot trees within the report so net mitigation is easily discernible.

Northwood 5 Tree Evaluation, The Irvine Company, Irvine, California. Project manager for this evaluation of eight eucalyptus windrows in the Northwood 5 development of Irvine and the adjacent Hicks Canyon Wash. Inspected each tree in the eight windrows and prepared recommendations for which ones should be removed because of health, structure, or hazardous conditions. In addition, provided specifications for removal, pruning, irrigation, and maintenance, and supervised the tree removal. Additional services included recommendations of techniques for tree protection during and after construction, and providing a complete eucalyptus tree maintenance plan. This project involved close cooperation with the Orange County Environmental Management Agency.

Market Place Eucalyptus Windrow Inspection, Irvine Apartment Communities, Irvine, California. Project manager for an inspection and report of the condition of a windrow of 57 blue gum trees (*Eucalyptus globulus*) that formerly had served as a windbreak for crops, but was now on a site slated for development. The developer wished to retain as many of the trees as possible. Project tasks included tree inspection, coordination with site engineers and landscape architects, report compilation, and a review of the tentative grading plan for construction impacts to the trees, along with suggestions for mitigating possible impacts.

On-Call Fire Plan Review/Third-Party Consultant, Orange County Fire Authority, California. Provides as-needed review of fuel modification plans and provides special studies regarding alternative materials and methods for the Orange County Fire Authority. To date, Dudek has provided review and comment of fire behavior modeling and proposed fuel modification and structural hardening for a large, master planned community in southern Orange County. Also involved with research and preparation of a report on the efficacy of utilizing water cannons as an alternative for full fuel modification width.

Tustin Ranch, Irvine Community Development Company, Tustin, California. Served as project manager for multiple projects spanning a 5-year period involving eucalyptus plantation and windrow trees on a large site being developed into residential and commercial development. Projects included an analysis, written report, recommendations, contract specifications, assistance in the bid selection process, and supervision/inspection of contractor work. One of the projects was analyzed for fire and hazard management on a site containing over 20,000 trees with various understory growth, including coastal sage scrub. Recommended tree removal, tree pruning, understory management, plant density, and crown heights. Additionally, identified individual trees to be preserved, delineated preservable stands and fuel modification zones, recommended an irrigation system and scheduling, and provided demolition specifications. Recommendations considered tree protection, fire prevention, grading/construction plans, viewshed, tree health, structural hazards, aesthetics, and density. Another project involved evaluation of 1,656 eucalyptus trees on a 200-acre site, including numbering/tagging each tree and recording detailed information. Removals, pruning specifications, hazard reduction, and construction techniques were recommended.

FPP Third-Party Review, Rancho Cielo Shelter-in-Place Community, Rancho Santa Fe Fire Protection District, California. Provided third-party review of an existing FPP for the Cielo community. The existing plan was outdated and required updating according to new codes and new industry findings. Dudek confirmed fire behavior modeling results and provided updated language throughout the procedural manual which is distributed to Cielo homeowners.

FPP, Bella Vista Residential Development, Encinitas Fire Department, California. Prepared an FPP providing "same practical effect" justification for reduced fuel modification width on this ridge top project in Encinitas. Sensitive biological habitat constrained the possible disturbance area. Coordinated regularly with the fire marshal, attending on-site meetings to discuss the results of fire behavior modeling and the proposed measures to offset fuel modification. The FPP was approved by the fire department and enabled construction of two additional luxury homes that would not have been possible otherwise.

Fuel Modification Zone Analysis and Fuel Management Program Development, Various Developers, Orange County, California. Managed various fuel modification plan projects for a residential development in Orange County. Field assessments of existing vegetation types and fuel loads were followed by fuel model input and scenario outputs. In addition, managed the preparation of conceptual and precise fuel modification plans meeting Orange County Fire Authority guidelines.

On-Call Fire Consulting, Laguna Beach Fire Department, California. Provides as-needed consulting to the Laguna Beach Fire Department. Among tasks requested are site fire risk assessments, vegetation hazard assessments, shelter-in-place assessments, red flag warning action plans, and fuel reduction monitoring and inspections.

West Coyote Hills FPP and Assessment, Chevron, Fullerton, California. Manages the preparation of an FPP for a 500-acre, 1,600-unit planned community in Fullerton. The project includes WUI, and based on the fire behavior assessments and analysis on the site, proposed reduced fuel modification in areas that include reduced fire intensity. The net result of the proposed fuel modification zones is a reduction in native habitat impacts with fire behavior modeling backed justifications for the reduced impacts.

Barona Oak Tree Health Assessment and Recommendations, Barona Golf Course, California. Provided assessment and recommendations for improving the declining conditions of relocated native oak trees. Tree conditions improved steadily following implementation of Dudek's recommendations. Approximately six months after the project ended, wildfire encroached onto the golf course and damaged several trees. After revisiting the trees, further specific recommendations for minimizing decline and maximizing tree life expectancy were provided.

Fuel Modification Zone Analysis and Fuel Management Program Development, Various Developers, Orange County, California. Assisted a wildland fire ecologist on several residential development projects in Orange County. Field assessments of existing vegetation types and fuel loads were followed by fuel model input and scenario outputs. Fuel management programs that justified deviations from the Orange County Fire Authority standards were provided, along with agency coordination and meeting attendance.

Onyx Ridge Residential Development, Latitude 33, Rancho Santa Fe, California. Prepared a shelter-in-place FPP for this residential development project in Rancho Santa Fe. The project included development of nine residential units on a ridgetop with one access. Mitigation measures were integrated into the FPP to compensate for the access issue. Coordinated regularly with the Rancho Santa Fe Fire Protection District and the client through project approval.

Camp Expansion FPP, Salvation Army, Ramona, California. Managed and prepared an FPP for this 600-acre project site. The Salvation Army proposes facility expansion to include several new structures, including large multi-purpose facilities. The FPP outlines several customized mitigation measures for the site to compensate for the sole access identified as a key project issue. The project included FlamMap fire behavior modeling, site assessment, code review and application, customized fuel modification zone development, structural fire protection system recommendations, and planned infrastructure summaries.

Cross Creek Residential Development, Fallbrook, California. Managed and prepared an FPP letter report, per San Diego County format, for a 10-unit residential project in the community of Fallbrook. The FPP supports the project's EIR as a technical appendix. Coordinated with the local fire protection district, the client, the consulting team, and the County of San Diego Department of Planning and Land Use Fire Services through FPP approval.

Master Planned Community FPP, Confidential, Southern California. Assembled a fire protection planning team anchored by Dudek and Hunt Research on this 26,000-acre project site in Southern California. Authored the report, integrated subconsultant input, provided presentations to fire department personnel, managed fire behavior modeling using FlamMap, and worked closely with project biologists to minimize ecological impacts while providing fire protection.

Master Planned Community FPP, Confidential Project, Southern California. Revised, updated, and re-wrote an existing FPP based on a revised project footprint and updated fire and building codes. The FPP includes documentation of all fire protection features that will be provided for this community. Key issues included road width reductions, fire response travel times, fuel modification plant palettes, and fire station construction.

Master Planned Community FPP, Confidential Project, Los Angeles County. Managed and authored an FPP for a 12,000-acre project site in Los Angeles County. The FPP provided scientific data to support recommended fire protection features, fuel modification widths, and fire station locations for this new community. The FPP was not a requirement of the local fire department but was prepared to provide a single source for the numerous fire protection related components of this large community.

Master Planned Community FPP, Yokohl Ranch, Tulare County, California. Prepared an FPP for this 36,000-acre project site near Visalia. The FPP summarizes the site's current conditions, fire history, overall risk of wildfire, anticipated fire behavior, and required and recommended fire protection features. The site includes grasslands, chaparral, oak woodlands, and mixed conifer forest fuel types.

FPP for Hotel Resort Community, Aliso Creek, Laguna Beach, California. Managed this project to prepare a comprehensive FPP for a resort community within a very high fire hazard severity zone in Laguna Beach. The FPP included justifications for reduced fuel modification zones based on environmentally sensitive habitat area constraints. The use of shelter-in-place and water cannon technology are included as alternative materials and methods for non-conformances.

Master Planned Community FPP, Merriam Mountains, NNP, Stonegate Merriam LLC, San Diego County, California. Served as the fire protection planning team coordinator, leading a 6-person team of experienced fire protection planners with over 150 years of combined experience. Re-wrote and augmented the existing FPP, provided FlamMap fire behavior modeling to represent the pre- and post-project fire behavior predictions, and assembled additional reviewers with statewide recognition who ultimately endorsed the FPP. The originally stalled FPP was approved by the county fire services section following this strategically implemented process.

Fuel Modification Plans, Restoration Area FPP, Newhall Land, Santa Clarita, California. Provided support on this project which included preparation of conceptual and precise fuel modification plans for proposed residential development. The project also included assessment of a proposed sensitive species restoration site and pre-plans for fire department response to minimize damage to the restoration area.

FPP, Residential Development, Malibu, California. Managed and provided oversight and QA/QC for two FPPs in the City of Malibu. The FPPs provided single-source technical appendices of the project's EIR where all fire protection related information was summarized. The FPPs addressed structural ignition, water availability requirements, sprinkler requirements, roads/fire access, and fuel modification.

Post-Burn Oak Tree Evaluations, Mountain Park Development Site, Anaheim, California. Participated in this study of a large development site following the Sierra Fire in Orange County. Many of the site's oak trees were damaged by the wildfire, and Dudek conducted a post-burn analysis that documented oaks that were killed, moderately damaged, and minimally damaged. Dudek provided recommendations for tree management and restoration.

Post-Burn Oak Tree Assessments, Proposed Development Project, Trabuco Canyon, Orange County, California. Conducted a post-wildfire oak tree evaluation for approximately 200 oak trees occurring within a proposed project site. The oak trees were damaged by the Trabuco wildfire and varied from completely killed to minimally scorched. Dudek provided a narrative and photographic summary of the site as well as recommendations for recovery of some of the trees and potential restoration for areas most severely damaged.

Wildfire Hazard Assessment and Community Wildfire Protection Plan, Rancho Santa Fe Association and Fairbanks Ranch, Rancho Santa Fe, California. Provided assessment and recommendations for a 100-acre area that was previously burned in the Witch wildfire. Several homes were lost, and that prompted the associations to assess the hazard and develop recommendations to reduce the hazard. Dudek conducted fire behavior modeling using FlamMap to graphically display the priority areas and provided recommendations to reduce the hazard. Dudek also prepared a community wildfire protection plan for the area that was accepted by the FireSafe Council. This plan has been submitted with a grant application for fuel reduction funding.

The Enclave at Ivanhoe Ranch Residential Project FPP, PV Ivanhoe, LLC, San Diego County, California. Managed this FPP project which evaluated and designed appropriate fire protection features for a 119-unit residential dwelling unit project in a very high fire hazard severity zone. The project included evaluation of emergency fire and medical response, defensible space, water and fire flow, fire access, evacuation, and code consistency.

Education

University Innovation District, City of Chula Vista, California. Managed and was lead author of this FPP for a university campus and supporting academic uses, student housing, a research and development park, and public infrastructure (e.g., streets and utilities) to serve the proposed project. The project included analysis of appropriate wildfire protections as well as determining appropriate emergency response configurations from nearby fire stations.

University of California, San Diego Fire Protection Planning Study, University of California, San Diego Planning Department, La Jolla, California. Prepared a Fire Protection Planning Study to support the University of California, San Diego Long Range Development Plan (LRDP) process. The study evaluated the site's fire risk, which includes a large eucalyptus forest and native chaparral and coastal sage scrub landscapes, along with laying out best practices for fire protection. As the LRDP is realized, the fire protection measures and features defined in the Fire Protection Planning Study document will be used to guide fire safety requirements.

San Diego State University Campus Housing FPP, San Diego State University, California. Managed and was primary author of this FPP for new campus housing located next to a wildland canyon. The FPP addresses the potential fire risk and delineates fuel modification zones and building requirements for ignition resistance.

Santa Barbara Botanic Garden FPP, Santa Barbara, California. Managed the preparation of an FPP for the proposed botanic garden expansion. The FPP included site-specific fire behavior modeling, analysis of the option for on-site sheltering, and addressed all fire protection features that would be provided for the site's structures. Fuel modification was customized for this site based on the site's terrain and expected fire behavior.

Santa Barbara Museum of Natural History FPP, Santa Barbara, California. Was primary author and managed this FPP for the proposed expansion of the museum of natural history. The FPP addresses the site's unique fire hazards and guides future expansion, including considerations for evacuation, restricted on-site populations during Red Flag Warning weather, and provisions for defensible space.

Bonsall Unified School District New High School Fire Protection and Evacuation Plan, Bonsall, California. Lead author, fire protection planner, and manager of this project to assist the Bonsall Unified School District with fire safe planning for a new high school within a high fire hazard severity zone. The FPP documented the fire environment, related hazards, and overall fire risk while specifying safety features and measures that would result in low overall fire risk and the ability to shelter in place if considered safer than evacuating. Provided input on the EIR's wildfire chapter, responses to comments, and overall fire- and evacuation-related planning.

Site Fire Hazard Inspections, Red Flag Warning Action Plan, and Fuel Modification Monitoring, Anneliese's School's Willowbrook Campus, Laguna Beach, California. At the request of the Laguna Beach Fire Department, was retained to provide site-wide assessment of wildfire vulnerability. The site assessment included evaluations of vegetative fuels, structural composition, fire protection systems, combustible storage on site, ignition sources, and school location. Among other facets of this project, a red flag warning action plan was devised to close school during extreme fire weather days, an emergency preparedness plan was prepared to guide evacuations during various scenarios, and a structural retrofit timeline was put in place to increase the ignition resistance of the main administration building.

Laguna College of Art and Design Emergency Response and Evacuation Plan, Laguna College of Art and Design, Laguna Beach, California. Managed and authored the Emergency Response and Evacuation Plan (EREP) for the Laguna College of Art and Design (LCADD) several campus locations within Laguna Canyon. Chapters address the top several potential natural disasters or human-caused emergencies with appropriate actions that should be taken prior to, during, and following each. The EREP helps LCADD manage and mitigate potential risk at each of its campus locations through proactive measures.

Wildfire Hazard Assessment, Camp Hi Hill, The Planning Center, Angeles National Forest, California. Managed this project assessing a Long Beach Unified School District Camp (Camp) situated amongst mixed conifer and hardwood forest in the Angeles National Forest. The Camp is used for elementary school student exposure to the forest and the unique learning opportunities it provides. Dudek conducted fuel loading analysis, fire behavior modeling using BehavePlus, structural conditions, hazard assessment, relocation/evacuation potential, and provided fuel reduction recommendations. In addition, Dudek advised the Camp on a last-resort option of sheltering in place on site with the implementation of structural hardening procedures.

Chapman University Community Forest Management Plan, Chapman University, Orange, California. Conducted tree inventory and mapping using GPS technology. Data derived from the tree inventory and interviews with maintenance staff were used to develop a comprehensive management plan. The management plan included maintenance practices, trim cycle analysis, pest and disease issues, watering, fertilizing, species diversity, and tree removal and replacement. Provided a tree management software review and analysis of the tree inventory maintenance software used by Chapman University.

Energy

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects EIR/Environmental Impact Statement, California Public Utilities Commission and Bureau of Land Management, San Diego County, California. Responsible for preparation of the EIR/Environmental Impact Statement (EIS) fire and fuels management section of the EIR/EIS for San Diego Gas & Electric's East County Substation project, which includes a 500/230/138-kilovolt (kV) substation, approximately 14 miles of new 138 kV transmission line, and a rebuild of the Boulevard Substation. In addition to addressing the new substation project, the EIR/EIS also addresses as "connected actions" a 200-megawatt (MW) wind energy project encompassing approximately 15,000 acres and a generation tie-in required for a 500/230 kV transmission line to connect an approximately 1,200 MW wind energy project in Baja California, Mexico. The Draft EIR/EIS was prepared in December 2010.

Deimer Treatment Plant Walnut Woodlands Assessment and Monitoring, Metropolitan Water District of California, Yorba Linda, California. Managed this project that evaluated a habitat mitigation project of native California black walnut tree plantings for their establishment success and monitored them over the mitigation establishment period. Dudek documented the tree conditions, overall mitigation success criteria achievement, and made recommendations for improving the growing site. Photographs were collected throughout the monitoring period from established points to document the walnut tree mitigation success.

Confidential Solar and Wind Renewable Energy Projects, various clients, San Diego County, California. Managed fire protection and evacuation planning documents for large scale renewable energy projects, including solar farms and wind energy projects. Dudek's role was to evaluate the potential for wildfires related to the projects and develop measures to protect the facilities while minimizing potential ignitions associated with the projects. Additional planning documents included Construction FPPs, Technical Fire Response Plans, and Fire Safety Plans.

Suncrest Renewable Energy Facility Fire Protection and Evacuation Plan, Construction Fire Prevention Plan and Technical Report, San Diego County, California. Managed the preparation of three fire-safety-related documents for the Suncrest Facility, focusing on protecting the facility's assets and on minimizing the potential for a fire ignition that escapes to off-site vegetation. The FPP documents the site's fire environment and details design features to protect the site and contain fire that occurs on-site.

Suncrest Renewable Energy Facility Wildfire Mitigation Plan, HorizonWest Transmission, San Diego County, California. Prepared the first Wildfire Mitigation Plan for the Suncrest facility in 2019 with significant coordination and input from HorizonWest Transmission operations and planning personnel. Updated the plan to convert to the California Public Utilities Commission (CPUC) new format in 2020. The comprehensive Wildfire Mitigation Plan documents all policies, measures, and plans that are implemented or planned to be implemented to reduce risk of vegetation fires.

Burbank Water and Power Wildfire Mitigation Plan, City of Burbank Water and Power, California. Prepared a Wildfire Mitigation Plan for the City of Burbank Water and Power that is consistent with the CPUC requirements. The Wildfire Mitigation Plan documents risk categories and the efforts that have been made or will be made to minimize the potential for vegetation ignitions.

Wildfire Mitigation Plan Third-Party Reviews, various clients, California. Provided third-party review and acted as manager for several projects where Dudek was tasked with reviewing Wildfire Mitigation Plans for municipal utilities for CPUC requirement compliance. Dudek reviewed the plans, provided recommended corrections/additions, and presented findings at public meetings.

Oak Tree Damage Assessments, Confidential Oil Field, Santa Barbara County, California. Managed the evaluation of 250 oak trees scattered throughout a large oil field in Santa Barbara County. The trees were subjected to poor pruning, branch breakage and tearing, and in some cases, whole tree removal. Trees were inventoried, mapped, and assessed for damage level and likelihood of tree recovery. Measures were provided to address issues, as possible.

Navajo Transmission Project, Western Area Power, New Mexico, Arizona, and Nevada. Performed photo-interpretation and vegetation mapping along 2,400 miles of 1-mile-wide alternative corridors for a 500 kV electrical transmission project in New Mexico, Arizona, and Nevada. Mapped special-status species (fauna) habitats and calculated wood volume for potentially impacted forest stands on Native American land along the proposed corridors.

Unnamed Electrical Transmission Line Project, Western Area Power, Kingman, Arizona. Performed rare plant surveys in western Arizona for white margined beardtongue (*Penstemon albomarginatus*) on a proposed electrical transmission line corridor near Kingman and authored a biological report with recommendations.

Fiber Optic Infrastructure Project, IXC Communications, Inc., Boulder City, Nevada to Bullhead City, Arizona. Provided environmental monitoring on a large fiber optic cable installation project in Nevada and Arizona. Primary responsibilities consisted of enforcement of environmental regulations regarding desert tortoise (*Gopherus agassizii*) and archaeological resources.

Arizona Public Service, Unnamed Pipeline Project, Oak Creek Canyon, Sedona, Arizona. Performed delineation of Waters of the United States for a pipeline project in northern Arizona. Extensive use of GPS for determining distances, creek profiles, and creek bank locations was required.

United States to Mexico Electrical Transmission Line Project, Arizona Public Service, Yuma, Arizona to San Luis Rio Colorado, Mexico. Provided environmental monitoring at a construction site in southwestern Arizona for an Arizona-to-Mexico electrical transmission line. The species of greatest concern was the endangered flat-tailed horned lizard (*Phrynosoma mcallii*).

Mead–Adelanto Electrical Transmission Line Project, Southern Nevada to Southern California. Environmental monitor (over a 2-month period) at various substation and transmission line construction sites on a major transmission line from Nevada to California. Trained staff and conducted desert tortoise monitoring, surveys, and relocation on a daily basis in fulfillment of EIR measures.

Unnamed Electrical Transmission Line Project, Arizona Public Service, Salton Sea, California. Conducted flat-tailed horned lizard surveys along potential transmission line corridors near the Salton Sea in the Imperial Valley, California.

Military

Miramar Naval Station Fire Management Plan, K2U&A Consultants, San Diego County, California. Participated in field assessments across the Miramar Naval Station and prepared multiple sections of the Fire Management Plan. The Fire Management Plan focused on fire behavior on the site, creation of mosaic fuel patterns and discussion of fire history, likely fire scenarios, and use of prescribed fire as a fuel reduction tool.

Integrated Natural Resources Management Plans, United States Air Force and United States Marine Corps, Nellis Air Force Base, Nevada and Marine Corps Air Station Miramar, California. Assisted with the preparation of integrated natural resources management plans for Nellis Air Force Base (AFB) in Nevada and Marine Corps Air Station Miramar in California.

Legislative EIS – Barry M. Goldwater Air Force Range, United States Air Force, Southern Arizona. Assisted with preparation of a Legislative EIS for Barry M. Goldwater Air Force Training Range in Arizona. Responsible for sections within three chapters and assisted with coordination and completion of the final product. In addition, performed land-use field truthing and zone mapping.

Cactus Ferruginous Pygmy Owl Surveys, Various Private Clients, Tucson and Florence, Arizona. Performed multiple Ferruginous pygmy owl (*Glaucidium brasilianum*) surveys at sites proposed for residential and commercial development. Surveys were required by local permitting agencies and typically included a detailed report summarizing each site's vegetation/habitats, survey results, and the likelihood that pygmy owls would utilize the site.

Native Fish Capture and Relocation, United States Air Force, Nellis AFB, Southern Nevada. Assisted with the capture and relocation of native fish from a man-made pond scheduled for closure and draining at Nellis AFB in southern Nevada.

Disturbed Target Site Revegetation Project, United States Air Force, Nellis AFB, Southern Nevada. Participated in native species revegetation efforts on target sites on Nellis Air Force Range in southern Nevada. Disturbed target areas that were regularly bombed by fighter jets as part of the overall mission were revegetated with native creosote and saltbush plants.

Ferruginous Pygmy Owl Surveys, United States Air Force, Barry Goldwater Air Force Range, Southern Arizona. Performed dusk and dawn surveys for Ferruginous Pygmy Owl, a crepuscular species. Surveys were conducted in every primary dry river bed on the 2-million-acre air force range. Provided major contributions to the final report summarizing the status of pygmy owls on the range.

Legislative EIS, United States Air Force, Luke AFB, Glendale, Arizona. Senior author of biological resource chapter addressing bird-aircraft strike hazards in the EIS for a golf course project on Luke AFB in Arizona.

Maternal Bat Colony Surveys, United States Air Force, Barry M. Goldwater Air Force Range, Southern Arizona. Organized and participated in abandoned mine audit and shaft surveys for maternity bat colonies on Barry M. Goldwater Air Force Range in Arizona. Species encountered included California leaf-nosed Bat (*Macrotis californicus*), Cave Myotis (*Myotis velifer*), Western Pipistrelle (*Pipistrellus hesperus*), and Pallid bat (*Antrozous pallidus*).

Multiple Species Surveys, United States Air Force, Barry M. Goldwater Air Force Range, Southern Arizona. Conducted biological surveys on large expanses of habitat on the 2-million-acre Barry M. Goldwater Air Force Range in Arizona. Surveys were designed for sensitive species, such as desert tortoise, chuckwalla (*Sauromalus ater*), Gila monster (*Heloderma suspectum*), red-backed whiptail lizard (*Aspidoscelis xanthonota*), bats, and loggerhead shrike (*Lanius ludovicianus*).

Intensive Tortoise Population Study, United States Air Force, Barry M. Goldwater Air Force Range, Southern Arizona. Served as crew chief during intensive population estimate surveys for desert tortoise on the Barry M. Goldwater Air Force Range in Arizona. Responsible for field crews, data collection and analysis, and co-authoring the final report.

Native Vegetation Impact Study, United States Air Force, Barry M. Goldwater Air Force Range, Southern Arizona. Assisted with 3-year repeat photography study on an active bombing range on the Barry M. Goldwater Air Force Range in Arizona. The project's primary goal was to document effects of Air Force activity on natural plant communities.

Native Vegetation Impact Study, United States Army National Guard, Florence Training Center, Florence, Arizona. Authored methods and results sections of an assessment on potential impacts to a military training site operated by the Army National Guard in Florence, Arizona. Coordinated field crew and compiled and reduced field data, as well as mapping vegetation types across the range.

Environmental Monitoring, United States Air Force, Nellis AFB, Nevada. Conducted environmental monitoring at Nellis Air Force Base in southern Nevada during fence construction on sensitive habitat (bearpaw poppy [*Arctomecon californica]* and desert tortoise).

Urban Forest Management Plan, United States Air Force, Luke AFB, Glendale, Arizona. Conducted extensive field inventory using GPS, analyzed data, and authored the management plan for development of an urban forest management plan (UFMP) database for Luke AFB in Arizona.

Municipal

South Orange County Wastewater Authority Coastal Treatment Plant Fire Protection Planning, South Orange County Wastewater Authority, Aliso Canyon, California. Managed and prepared this FPP that provides a summary of the Coastal Treatment Plant's wildfire risk associated with specific operations, staffing, and its WUI location. In addition, the FPP provides a summary of existing conditions and recommended measures for "enhanced" fire protection and safety based on the site's unique function, facilities, and location within a wilderness park. Among the recommended measures are strategic fuel modification, building ignition resistance retrofits, fire suppression equipment, and training

On-Call Arboricultural Services, City of San Clemente, California. Responds to numerous requests for tree evaluations and assessments throughout the City of San Clemente. Tree evaluations often include assessment of potential sidewalk removal/installation impacts and assessment of trees exhibiting declining health. Provides objective analysis and reports regarding the trees from a sound arboricultural perspective.

Fuel Modification Plan Third-Party Review, Emerald Bay Service District, Laguna Beach, California. Managed this project to review the necessary fuel modification to protect the residential and infrastructure within the Emerald Bay Service District jurisdictional boundaries. Dudek provided research, fire behavior modeling, historical fire review, and overall risk at the site and developed a recommended approach within a letter report to support the District's negotiations with California State Parks.

Community Forest Management Plan, City of Carlsbad Public Works, California. Prepared a city-wide community forest management plan for the City of Carlsbad (City). The City has inventoried some 13,000 street and median trees as part of a city-wide GIS survey system. To ensure that the tree resources are managed appropriately, a comprehensive community forest management plan was developed that includes an evaluation of the existing tree inventory, implementation of a long-term maintenance program, and a recommended tree replacement program. In addition, the plan addresses the declining Hosp Grove, a large open space area forested with dying eucalyptus. The plan includes removal of nearly 9,000 dead and dying trees and replanting with native and drought-tolerant species.

On-Call Arboricultural Services, City of Irvine, California. Responds to numerous requests for tree evaluations and assessments throughout the City of Irvine. Tree evaluations often include assessment of potential sidewalk removal/installation impacts and assessment of trees exhibiting declining health. Provides objective analysis and reports regarding the trees from a sound arboricultural perspective.

First Step to a UFMP, City Plants/City of Los Angeles, California. Managed this comprehensive analysis of the existing Los Angeles urban forest management approach, personnel, budgets, and policies. The project included extensive stakeholder outreach and coordination along with preparation of a comprehensive status document that critically evaluates how Los Angeles' urban forest and its management compare with other well-run municipal urban forests. The study sets the stage for Los Angeles to make significant changes to their current approach and provides a launching pad for the eventual creation of a complete UFMP. Dudek presented results at two large public meetings.

UFMP, National City, California. Prepared a city-wide UFMP for National City. The project included tree inventory of some 10,000 street and median trees, analysis of tree-provided benefits, assessment of the City's urban forest, its tree policies and its management approach, and preparation of the comprehensive plan. To ensure that the tree resources are managed appropriately, a comprehensive community forest management plan was developed that includes an evaluation of the existing tree inventory, implementation of a long-term maintenance program, and a recommended tree replacement program.

UFMP, City of Irvine Public Works, California. Conducted analysis of city tree populations following collection of tree attribute information for over 50,000 city-owned trees. Analysis included species diversity and distribution, trim cycle breakdown, recommended species for future planting, park tree species, changes from initial plantings, and planting opportunity identification throughout the City.

UFMP, City of Beverly Hills, California. Managing the creation of a UFMP for Beverly Hills. Primary author of the Wildfire chapter that focuses on tree-related fire risks in the city's northern reaches that are within very high fire hazard severity zones. The project is critically evaluating the city's tree management practices, policies, and regulations, and providing a comprehensive path forward to meet city and resident stakeholder goals.

UFMP, City of Downey, California. Managed the preparation of a comprehensive UFMP, including graphically portraying common concepts and strategies. The project included analysis of tree inventory information, review of tree protection policies and climate adaptation plans, public and stakeholder surveys, setting up an urban forest working group, and goal setting.

Tree Assessments and Arborist's Report for Median Curb Replacement, Barranca Parkway, City of Irvine, California. Curb replacement on both sides of a Barranca Parkway median required root disturbances for median trees, root removal, and backfill soil placement at back of curb. Evaluated the potential tree impacts, provided specifications to minimize impact, and monitored selected trees considered at highest risk. All trees were retained in place and provided special measures to reduce potential impacts.

Illegal Tree Cutting Loss Appraisal, Avenida Pico, City of San Clemente, California. Several large City of San Clemente–owned eucalyptus trees were illegally and improperly pruned for coastal views. The tree damage was valued at $36,000 by using the trunk formula method of tree appraisal, and this amount was collected by the city from the guilty party.

Street Tree Impact Assessment for Sidewalk Placement Project, MacArthur Boulevard, City of Irvine, California. Managed this project that identified impact levels associated with sidewalk construction along the parkway of MacArthur Boulevard. Nearly 300 trees were located within or directly adjacent to the proposed sidewalk. Evaluations resulted in the removal of a small percentage of the trees and the preservation and special practices provided to most of the trees. Dudek is well-equipped to assess impacts and disposition of trees adjacent to construction projects.

Tree Protection and Monitoring at Cell Tower Site, Verizon, Mission Viejo, California. Managed this project directing buried utilities placement at an existing water tank site. The site was identified for placement of cell towers, and existing mature trees were identified as a project constraint. Dudek recommended horizontal boring to span the several-hundred-yard treed area and limited trenching for daylight areas. As a result of these recommendations, the existing trees were unharmed.

University Drive Median Tree Encroachment Evaluations, City of Irvine, California. Managed this project that focused on the assessment of tree impacts from curb replacement in the University Drive medians. Back of curb trenches, equipment operation, and backfill soil were evaluated, and recommendations regarding tree preservation or removal were provided within an arborist's report.

Eucalyptus Windrow Internal Decay Study, Irvine Public Works, City of Irvine, California. Currently managing this 5-year study of internal tree decay in the City of Irvine's historic eucalyptus windrow trees. The study includes internal probing of nearly 400 trees per year and statistical analysis of results to correlate external observations with likelihood of extensive internal decay. The project will result in valuable insight regarding eucalyptus trees converted from agricultural to urban environments and their ability to cope with harsh urban environments.

Streetscape, Park, and Windrow Tree Inventory and Mapping, Public Works, City of Irvine, California. Leads this perpetual tree inventory effort to capture locations and tree attribute information for over 50,000 trees within the City of Irvine. Skilled arborists conduct tree inventory and assessment while using GPS and a customized data interface to capture tree positions.

Vegetation Management Plans Sycamore Canyon, Stoneridge, Portrero Mason, Escondido Creek Parks, San Diego County, California. Managed and participated in completion of several San Diego County Parks Vegetation Management Plans to help pre-plan for wildfires, minimize the potential for wildfires, protect natural resources and neighboring private party assets, and plan for post-fire responses. The Vegetation Management Plans help guide efficient and effective approaches to preserving park resources.

T-Street Canyon Bank Stabilization, Beaches and Parks Department, City of San Clemente, California. Provided on-site monitoring and recommendations during this 5-year project designed to meet agency-set performance goals for regeneration success. Native vegetation was removed for placement of stabilization features, including a box culvert. Revegetation occurred, and as a result of monitoring efforts and issue resolution recommendations, the project accomplished success goals earlier than anticipated.

Street Tree Inventory, Beaches and Parks Department, City of San Clemente, California. Leading the team responsible for implementing tree inventory and establishment of TreePro management software for the City of San Clemente. The team is inventorying all of the street trees within the city using GPS technology. While in the field they are mapping each tree, as well as assessing each one for health, condition, and maintenance needs. The software, which includes a mapping component tied to a database, will allow city staff to more effectively manage and budget for the city's urban forest.

Integrated Pest Management Plan, San Clemente Pier, City of San Clemente, California. Managed preparation of an integrated pest management plan for bird over-population on the San Clemente Pier. The pigeons and sea bird populations on the pier had become too high, and the resulting public nuisance and rise in maintenance costs created the nexus for this project. Dudek provided an analysis of the situation and identified several non-poisonous methods for reducing the population within existing laws and using humane approaches.

Transplanted Canary Island Pine Tree Monitoring at Santa Ana Stadium Cell Tower Site, Sprint, Santa Ana, California. Provided arboricultural monitoring for four transplanted Canary Island pine trees (*Pinus canariensis*) located directly adjacent to a cell tower at Santa Ana Stadium. Issues encountered included vandalism, inadequate watering, and poor pruning practices.

Fawnskin Tree Planting Monitoring at Cell Tower Site, Verizon Wireless, Big Bear, California. Coordinated the planting of eight native cedar trees at a cell tower site. The trees were planted to provide, over time, visual mitigation for the facility from nearby residences. Monitoring occurred for a 6-month period and issues encountered included vandalism, deer browsing, inadequate watering, and hard freezes.

WUI Code Implementation Plan, Chula Vista Building Department, Chula Vista, California. Assembled a fire protection planning team, including Hunt Research and Scott Franklin Consulting, and managed this complex project that produced a document addressing fire behavior, structural and infrastructure fire code updates, and fuel reduction/vegetation management within the Natural Community Conservation Plan Open Space Preserve areas. The City of Chula Vista Building Department sought an update of the WUI code based on the natural areas that occur throughout the City of Chula Vista. Much of the preserve is adjacent to older construction residences that were not provided adequate set-backs. Dudek worked with the City of Chula Vista building, planning, fire, recreation, and landscape architecture departments to resolve conflicts and result in a safer situation for existing and new development.

Preplan Map Conversion, Newport Beach Fire Department, California. Managed a project that involved creation of a database for "pre-planning" fire management in high-priority structures for the Newport Beach Fire Department (NBFD). This project involved the creation of digital access, layout and fire equipment maps, and associated

property data for high-priority structures, which include hospitals, schools, apartments, and other high-occupancy buildings. Important components of the maps include site and building access and egress points, utilities, ventilation, elevators, and types of construction. These maps are also linked with associated property data that includes alarm and sprinkler conditions, property owner information, inspection schedules, and special hazard conditions. In addition, the maps are geo-referenced for future incorporation into the City of Newport Beach's GIS.

Community Wildfire Protection Plans, Santa Clara County FireSafe Council, Santa Clara County, California. Project manager for preparation of community wildfire protection plans for the Santa Clara County FireSafe Council. The plans focus on two areas, the east foothills area and the Croy fire area. Responsible for interfacing with approximately 20 different fire personnel, along with community groups throughout Santa Clara County. Managed and participated in site fuel assessments, fire behavior modeling, risk assessments, and preparation of several chapters of the final plan.

Structural Preplan Project, NBFD, Newport Beach, California. Managed the digitization of hard copy pre-plan maps and the creation of electronic versions useful in on-board fire engine computers. Pre-plan information identified ingress and egress routes as well as floor-by-floor layouts and special fire-related apparatus.

Fuel Management in WUI Areas, NBFD, Newport Beach, California. Worked with NBFD to assess compliance with fuel modification zones in the WUI areas prone to wildfire. Vegetation type, spacing, and conditions were evaluated for compliance with established fuel modification zone ordinances. Oversaw database creation for use by Fire Chief and staff and managed a related project to inspect fuel modification zones annually.

Wildfire Hazard Reduction Project, Crest Canyon, City of Del Mar Fire Department, California. Managed this project for the Del Mar/Solana Beach Fire Department. The project included parcel by parcel inspection and assessment of 65 parcels within or directly adjacent to Crest Canyon. Dudek recommended fuel reduction treatments for each parcel, prepared specifications for contractor bid, and monitored contractor work for this project. Dudek also provided community education and outreach due to highly emotional ties to flammable trees and vegetation requiring removal. In all, 134 tons of fuels were treated with all but 15 tons remaining on site as chipped ground cover.

Wildfire Hazard Reduction Project, Saxony Canyon and Lake Val Sereno, City of Encinitas Fire Department, California. Dudek was contracted by the City of Encinitas Fire Department to perform a prioritization analysis and then focused fire hazard reduction projects in the city's WUI. Dudek performed lot-by-lot analysis for some 300 parcels, ran fire behavior models for each site, and prepared lot-by-lot treatment specifications. Dudek worked with in-house biologists and restoration specialists to ensure that fuel reduction work was being completed within governing regulations.

Resource Management

Stephens' Kangaroo Rat Habitat Management Plan, Riverside Habitat Conservation Authority, Riverside, California. Managed the Fire Management Plan for this project that provided overall fire management goals within each delineated Stephens' Kangaroo Rat (SKR; *Dipodomys stephensi*) management unit. The units were delineated based on existing habitat and long-term objectives for maintaining or improving habitat for SKR. Dudek researched and developed fire history analysis, vegetation type ecology and responses to wildfire fire behavior, specific response procedures for each management unit, and created response maps for responding fire department personnel.

Tree Encroachment in Meadows of Grand Canyon National Park, National Park Service, North Rim–Grand Canyon National Park, Arizona. Performed tree inventory and destructive sampling of native conifers on the north rim of Grand Canyon National Park. Extensive dendrochronology was performed to determine the age of encroaching trees and the rate of meadow loss.

Park Reforestation Project, 43 City Parks, City of Irvine, California. Utilized available electronic tree information and mapping and performed on-site evaluations to prepare a master park reforestation plan. The goal of the project was to identify parks and appropriate species that would become "signature" trees for each park. The final submittal included individual park plans with proposed planting areas, number of planting vacancies, and recommended species. This information was then used to prepare a grant funding application, and a grant was successfully obtained.

Tree Vandalism Damage Loss Value Appraisal, San Clemente Skate Park, San Clemente, California. Provided a trunk formula method appraisal of several Chinese elm (*Ulmus parvifolia*) trees located within a skate park. The trees were cut at 4 feet by an axe, leaving the moderately sized tree crowns on the ground. The trees were valued so that recovery of lost value would be possible as part of the case settlement.

Hosp Grove WUI Fire Behavior and Recommendation Study, City of Carlsbad Fire Department, California. Conducted a wildfire hazard evaluation of the Hosp Grove, an approximately 80-acre eucalyptus forest in an urban area of Carlsbad. Dudek conducted wildfire behavior modeling to model the potential for a crown fire and based on that outcome, addressed the adjacent home fuel modification requirements and provided a summary with graphical output illustrating our findings and recommendations.

Transportation

Oak Tree Restoration Site Maintenance, El Dorado Department of Transportation, El Dorado County, California. Coordinated and managed an oak tree restoration site maintenance project in El Dorado County. Dudek's subsidiary company provides labor to water the restoration trees and Dudek monitors their conditions on this multi-year project.

State Route 22 Rehabilitation Project–Tree Inventory and Management, Orange County, California. Participated in this project focusing on existing trees along the State Route (SR) 22 right-of-way (ROW). Road widening and other improvements required removal of a large quantity of trees, and Dudek provided tree mapping with GPS with recommendations for relocation and preservation possibilities. The result of Dudek's participation on this project was identification of approximately 60 trees suitable for relocation and inclusion in the post-road improvement landscape.

Highway 125 Expansion Tree Inventory and Management, County of San Diego, California. Worked with project surveyors to locate, identify, and assess trees within a proposed ROW for linear expansion of Highway 125. Approximately 700 trees were evaluated and the potential/recommendation for tree relocation for each tree was provided.

SR 76 Road Widening and Turn Lane Creation–Tree Evaluation, County of San Diego, Fallbrook/Bonsall, California. Provided assessment of five mature California sycamore trees adjacent to SR 76. A proposed widening for turn lane installation required the assessment of potential impacts. As a result of the project, three mature sycamore trees were removed and specified mitigation tree planting on a nearby mitigation area at a 3:1 ratio.

Sycamore and Oak Tree Arborist's Report, SR 241 Transportation Corridor Widening Project, Orange County, California. Conducted on-site and construction plan evaluations to determine the potential tree impacts from bridge widening on the SR 241 Transportation Corridor. Approximately 20 trees were identified as having the potential to be impacted by the project and specific measures were provided to avoid or reduce impacts.

Environmental Review, Arizona Department of Transportation, Northern Arizona. Conducted environmental field reviews for the Arizona Department of Transportation in northern Arizona. Environmental issues that could potentially affect proposed road-related projects were the primary concern.

Union Pacific, Southern Pacific Merger, Union Pacific Railroad, Various Locations throughout Arizona and New Mexico. Performed site assessments for the merger of Union Pacific and Southern Pacific railroads at construction sites in Arizona, Texas, and New Mexico, providing biological information to the project manager to be included in the final report.

Water/Wastewater

Recycled Water Pipeline Installation through Oak Woodlands, Las Virgenes Municipal Water District, Calabasas, California. Supporting Dudek's engineering and planning groups, provided tree inventory and mapping along with analysis of potential tree impacts from placement of a 24-inch underground pipeline near existing oak woodlands. Dudek's analysis resulted in pipeline placement that reduced potential impacts to 37 oak trees to insignificant and a waiver by the California Coastal Commission for further review.

Tree Threats to Buried Water Supply Pipelines Preliminary Study, San Diego County Water Authority, California. Managed a study of tree threats to buried water supply pipelines. The project included an analysis of tree biology and physiology, the subsurface environment, and pipeline or infrastructure condition. Based on these findings, Dudek's certified arborists and foresters made recommendations to the San Diego County Water Authority (Water Authority) regarding evaluation of ROW-encroaching trees as the first phase of a comprehensive tree management plan for the Water Authority's ROW. Understanding what the ROW-encroaching tree population characteristics are (i.e., total number of trees, tree sizes and ages, species presence, and distribution) is the first step to resolving the issue. Once the tree population is better defined, decisions can be made as to which trees are considered high-priority removals and which are considered to present relatively low risk.

Trunk Sewer Diversion Pipeline Project, Irvine Ranch Water District, Irvine, California. Proposed placement of a 30-inch-diameter force main and associated aboveground facilities required an assessment of the proposed project alignment for potential tree impacts. Numerous trees growing throughout the project area were evaluated for potential impact. Impacted trees were identified and mitigation recommendations were provided in an arborist's report.

Water Pipeline Eucalyptus Tree Encroachment Assessment and Construction Monitoring, Santa Ana Canyon Boulevard, Anaheim, California. Managed this project that included the trenching and placement of a 60-inch-diameter pipeline near several median eucalyptus trees. Dudek provided specifications to minimize impacts along with on-site monitoring during soil disturbing activities to ensure the trees' root systems were avoided.

Great Oak Management Plan, Pipeline 6, Metropolitan Water District of Southern California, Pechanga Indian Reservation, Riverside County, California. Evaluated the "Great Oak," the oak tree located on the Pechanga Indian Reservation commonly believed to be several hundred years old and one of the largest in the state. Advised that the tree was likely substantially younger than generally believed and provided analysis of potential impacts from a pipeline that would be constructed within the vicinity of the tree.

Oak Tree Health Assessments, Impact Analysis, and Protection for Storm Drain Improvements, Sycuan Indian Reservation, San Diego County, California. Evaluated potential impacts from site alterations necessary for storm drain improvements in a semi-natural riparian drainage. Permeable fabric and rip-rap placement near several native oak trees required specifications for tree protection. Provided on-site direction for minimizing tree impacts and submitted a specification for preservation of the trees during and following construction.

Oak Tree Encroachment and Protection for Sewer Line Expansion, Upper Chiquita Reservoir, Talega, Orange County, California. Delineated the tree protection zones for several native oak trees within the project vicinity for a proposed sewer line expansion. Where constraints negated the ability to avoid tree protection areas, Dudek prepared specifications for precise limb removals, enabling heavy equipment access within the alignment area. Dudek monitored the limb cutting so that the specifications were clearly communicated and understood and to minimize oak tree impacts.

Oak Tree Protection and Relocation Consulting, Sewer Pipeline Installation Project, Rose Canyon, City of San Diego, California. Provided consultation on methods to reduce impacts from heavy equipment necessary to trench and bury a sewer pipeline through the bottom of Rose Canyon. An additional 15 oak trees located directly within the pipeline alignment were identified for relocation to adjacent, undisturbed areas. Provided monitoring through the establishment period.

River Mountains Tunnel Project, County of Clark, Henderson, Nevada. Performed desert tortoise surveys in the River Mountains of southeastern Nevada prior to construction of a large water supply tunnel. Later served as environmental monitor to oversee activity compliance during geotechnical, seismographic, and exploratory drilling operations.

Sweetwater Reservoir Expansion, Sweetwater Authority, San Diego County, California. Authored the environmental setting section of an environmental assessment for a proposed Sweetwater Reservoir expansion in southern San Diego County.

Flood Control Basin Environmental Assessment, County of Clark, Las Vegas, Nevada. Coordinated multidisciplinary activities on an environmental assessment for a proposed detention basin in Clark County, Nevada.

Douglas Nickles, RPF

AS-NEEDED URBAN FORESTRY SPECIALIST

Douglas Nickles is a fire protection planner with more than 30 years' experience as a fire marshal, urban fire forester, open space planner, and licensed forester. Mr. Nickles specializes in preparing fire protection plans, wildland-urban interface fire management plans, evacuation plans, multi-hazard emergency response plans, and forest and natural resource management plans. He possesses considerable experience in fire and building code life safety regulations, wildland urban interface development project planning and protection, emergency preparedness, emergency response planning, and public education and information. He also serves as a Co-Chair for the So Cal Fire Prevention Officer's Wildland Urban Interface Committee. Mr. Nickles previously worked for the City of Glendale Fire Department, where he was responsible for vegetation management, wildland fire hazard mitigation, planning entitlement reviews, General Plan element updates, fire and building plan check, fire and life safety building inspections, fire code enforcement, hazardous materials program management, and industrial wastewater program management. He also has six years of forestry experience working for a forest and land management consulting firm in Northern California.

Education

California Lutheran University
MBA, Business Administration

Humboldt State University
BS, Forestry (Fire Management concentration)

Certifications

Registered Professional Forester (RPF), No. 2135

Wildland Fire Behavior Certificate, County of Los Angeles Fire Department

Archeology Certificate, CAL FIRE

Incident Information Officer Certificate, CAL FIRE

Professional Affiliations

SoCal Fire Prevention Officers Association

Relevant Previous Experience

Glendale Fire Department, Glendale, California. Served as assistant fire marshal**.** Administered all personnel and programs undertaken by the Fire Prevention Bureau including Vegetation Management, Hazardous Materials, Household Hazardous Waste Collection, Used Oil Collection, Industrial Waste Water, Fire and Life Safety inspections, Plan Review and New Construction inspection. The Bureau operates with four interrelated units: Administration, Development Services, Environmental Programs, and Special Projects/Prevention Programs. Overall administrative functions include personnel management, training and career development, organizational planning and development, intra- and interdepartmental coordination, code enforcement, records management, revenue and budget management, code adoption, and development of policies and procedures. (2017–2019)

Glendale Fire Department, Glendale, California. Served as fire prevention coordinator. Managed the Programmatic Inspection Unit with oversight responsibility for multiple programs. Oversee all inspection and regulatory operations and professional staff. Oversee annual fire and life safety inspection program for state mandated and permitted facilities. Make recommendations for enforcement of fire and life safety requirements. Prepare reports regarding code violations; issue violation notices; initiate enforcement as necessary. Direct all regulatory activities, inspections and reporting for the City's Certified Unified Program Agency (CUPA) and related hazardous materials management programs. Meet regularly with regional and state agencies to discuss and coordinate regulatory and enforcement activities. Oversee the Industrial Wastewater Inspection Program; coordinate with the City of Los Angeles. Oversee the Household Hazardous Waste Collection and Used Oil Curbside Collection Programs. Oversee the Vegetation Management Program. (2014–2017)

Glendale Fire Department, Glendale, California. Served as fire prevention coordinator. Managed the Fire Engineering Unit. Oversaw all plan check operations and professional staff. Evaluate and analyze plans, structures and processes to ensure adequate fire protection and conformance with federal, state and local fire safety laws and regulations. Planning entitlement reviews including Conditional Use Permits, CEQA and Environmental Impact Reports. Interpret fire and life safety laws and regulations and provide technical advice and assistance to the general public and other City departments, architects, contractors, engineers, builders, and owners. Assist with code adoption and enforcement activities. Assist with preparation and updating of General Plan Elements including Safety, Conservation and Open Space, and Recreation Elements. Oversee the Vegetation Management Program. (2004–2014)

City of Glendale Fire Department, Glendale, California. Served as urban fire forester. Managed the Vegetation Management Program. Responsibilities included start-up and development of the Vegetation Management Program including administration, inspection procedures and guidelines, preparation of program operations manual, development of policies and procedures, contract management and administration, and department-wide training program. Grant application, administration and implementation for City projects. Coordinated establishment of a Firewise Community in Glendale, one of the first seven in the nation. Managed the Fire Prevention Public Education and Public Information programs. (1991–2004)

City of Thousand Oaks, Thousand Oaks, California. Served as associate planner for the open space Joint Powers Authority between the City and Conejo Recreation and Park District. Responsibilities included daily administration of the agency and coordinating administrative support for public meetings. Established and served as support staff for the citizen advisory committee. (1988–1991)

Envicom Corporation/PHR Environmental, Calabasas, California. Served as environmental planner/analyst. Prepared environmental impact reports and conducted research, site inspection, development plan preparation, and preparation of due diligence reports for major development projects throughout Southern California. (1988)

HJW and Associates, Oakland, California. Served as forester, providing forest/natural resource management and timber harvesting consulting and contract administration services throughout Northern California. (1987-1988)

Interface Management Services, Thousand Oaks, California. As owner, consults part time in resource management, land use planning, fire prevention, fire protection plan preparation, wildland fire safety, vegetation management, oak woodland management, and urban forestry, with an emphasis in wildland-urban interface settings throughout Southern California. (1985–Present)

W.M. Beaty and Associates, Redding, California. Served as assistant district forester. Consulted in natural resource and forest management including timber harvesting, wildland fire protection, plantation management, and forest management plans throughout Northern California. (1979–1984)

California Department of Forestry and Fire Protection. Served as forestry aide, assigned to Latour Demonstration State Forest in Shasta County assisting with forestry and natural resource management activities. (1979)

California Department of Forestry and Fire Protection. Served as firefighter, assigned to Susanville in Lassen County in 1977, and Fortuna in Humboldt County in 1978. (1977–1978)

Publications

Nickles, Douglas V, (2001) The Urban-Wildland Interface Ecosystem: Integration of Fire and Resource Management. *Proceedings of the California's 2001 Wildfire Conference: 10 Years After the 1991 East Bay Hills Fire*. UC Forest Products Lab.

Nickles, Douglas V, (1997) Urban/Wildland Interface Management: A Coordinated Approach to Fire Safety. *Fire Safe Communities Regional Workshop*. California Urban Forest Council.

Nickles, Douglas V, (1997) Monitoring Survival and Vigor of Specimen Valley Oaks Influenced by Urban Development Sites. *Proceedings of a Symposium on Oak Woodlands: Ecology, Management and Urban Interface Issues*. General Technical Report. PSW-GTR-160. (peer reviewed)

Nickles, Douglas V, (1994) Hillside Development, Open Space and Hazardous Vegetation: A Coordinated Vegetation Management Approach to Urban Interface Fire Safety. *15th Forest Vegetation Management Conference*.

Conference Presentations

"Drought and Fire." Chevy Chase Canyon Property Owner's Association, Glendale, California, November 2014.

"Fire Prevention and Tree Protection in the Urban Wildland Interface." Southern California Fire Prevention Officers, Chino, California, May 2012.

"Fire Safety Requirements in the Wildland Urban Interface: The Inspector's Role: Enforcing the requirements of CBC Ch. 7A and CRC Sec. R327." Southern California Fire Prevention Officers, Camarillo, California, November 2012.

"Designing Firewise Friendly Landscape Ordinances: Regulating Ornamental Landscaping and Vegetation Management in an Urban Setting." National Wildland Urban Interface Conference, Denver, CO, November 2009.

"Coordinating Fire Hazard Reduction with Local Municipalities: Roadside and Public Open Space." Western Chapter International Society of Arboriculture, Arcadia, California, September 2009.

"Fire Prevention and Tree Protection." California Urban Forest Council Annual Conference, Long Beach, California, August 2008.

"Oaks and Fire in Yosemite Lakes Park: Living in the Front Woods." Yosemite Lakes Springs Property Owner's Association, Coarsegold, California, November 2007.

"Vegetation Management and Fires: Managing the Urban Forest." Public Applicators Training Program, Arcadia, California, May 2004.

"The Urban-Wildland Interface Ecosystem: Integration of Fire and Resource Management." Society of American Foresters Annual Convention, Washington, D.C., November 2001.

Specialized Training

- Leadership Academy, Society of American Foresters
- California Fire Prevention Institute Annual Conference (multiple), California Chiefs Fire Prevention Officers
- Fire Service Supervision (Q-318), National Fire Academy
- Incident Information Officer (I-403)
- Hydraulics for Fire Protection
- Sprinkler Plan Review and Inspection
- Wildland Firefighting, Lassen College

- Wildland Fire Suppression Tactics (S-336)
- Division/Group Supervisor (S-339)
- Wildland Fire Behavior (S-190)
- Intermediate Wildland Fire Behavior (S-290)
- Introduction to Wildland Fire Behavior Calculations (S-390)

Awards

Fellow Award, Society of American Foresters (2008), recognizing individuals for long standing service to forestry at the local, state, and national level.

Presidential Field Forester Award, Society of American Foresters (2003), recognizing individuals who have displayed uncommon talent, skill, and innovative methods to achieve a record of excellence.

Matthew Crockett

WILDFIRE PLANNING ANALYST

Matthew Crockett is a wildfire planning analyst with 3 years' cumulative experience in the natural resources management field, with expertise in forest science and community wildfire planning. Mr. Crockett's relevant work experiences include authoring community wildfire protection plans (CWPPs) and Fire Protection Plans (FPPs), conducting private forestry work, and advocating for environmental policy at the State Capital. His technical skills include geographic information system (GIS) analysis, fire behavior modelling, post-fire risk assessment, and carbon accounting. Mr. Crockett previously worked for the San Luis Obispo Fire Safe Council as a project manager for community wildfire risk reduction projects.

Education

California Polytechnic State University San Luis Obispo MS, Environmental Sciences and Management, 2022

California Polytechnic State University San Luis Obispo BS, Environmental Management and Protection, 2022

Professional Affiliations

Association of Environmental Professionals (AEP)

Society of American Foresters (SAF)

Dudek Project Experience

Los Angeles County Integrated Wildfire Safety Program, County of Los Angeles Department of Regional Planning, Los Angeles, California. Served as a supporting analyst and identified communities and critical infrastructure at risk from wildfire throughout Los Angeles County based on integrated wildfire hazard modelling.

Whitewood Condo/Apartment FPP, Melissa Krause, Murietta, California. Served as a supporting analyst and prepared the FPP for a residential development project. The FPP identified wildfire risk and identified fire protection measures that addressed structural hardening and fuels modification.

Relevant Previous Experience

City of Pismo Beach CWPP, City of Pismo Beach Fire Department (CAL FIRE), Pismo Beach, California. Lead author of a CWPP on behalf of the City of Pismo Beach Fire Department. The project involved conducting wildfire behavior modelling to identify assets at risk. Biophysical and sociopolitical mitigation measures were recommended to reduce risks to communities and other assets.

Avila Beach CWPP, City of Pismo Beach Fire Department (CAL FIRE), Pismo Beach, California. Co-author of a CWPP on behalf of the City of Pismo Beach Fire Department. Emphasized identifying ways to improve emergency evacuations from the Avila Beach area.

Project Manager, San Luis Obispo County Fire Safe Council, San Luis Obispo, California. Collaborated directly with community members and fire agencies to identify assets at risk from wildfire and priority mitigation practices to improve wildfire resilience in San Luis Obispo County.

Greenhouse Gas Emissions Analyst, CAL FIRE, San Luis Obispo, California. Quantified how state-sponsored fuels reduction projects impact greenhouse gas emissions and carbon sequestration utilizing tools such as Forest Vegetation Simulator (FVS), FlamMap, and IFTDSS.

Forestry Technician, Sierra Pacific Industries, Camino, California. Conducted field work, including timber harvest layout, wildlife surveys, and forest inventory. Other roles included assisting with Timber Harvest Plan documentation and performing fire suppression activities during the Caldor Fire.

Publications

Crockett, M. 2022. "*Post-Fire Erosion Following the CZU Lightning Complex Fire: Quantifying Hillslope Erosion and Providing Guidance Towards Improving Post-Fire Response.*" Graduate Project; California Polytechnic State University, San Luis Obispo.

Awards

Dave A. Bichsel Memorial Scholarship, California Forestry Association & California Forest Foundation, 2020. Awarded for demonstrating a zest for forestry and desire and experience relating to active forest management.

Sierra Pacific Industries Intern Scholarship, Sierra Pacific Industries, 2021. Awarded in response to my performance as an intern and academic credentials.

San Luis Obispo County Fire Safe Council Scholarship, San Luis Obispo Fire Safe Council, 2022. Awarded to acknowledge previous work and a future desire to continue working in the wildfire planning sector.

CHRISTOPHER A. DICUS, Ph.D.

Professor, Wildland Fire & Fuels Management
California Polytechnic State University
San Luis Obispo, California, U.S.A.

EDUCATION

Louisiana State University: Doctor of Philosophy, Forestry [Silviculture emphasis]
Utah State University: Master of Science, Forestry [Fire Ecology emphasis]
Louisiana Tech University: Bachelor of Science (*Summa cum laude)*, Forestry-Wildlife

PROFESSIONAL EXPERIENCE

Professor, Wildland Fire & Fuels Management – Natural Resources Mgmt. & Environmental Sciences Dept., California Polytechnic State University, San Luis Obispo, CA, September 2001-2013; September 2016-present.

- **Pertinent Courses Taught**
  - **NR-204: Wildland Fire Control**
  - **NR-305: Forest Ecology**
  - **NR-307: Fire Ecology**
  - **NR-308: Fire & Society**
  - **NR-312: Technology of Wildland Fire Management**
  - **NR-340: Wildland Fire Management**
  - **NR-365: Silviculture**
  - **NR-455: Wildland-Urban Interface Fire Protection**
  - **UNIV-339: Disaster Resistant Sustainable Communities**

Interim Associate Dean, Research & Graduate Programs – College of Agriculture, Food & Environmental Sciences**,** California Polytechnic State University, San Luis Obispo, CA, September 2015-August 2016.

Faculty Fellow to the Provost – Office of the Provost & Executive Vice President for Academic Affairs, California Polytechnic State University, San Luis Obispo, CA, Sept. 2013-September 2015.

AWARDS & HONORS

- Lead author on manuscript listed as 1 of 13 "Best Papers 2005-2015", *Fire Ecology* journal (2015)
- College of Agriculture, Food & Environmental Sciences Outstanding Researcher Award (2011)
- Distinguished Alumnus of the Year, Louisiana Tech University School of Forestry (2006)
- Phi Beta Delta Honor Society for International Scholars
- Phi Kappa Phi Honor Society

PROFESSIONAL LEADERSHIP

- **Association for Fire Ecology** (an international scientific society)
  - President (2018-2021)**;** Board of Directors (2006-2021)
- **California Fire Science Consortium**
  - Coordinator, Wildland-urban Interface Module (2011-present)
- **San Luis Obispo County FireSafe Council**
  - Board of Directors (2002-present)
- **Wildland-Urban Interface F.I.R.E. Institute**
  - Principle Investigator (2020-present)
- **Society of American Foresters**
  - Chair, Los Padres Chapter (2003-2010)

LITIGATION CASE HISTORY

Expert Witness in Litigation (by date of initial engagement)

- 2022: Rancho de Dias Alegres LLC, S-M Timber Farm 2, L.C., Aks 15, L.C., and AKS Ranch-15 Limited Partnership v. United States, for plaintiff
- 2021: Village Communities, LLC v. County of San Diego, for plaintiff
- 2021: Porter v. Debenedetto, for defendant
- 2020: [Insurers] v. Calpine Corporation, for defendant
- 2019: GSN Capital, LLC and Dave Zortman v. Shoshone City & Rural Fire District, for defendant
- 2019: Douglas et al. v. McCutchan et al., for plaintiff
- 2018: Alberta Motor Association Insurance Company v. Everest Reinsurance Company, for defendant
- 2018: [Insurers] v. Boeing Corporation, for defendant
- 2018: New Mexico Pension Fund v. PG&E, for plaintiff
- 2017: Ruffino v. United States, for defendant
- 2013: [Insurers] v. Asplundh Tree Expert Company, for defendant
- 2012: Aspen Insurance UK Limited v. Swiss RE Europe SA (UK branch), for defendant
- 2011: [Residents] v. Victoria (Australia) Department of Sustainability & Environment, for defendant

Technical Reports Submitted for Litigation

- **Dicus, C.A.** 2021. Wildfire hazard & risk at the proposed Lilac Hills Ranch, San Diego County, California. Technical report submitted to the United States District Court, Southern District of California.
- **Dicus, C.A.** 2021. Rebuttal to expert report of Chief Tony Mecham. Technical report submitted to the United States District Court, Southern District of California.
- **Dicus, C.A.** 2019. Fire Spread and structural loss during the 2016 Fort McMurray Wildfire. Technical report submitted to Court of Queen's Bench of Alberta (Canada).
- **Dicus, C.A.** 2019. Fire Spread and Loss During the 2017 Lagoon Fire, Shoshone, Idaho. Technical report submitted to the District Court of the Fifth Judicial District of the State of Idaho.
- **Dicus, C.A.** 2019. Potential fire risk posed by eucalyptus trees bordering 1950 Alexander Valley Road, Healdsburg, California. Technical report submitted to the Superior Court of California, County of Sonoma.
- **Dicus, C.A.** 2018. Implementation of pile and burn treatments to reduce wildfire risk near South Lake Tahoe, California. Technical report submitted to the U.S. Department of Justice.
- **Dicus, C.A.** 2012. Effects of fuel loading and building construction on the risk of bushfire loss to private property. Technical Report submitted to the Supreme Court of Victoria, Australia. 66p.

Testimony in Deposition/Court Proceedings

- 2022: Village Communities, LLC v. County of San Diego (California)
  - Re: Fire risk and mitigation in a proposed residential/commercial development
- 2021: GSN Capital, LLC and Dave Zortman v. Shoshone City & Rural Fire District (Idaho)
  - Re: Fire spread/behavior and timing of fire losses
- 2021: Porter v. Debenedetto (California)
  - Re: Combustion of pile burns
- 2019: Alberta Motor Association Insurance Company v. Everest Reinsurance Company (Alberta, Canada)
  - Re: Fire spread/behavior and timing of losses
- 2013: [Insurers] v. Asplundh Tree Expert Company (Texas)
  - Re: Fire spread/behavior and timing of losses

OTHER CONSULTING ENGAGEMENTS

Technical Reports Submitted to Clients/Government Entities

- **Dicus, C.A.** 2021. Review & Assessment: Risk of wildfire losses at Harmony Grove Village South. Technical report submitted to client.
- **Dicus, C.A.** 2020. Categorizing surface fuel models in Marin County, California. Technical report submitted to Marin County Fire Department.
- **Dicus, C.A.** 2020. Potential wildfire behavior & effects at Yellow Pine Solar Project: Comparison of two vegetation management options. Technical report submitted to US Bureau of Land Management.
- **Dicus, C.A.** 2020. Review & Assessment: Newland Sierra Fire Protection Plan. Technical report submitted to client.
- **Dicus, C.A.**, 2019. Lilac Hills Ranch Wildfire Risk Assessment. Technical report submitted to client.
- California Governor's Office of Emergency Services. 2018. State of California Multi-Hazard Mitigation Plan. (**C.A. Dicus** responsible for Chapter 8, Fire Hazards: Risks and Mitigation).
- **Dicus, C.A.** 2017. Potential impacts to coast live oak stands following defensible space at 3300 Kanan Dume Road. Technical report submitted to Los Angeles County Department of Regional Planning.
- **Dicus, C.A.** 2017. Rebuttal to Staff Comments: Potential impacts to coast live oak stands following defensible space at 3300 Kanan Dume Road. Technical report submitted to Los Angeles County Department of Regional Planning.
- 2016. Conn, W.D., C.K. Nuworsoo, **C.A. Dicus**, K.C. Topping, and D. Tuner. Single Access Subdivisions Assessment Project: Developing a planning tool for evaluating proposed developments accessible by dead end roads. Technical report submitted to Cal Fire and the California Board of Forestry & Fire Protection.
- California Emergency Management Agency. 2012. California Adaptation Planning Guide: Planning for Adaptive Communities. 60pp. (**C.A. Dicus** responsible for portions involving wildfire)
- California Emergency Management Agency. 2012. California Adaptation Planning Guide: Defining Local & Regional Impacts. 94pp. (**C.A. Dicus** responsible for portions involving wildfire)
- California Emergency Management Agency. 2012. California Adaptation Planning Guide: Understanding Regional Characteristics. 114 pp. (**C.A. Dicus** responsible for portions involving wildfire)
- California Emergency Management Agency. 2012. California Adaptation Planning Guide: Identifying Adaptation Strategies. 68 pp. (**C.A. Dicus** responsible for portions involving wildfire)
- **Dicus, C.A.** 2011. Fire Hazard & Mitigation for Stadium Park, Atascadero, California. Technical Report submitted to the City of Atascadero. 73p.
- California Emergency Management Agency. 2010. State of California Multi-Hazard Mitigation Plan. (**C.A. Dicus** responsible for Chapter 5.4, Wildfire Hazards, Vulnerability and Risk Assessment).

Testimony before Government Entities

- 2020: San Diego County Planning Commission
- 2018: Los Angeles County Department of Regional Planning
- 2017: Los Angeles County Department of Regional Planning
- 2016: California Board of Forestry & Fire Protection
- 2011: Atascadero (California) City Council
- 2005: California Board of Forestry & Fire Protection

SCIENTIFIC ENGAGEMENTS

Scientific Manuscripts (since 2009)

- **Dicus, C.A.** 2021. AFE, IAWF share common goals for diversity, education, cooperation. Wildfire Magazine.
- **Dicus, C.A.**, and K. Osborne. 2015. How fuel treatment types, locations, and amounts impact landscape-scale fire behavior and carbon dynamics in the Klamath Mountains. Pgs. 50-59 *In* Keane, Robert E.; Jolly, Matt; Parsons, Russell; Riley, Karin. 2015. Proceedings of the large wildland fires conference; May 19-23, 2014; Missoula, MT. Proc. RMRS-P-73. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 345 p.
- **Dicus, C.A.**, and K. Jacobson. 2014. Fine fuel dynamics following selection-harvest in Sequoia sempervirens. Pgs. 323-321 *In* Wade DD & Fox RL (Eds.), Robinson ML (Comp) (2014) 'Proceedings of 4th Fire Behavior and Fuels Conference', 1-4 July 2013, St. Petersburg, Russia.
- **Dicus, C.A.**, N.C. Leyshon, and D. Sapsis. 2014. Temporal changes to fire risk in disparate WUI communities in southern California, USA. Pgs. 969-978 *In* Viegas, D.X (Ed.). Advances in Forest Fire Research. University of Coimbra Press. ISBN 978-989-26-0884-6.
- **Dicus, C.A.**, T. Korman, C. Grant, D. Madrzykowski, F. Mowrer, C. Pascual, and D. Turner. 2013. Investigating the capabilities and limitations of compressed air foam systems for structural firefighting. Fire Engineering 166(7):65-69.
- **Dicus, C.A.** 2013. The burning question: Why is fire season becoming worse? California Forests Quarterly 2:2-3.
- Osborne, K., **C.A. Dicus**, C. Isbell, A. Ager, D. Weise, and M. Landram. 2011. Effect of landscape-level fuel treatments on carbon emissions and storage over a 50 yr time cycle. In Wade, D.D.; Robinson, M.L. (eds) Proceedings of the 3rd Fire Behavior and Fuel Conference, Oct. 25-29,2010, Spokane, Washington, USA. International Association of Wildland Fire, Birmingham, Alabama, USA. 5 p.
- **Dicus, C.A.** 2009. Changes to simulated fire behavior and societal benefits after two levels of thinning in a mixed-conifer wildland-urban interface community. Proceedings of the Royal Society of Queensland 115:37-44.
- **Dicus, C.A.** 2009. Fire on the landscape: Current policies and changing climate lead to higher costs, more severe wildfire. California Forests 13(2):16-17.
- **Dicus, C.A.**, K. Delfino, and D.R. Weise. 2009. Predicted fire behavior and societal benefits in three eastern Sierra Nevada vegetation communities. Fire Ecology 5(1):61-58.
- Kobziar, L., M. Rocca, **C.A. Dicus**, P. Morgan, N. Sugihara, A. Thode, and M. Varner. 2009. Challenges to educating the next generation of wildland fire professionals in the United States. Journal of Forestry 107(7):339-345.

Scientific Presentations

150+ oral presentations and 20+ posters presented at international, national, regional, and local conferences. Invited talks include oral presentations in 10 foreign countries, including Australia (×5), Portugal, France (x2), Italy, Finland, Russia, China, Japan, Thailand, and El Salvador. Selected oral presentations follow (others available upon request).

- **Dicus, C.A.**, R.D. Uribe, R.A. White, and S.R. Rein. 2022. Factors impacting home loss during a wind-driven wildfire in a Mediterranean ecosystem. Fire Across Boundaries: Connecting Science & Management Conference. Florence, Italy October 4-7.

- **Dicus, C.A.**, A. Meeder, and T. O'Rourke. 2022. Impacts to greenhouse gas emissions following fuel treatments in California Forests. International Fire Behavior & Fuels Conference. Pasadena, California, May 23-27.
- **Dicus, C.A.** 2022. Groundbreaking approaches for WUI fire mitigation in California. Wildfire Management Summit 2022 (Institute for Defense & Government Advancement). San Francisco, CA, April 25-26.
- **Dicus, C.A.** 2021. "Electrical utilities and wildfire in California". Foundations for Improving Resilience in the Energy Sector Against Wildfire on Alaskan Lands (FIREWALL). Virtual webinar and expert panel, September 15.
- **Dicus, C.A.** 2020. "Do I stay or do I go??? Shelter in Place vs. Evacuation". National Preparedness Month Webinars, Part 2: Wildfire Preparedness. Virtual webinar and expert panel, September 9.
- **Dicus, C.A.** 2019. Keynote Address – "California Ablaze: Is this (all of our) New Normal?" International Fire Behavior & Fuels Conference. Marseille, France, April 29-May 3.
- **Dicus, C.A.** 2018. Keynote Address – "The California Fire Experience: The good, the bad, and the downright tragic". Australian Bushfire Building Conference and Community Forum. Leura, Australia, September 6-7.
- **Dicus, C.A.** 2017. "On how to prevent and protect against wildfires". Tai'an, China, September 7-9.
- Dicus, C.A. 2017. "A global perspective on the ecology & management of wildfires". International Week, *Seinäjoki* University of Applied Sciences, *Seinäjoki, Finland, February 13-17.*
- **Dicus, C.A.**, N.C. Leyshon, and D. Sapsis. 2016. "Assessing WUI fire risk: A spatial analysis". International Fire Behavior & Fuels Conference, Melbourne, Australia, April 11-15.
- Dicus, C.A., N.C. Leyshon, and D.B. Sapsis. 2014. "Temporal changes to fire risk in disparate WUI communities in southern California, USA". International Conference on Forest Fire Research. Coimbra, Portugal, November 14-18.

Mass Media Presentations

Presentations and interviews in video, TV, radio, and print formats. Selected presentations follow (others available upon request).

- Examples of video presentations
  - 2021: Loopsider English (France). Wildfires are spiraling out of proportion in the US. Available at https://www.facebook.com/watch/?v=186618086851028&ref=sharing.
  - 2020: Seeker Media and Nissan. Watch how scientists in California are using prescribed burns to prevent more disastrous wildfires. Available at https://www.facebook.com/SeekerMedia/videos/250434539461491/UzpfSTcwMDA4MDE2MDozMDYwNjExMjk0OTk0MTQ6MTA6MDoxNTg4MzE2Mzk5Oi03MDg2Njc1MjI0NDIyMjY4OTAz/.
  - 2019: The New Yorker. Building for resilience in California's fire-prone future. Available at https://www.newyorker.com/culture/culture-desk/building-for-resilience-in-californias-fire-prone-future.

- Examples of media outlets in which I've been featured (others available upon request)
  - TV
    - BBC (United Kingdom)
    - FOX Weather (USA)
    - KABC (Sacramento)
    - Fox 11 (Los Angeles)
    - TRT World (Turkey)
    - RT America (Russia)
  - Radio
    - NPR Weekend Edition (Washington, D.C.)
    - KNX (Los Angeles)
    - KABC (San Francisco)
    - KABC (Australia)
    - Global News Canada
  - Print
    - Time Magazine
    - USA Today
    - New York Times
    - Los Angeles Times
    - The Hill
    - National Geographic

OTHER SIGNIFICANT PROFESSIONAL ACCOMPLISHMENTS:

- **Certified Senior Fire Ecologist**

- **California Registered Professional Forester**

- **Steering/Program Committee:**
  - 2022: Association for Fire Ecology/Pau Costa Wildland Fire Conference; Florence, Italy
  - 2021: Ninth International Fire Ecology & Management Congress; Virtual
  - 2020: Association for Fire Ecology/Pau Costa Foundation Webinar Series; Virtual
  - 2019: Eighth International Fire Ecology & Management Congress, Tucson, Arizona
  - 2018: The Fire Continuum Conference: Preparing for the Future of Wildland Fire. Missoula, Montana
  - 2010 Australia – United States Joint Research Symposium: Fire in the Interface; Melbourne & Canberra, Australia

- **Fire Behavior Technical Specialist** on major wildland fires
  - 2009 La Brea Fire (89,489 acres)
  - 2007 Zaca Fire (240,207 acres)
  - 2006 Day Fire (162,700 acres)
  - 2004 Gaviota Fire (7,440 acres)

- **Federal Training Courses**
  - S-490: Advanced Fire Behavior
  - S-493: FARSITE (which is a GIS-based fire behavior modeling course)
  - S-125: Fire Operations in the Wildland Urban Interface
  - Forest Vegetation Simulator (which focused on the Fire and Fuels Extension)

- **Honorary Research Associate**
  - Univ. of Tasmania School of Geography & Environmental Studies (Australia) – March-June 2009

Appendix B

Photographs of the site and surrounding area

N

0 5,000 10,000 20,000 Feet

Photo 1 Photo 2 Photo 3 Photo 4 Photo 5 Photo 6 Photo 7 Photo 8 Photo 9 Photo 10 Photo 11 Photo 12

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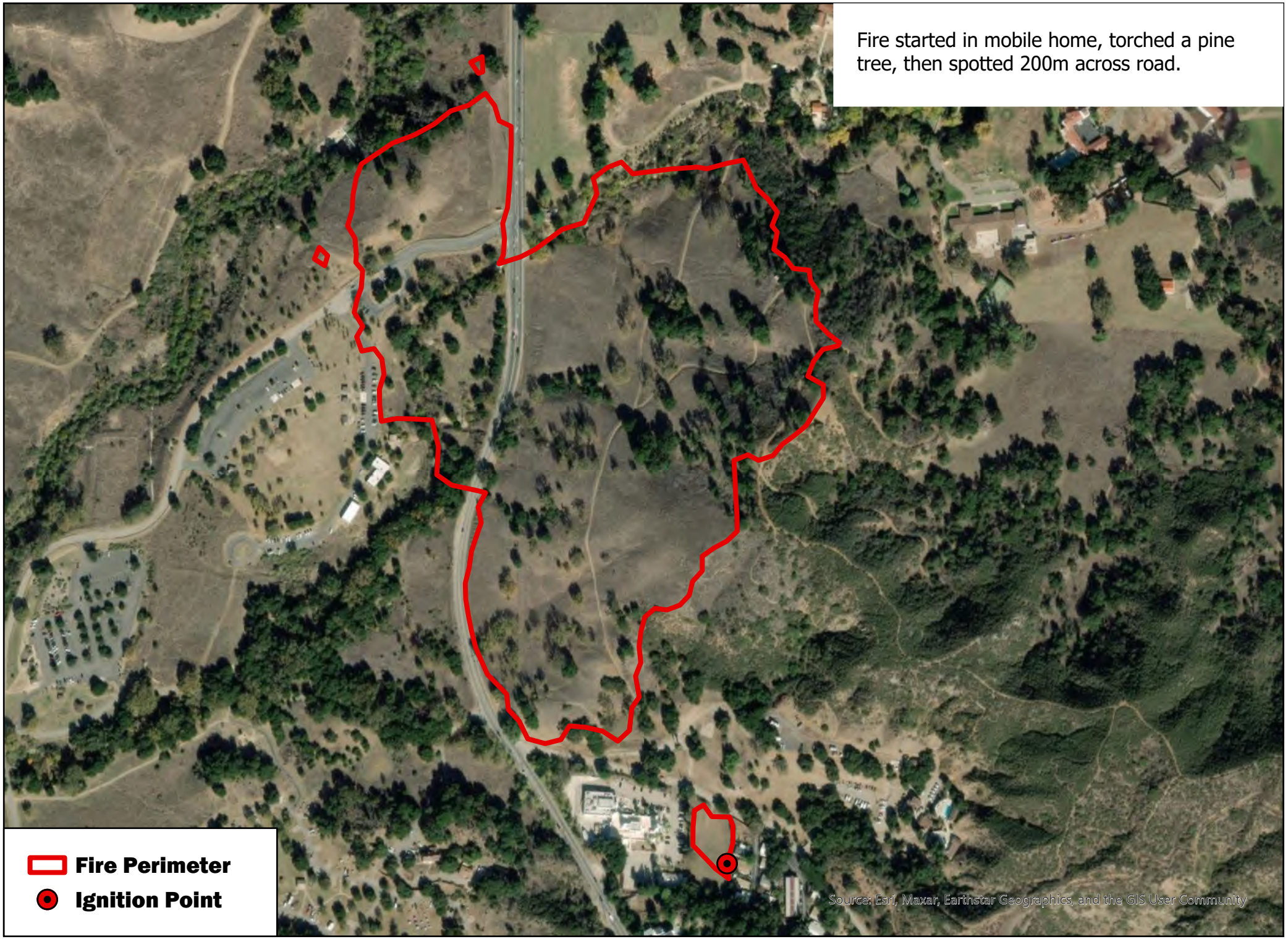
Photo 37 Photo 38 Photo 39 Photo 40 Photo 41 Photo 42 Photo 43 Photo 44 Photo 45 Photo 46 Photo 47 Photo 48

DUDEK

Appendix C

Historic Wildfires Caused by Structure Fires



DUDEK

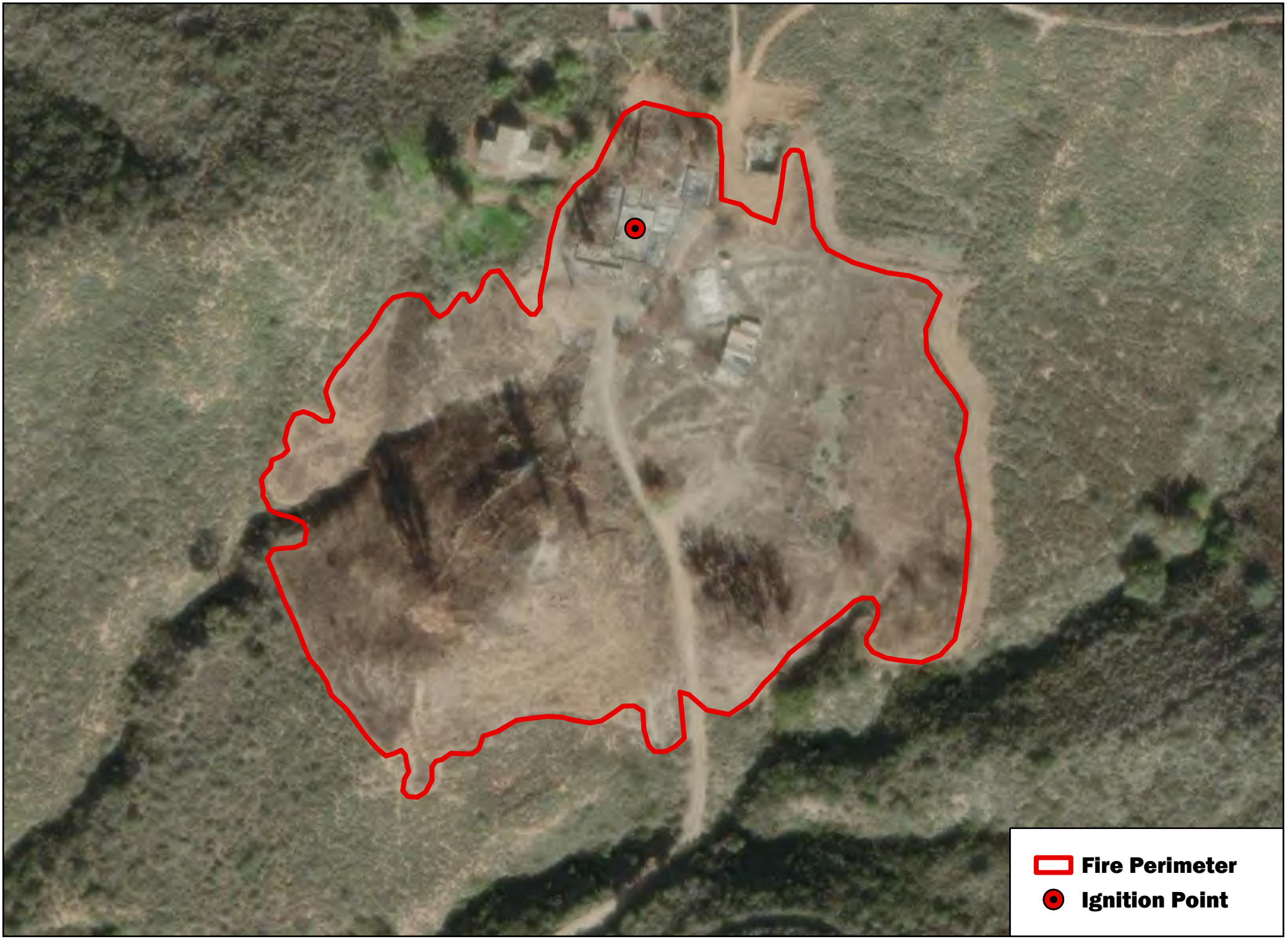
Source: CAL FIRE FRAP, 2022

DUDEK

Source: CAL FIRE FRAP, 2022

DUDEK

Source: CAL FIRE FRAP, 2022



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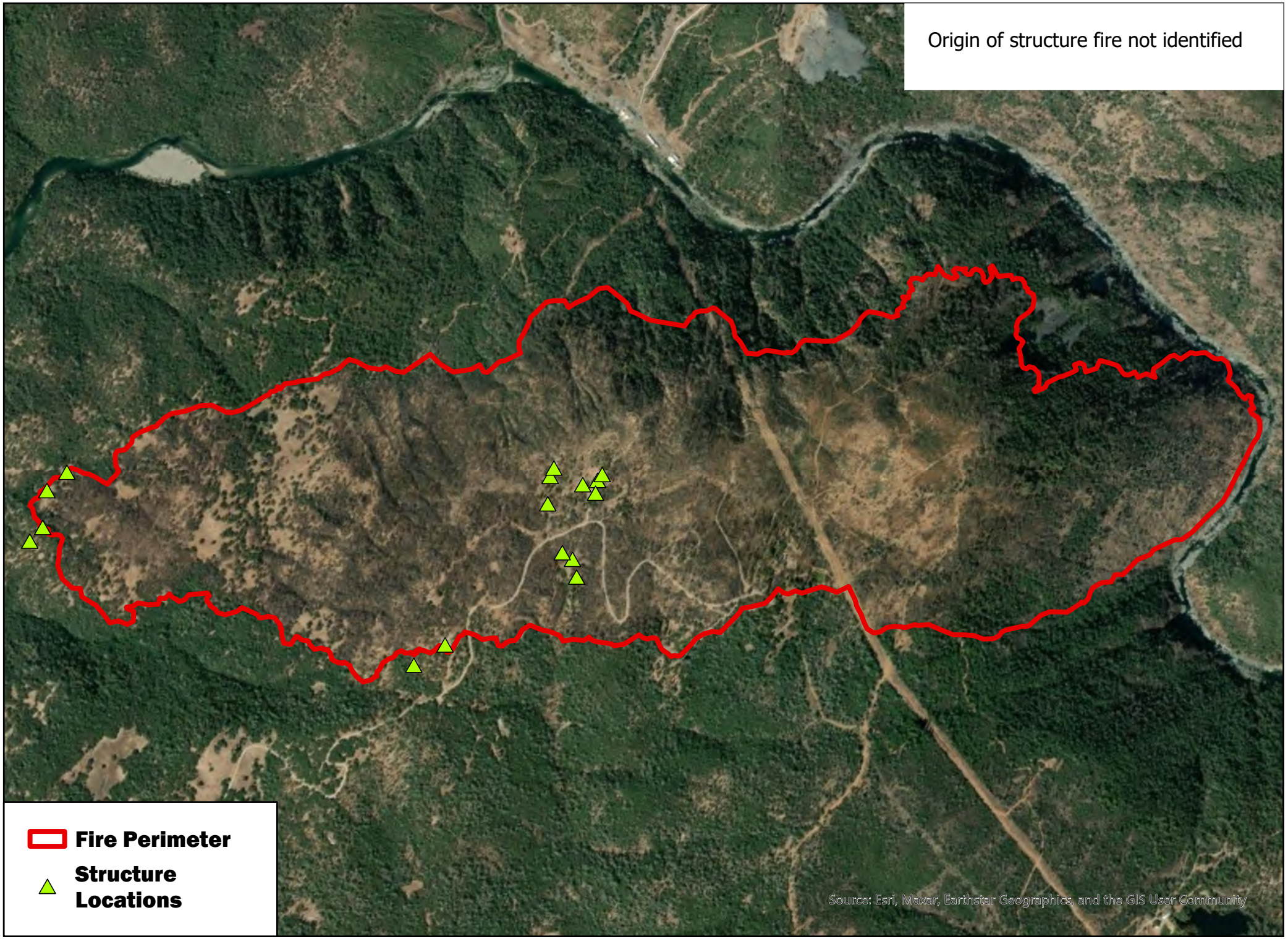

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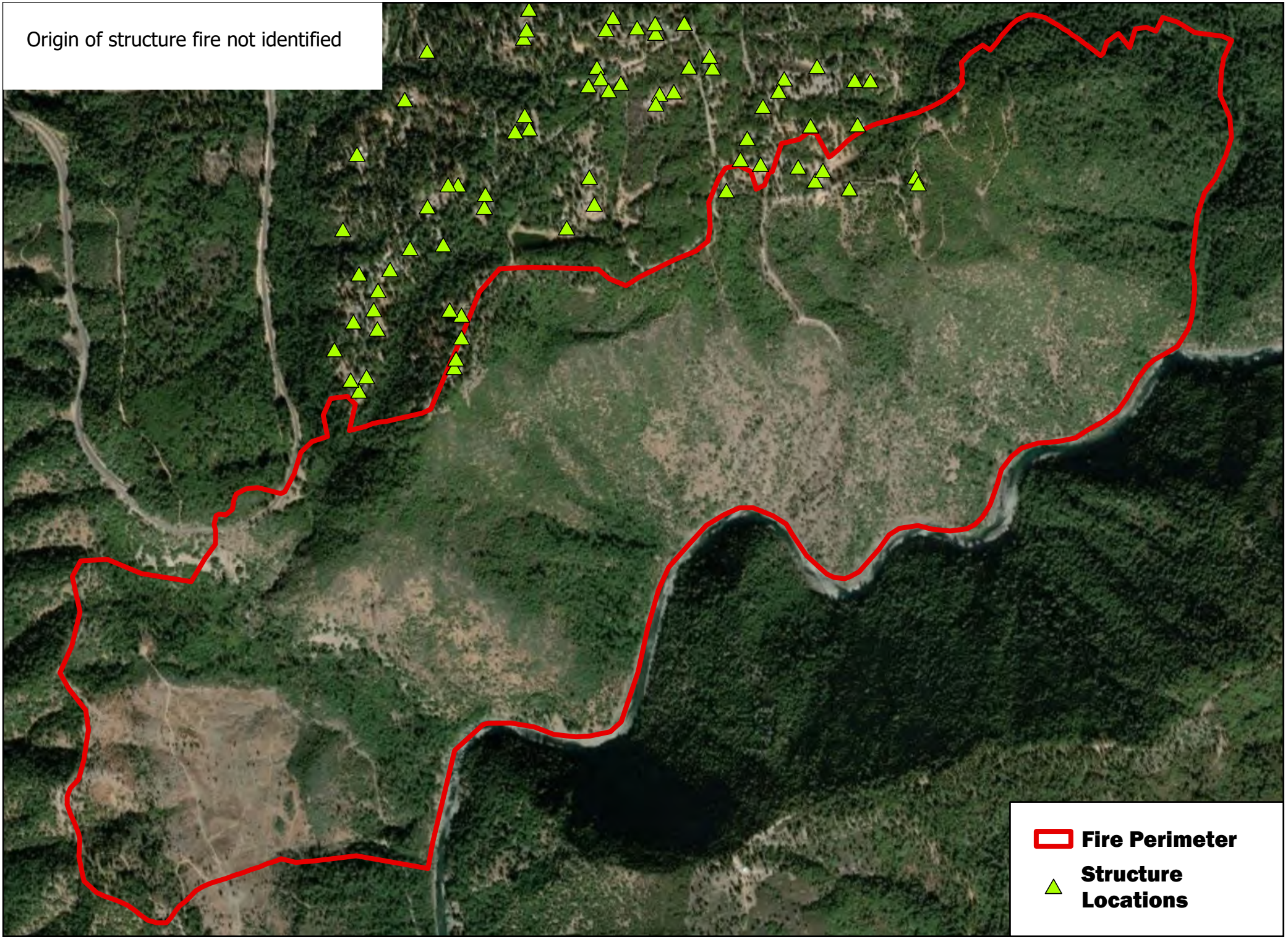

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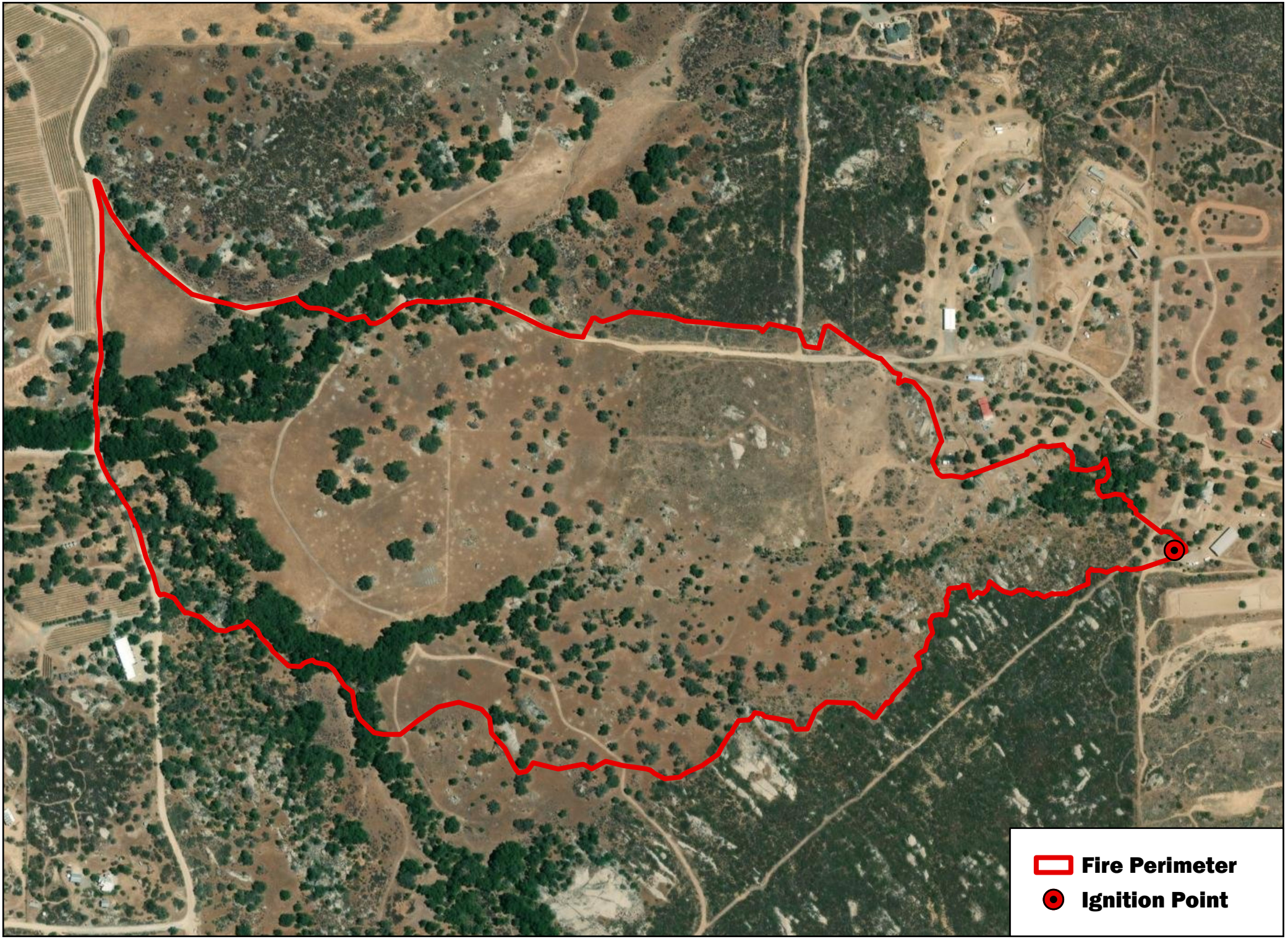
Source: CAL FIRE FRAP, 2022



DUDEK

Source: CAL FIRE FRAP, 2022

Appendix E

Centennial Wildfire Evacuation Technical Report

Wildfire Evacuation Technical Report

Centennial Project

MARCH 2025

Prepared for:

TEJON RANCH
P.O. Box 1000 | 4436 Lebec Road
Lebec, CA 93243
Contact: Nathan Keith, Sr. VP Real Estate

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Mike Huff

Mike Huff
Discipline Director, Urban Forestry + Fire Protection

Lisa Maier
Fire Protection Planner

Printed on 30% post-consumer recycled material.

Table of Contents

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TABLES

FIGURES

APPENDICES

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
CAL FIRE	California Department of Forestry and Fire Protection
CBC	California Building Code
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
HFHSZ	High Fire Hazard Severity Zone
HOA	Homeowner's Association
IC	Incident Command
IFC	International Fire Code
I-5	Interstate 5
LACDACC	Los Angeles County Department of Animal Care and Control
LACDCFS	Los Angeles County Department of Children and Family Services
LACCSS	Los Angeles County Department of Community and Senior Services
LACDHS	Los Angeles County Department of Health Services
LACDMH	Los Angeles County Department of Mental Health
LACDPH	Los Angeles County Department of Public Health
LACDPSS	Los Angeles County Department of Public Social Services
LACDPR	Los Angeles County Department of Parks and Recreation
LACDPW	Los Angeles County Department of Public Works
LACoFD	Los Angeles County Fire Department
LACSD	Los Angeles County Sheriff Department
MFHSZ	Moderate Fire Hazard Severity Zone
OA	Operations Area
OEM	Office of Emergency Management
Project	Centennial Project
SEIR	Supplemental Environmental Impact Report
TEP	Temporary Evacuation Point
TRA	Temporary Refuge Areas
WETR	Wildfire Evacuation Technical Report
WUI	Wildland Urban Interface
VHFHSZ	Very High Fire Hazard Severity Zone

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1 Purpose

This Wildfire Evacuation Technical Report (WETR) has three primary purposes. First, this WETR provides future Centennial populations with an evacuation resource that provides wildfire preparedness information and details procedures they may be asked to follow. Second, this WETR provides information that informs the Supplemental Environmental Impact Report (SEIR), providing an overview of evacuation procedures and protocols that are utilized by emergency management agencies during evacuation events. Finally, this WETR provides a Project-specific scenario evacuation time and potential impact modeling analysis to address California Environmental Quality Act (CEQA) and California Attorney General's Office Guidance.

2 Wildfire Preparedness

The Centennial Quick Reference Guide provides helpful tips and educational resources, so on-site populations are prepared in the event of a wildland fire evacuation.

Figure 1 illustrates the emergency evacuation routes potentially available to future developments of the Centennial Project. Figure 2 displays the Project vicinity and Figure 3 is the Project's site plan. In most wildfire evacuations, routes and destinations will be provided through emergency notifications. Occupants should know available routes, stay informed, and follow directions provided by law enforcement or fire agencies, news media and other credible sources. Occupants should not rely on navigation apps that may inadvertently lead persons toward the approaching wildfire.

2.1 Nearest Medical Facilities

At the time this plan was written the facilities listed below are the nearest medical facilities to project, however the Project has included a land incentive for a hospital as well as plans for clinics and urgent care centers.

Henry Mayo Newhall (35 miles)

23845 McBean Parkway,
Valencia, California 91355

Directions from Project:

- Start west on CA-138
- Merge onto I-5 South
- Take exit 168 for McBean Parkway
- Turn left onto McBean Parkway
- Hospital is on the left

Antelope Valley Medical Center (39 miles)

1600 West Avenue J

Lancaster, CA 93534

Directions from Project:

- East on CA-138 East toward 300th Street West
- Turn right to merge onto CA-138 East / CA-14 South toward Los Angeles / Lancaster / San Bernardino
- Take exit 45 for Avenue H toward Antelope Valley / Fairgrounds
- Turn left onto West Avenue H
- Turn right onto 15th Street West
- Turn right into medical center
- Hospital on right

Olive View UCLA Medical Center (44 miles)

14445 Olive View Drive,
Sylmar, CA 91342

Directions from Project:

- Start west on CA-138
- Use the left two lanes to merge onto the I-5 South
- Take exit 161A toward I-210 East toward Pasadena
- Take exit 2 toward Roxford Street
- Turn left onto Roxford Street
- Continue onto Olive View Drive
- Turn left onto Kennedy Road
- Hospital will be on the right.

Palmdale Regional Medical Center (45.2 miles)

38600 Medical Center Drive
Palmdale, CA 93551

Directions from Project:

- East on CA-138 East toward 300th Street West
- Turn right to merge onto CA-138 East / CA-14 South toward Los Angeles / Lancaster / San Bernardino
- Take exit 37 for 10th Street West
- Turn right onto 10th Street West
- Continue onto Tierra Subida Avenue
- Hospital on left

See also local Urgent Care facilities:

Concentra Urgent Care	AFC Urgent Care Valencia	High Desert Medical Group
25733 Rye Canyon Road Valencia, California 91355	27550 Newhall Ranch Road Valencia, California 91355	43839 15th Street West Lancaster, California 93534

2.2 Register to Receive Emergency Alerts

The County of Los Angeles uses a free mass notification system for residents and businesses called Alert LA County. The County's Office of Emergency Management (OEM) uses the system for notification of an emergency or disaster in communities. The system sends important emergency messages including evacuation instructions. It has accessibility features for people with disabilities and others with access and functional needs including the option to select one's preferred language for notifications.

In the event of a wildfire or similar emergency within the proximity of the Project site, the Incident Commander[1] (IC) will contact the Los Angeles County Sheriff Department (LACSD) and other law enforcement agencies that may be needed to support an emergency situation (i.e., California Highway Patrol). The LACSD and/or LACoFD coordinate with OEM to activate the Alert LA County system and release an emergency notification to the affected population. Because Alert LA County uses the 911 database, only land-line numbers are automatically included in the system. Therefore, the Project's occupants should register mobile phone numbers, and email addresses with the Alert LA system (https://lacounty.gov/emergency/alert-la/) in order to receive emergency evacuation instructions.

Contact Los Angeles County Office of Emergency Management Department at AlertLACountySupport@ceooem.lacounty.gov or dial (323) 980-2260.

The Project area is part of the greater Los Angeles media market, and the media outlets will also be a good source of information via television and radio. Media outlets cover emergency situations and information is disseminated guiding resident response. Commercial media broadcasts emergency information via nine radio stations: KHTS AM 1220, KFI AM 640, KNX AM 1070, KABC AM 790, KCBS FM 93.1, KFWB AM 980, KROQ FM 106.7, KRLA AM 870, KAVL AM 610. Television news outlets include:

- KABC 7 News: abc7.com
- KCBS 2 / KCAL 9 News: losangeles.cbslocal.com
- KNBC 4 News: nbclosangeles.com
- KTLA 5 News: ktla.com
- KTTV Fox 11 News: foxla.com

Social Media provides another outlet for news:

- County of Los Angeles
  - Facebook: https://www.facebook.com/countyofla
  - Twitter: https://twitter.com/CountyofLA/
- Los Angeles County Fire Department
  - Facebook: https://www.facebook.com/LACoFD/

[1] The individual responsible for the command of all function at the field response level, as defined by the Los Angeles County EOP.

  - Twitter: https://twitter.com/LACoFDPIO
- Los Angeles County Sheriff's Department
  - Facebook: https://www.facebook.com/LosAngelesCountySheriffsDepartment/
  - Twitter: https://twitter.com/LASDHQ

2.3 Get Involved in Community Readiness

Each of the Project's future developments is encouraged to form a volunteer Community Emergency Response Team (CERT) through the LACoFD CERT program. LACoFD offers free, FEMA-approved 20-hour CERT training to the communities within its jurisdiction. Classes are taught by trained emergency personnel, including firefighters and Emergency Medical Services (EMS) personnel. Through this training, participants learn about hazards that may impact their area as well as basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Upon completion of the course, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. Additional program information is available at https://fire.lacounty.gov/community-emergency-response-team/.

Additionally, the Project's HOA will organize annual evacuation public outreach, engage directly with organizations such as the California Fire Safe Council, and maintain a fire safe page on all websites for future developments of the Centennial Project, which will include this Wildfire Evacuation Technical Report (WETR) as well as links to important citizen preparedness information.

This WETR is prepared specifically for the Project and focuses on wildfire evacuations, although many of the concepts and protocols will be applicable to other emergency situations. Ultimately, this WETR will be used by the Project's community and HOA to educate occupants on their evacuation approach during wildfires and other similar emergencies. It is critical for Project occupants to understand the importance of being prepared, so if/when the time comes where evacuation is necessary, they will be able to systematically implement this evacuation study. Some actions Project occupants can complete in advance include:

- Follow the "Ready, Set, Go!" model developed for wildfire evacuations (Appendix A). "Ready, Set, Go!" is a program providing residents with the pre-planning needed to facilitate a fast and efficient evacuation.
- Become familiar with potential evacuation routes out of the area, as shown in Figure 1. Familiarity with evacuation routes will facilitate evacuation when messaging is provided regarding where to go and which routes to take.
- Create a car emergency kit, including cell phone charger, flashlight, jumper cables, water, and food.
- Gather important paperwork, including (personal) birth and marriage certificates, passports, Social Security cards; and (business) account information, data storage, and any other important documents.
- As time allows, make sure to secure personal property by locking all doors and windows, and unplugging electrical equipment, such as appliances and electronics.

Sample emergency preparedness resources available to occupants are provided in Appendices A-1 through A-2 (Los Angeles County Fire Department Emergency Survival Guide and "Ready, Set, Go!" Wildland Fire Action Guide) and Appendices B-1 and B-2 (Family Disaster Plan and Checklists). In addition, Project occupants are encouraged to become familiar with the concepts detailed at the following websites:

- LACoFD Emergency Preparedness Guide: https://fire.lacounty.gov/emergency-disaster-preparedness-safety-tips/
- "Ready, Set, Go!" Wildland Fire Action Guide: https://www.fire.lacounty.gov/rsg/
- Family Communication Plan: https://www.ready.gov/sites/default/files/2020-03/family-emergency-communication-planning-document.pdf
- Red Cross Emergency Planning: http://www.redcross.org/get-help/how-to-prepare-for-emergencies/make-a-plan
- Building a disaster kit: http://www.redcross.org/get-help/prepare-for-emergencies/be-red-cross-ready/get-a-kit
- Hazardous Materials Emergency Preparedness: https://www.ready.gov/hazardous-materials-incidents
- Making a Plan Checklist: https://www.ready.gov/make-a-plan

2.4 Evacuation Analysis Limitations

Wildfires and other emergencies are often fluid events and the need for evacuations are typically determined by on-scene first responders or by a collaboration between first responders and designated emergency response teams, including OEM and the IC established for larger emergency events. As such, and consistent with all emergency evacuation plans, this WETR is to be considered a tool that supports existing pre-plans and provides for occupants, who are familiar with the evacuation protocol, but is subservient to emergency event-specific directives provided by agencies managing the event.

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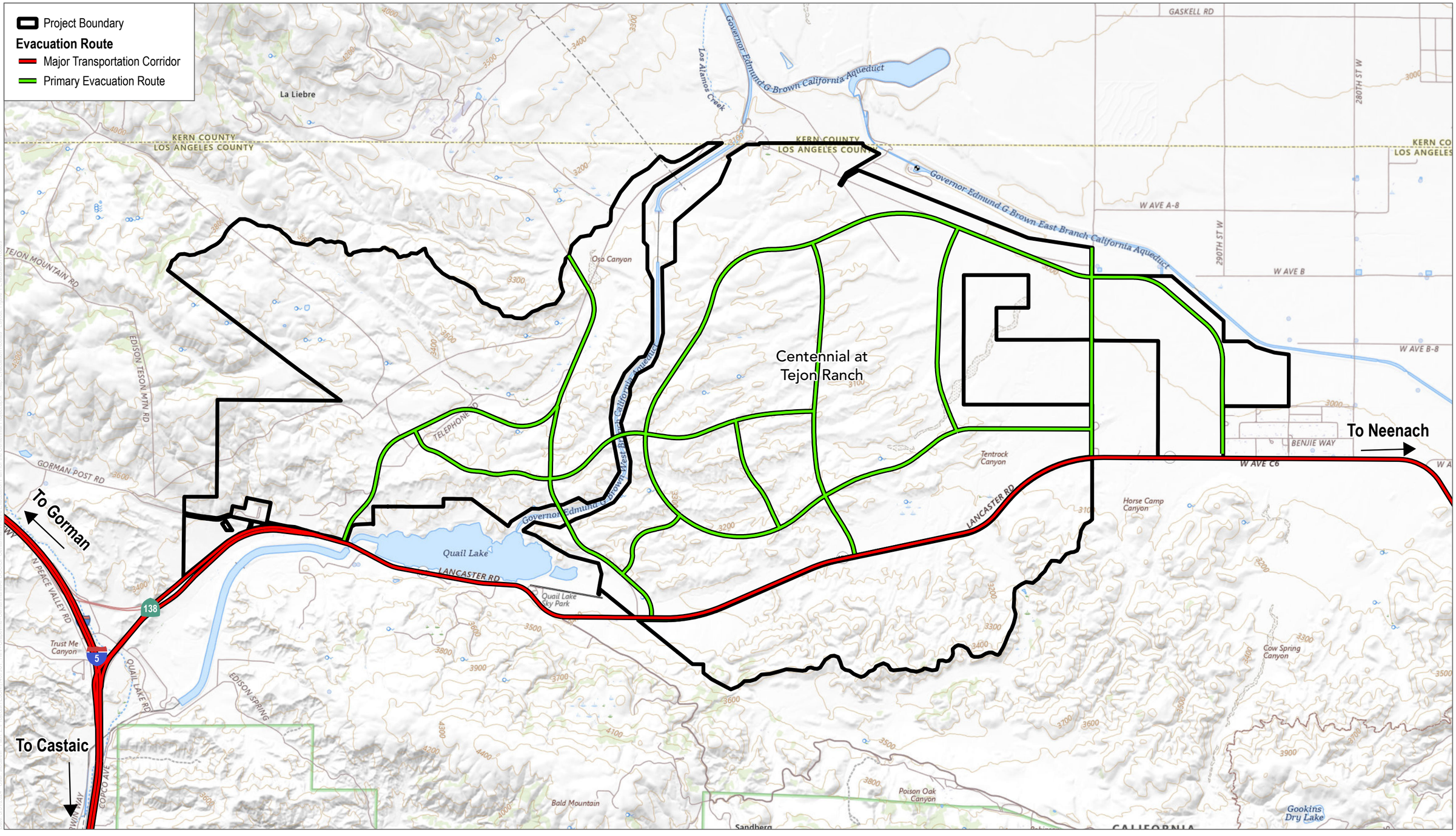

SOURCE: USGS National Map 2024

DUDEK

0 1,500 3,000 Feet

FIGURE 1

Evacuation Routes

Wildfire Evacuation Study for the Centennial Project

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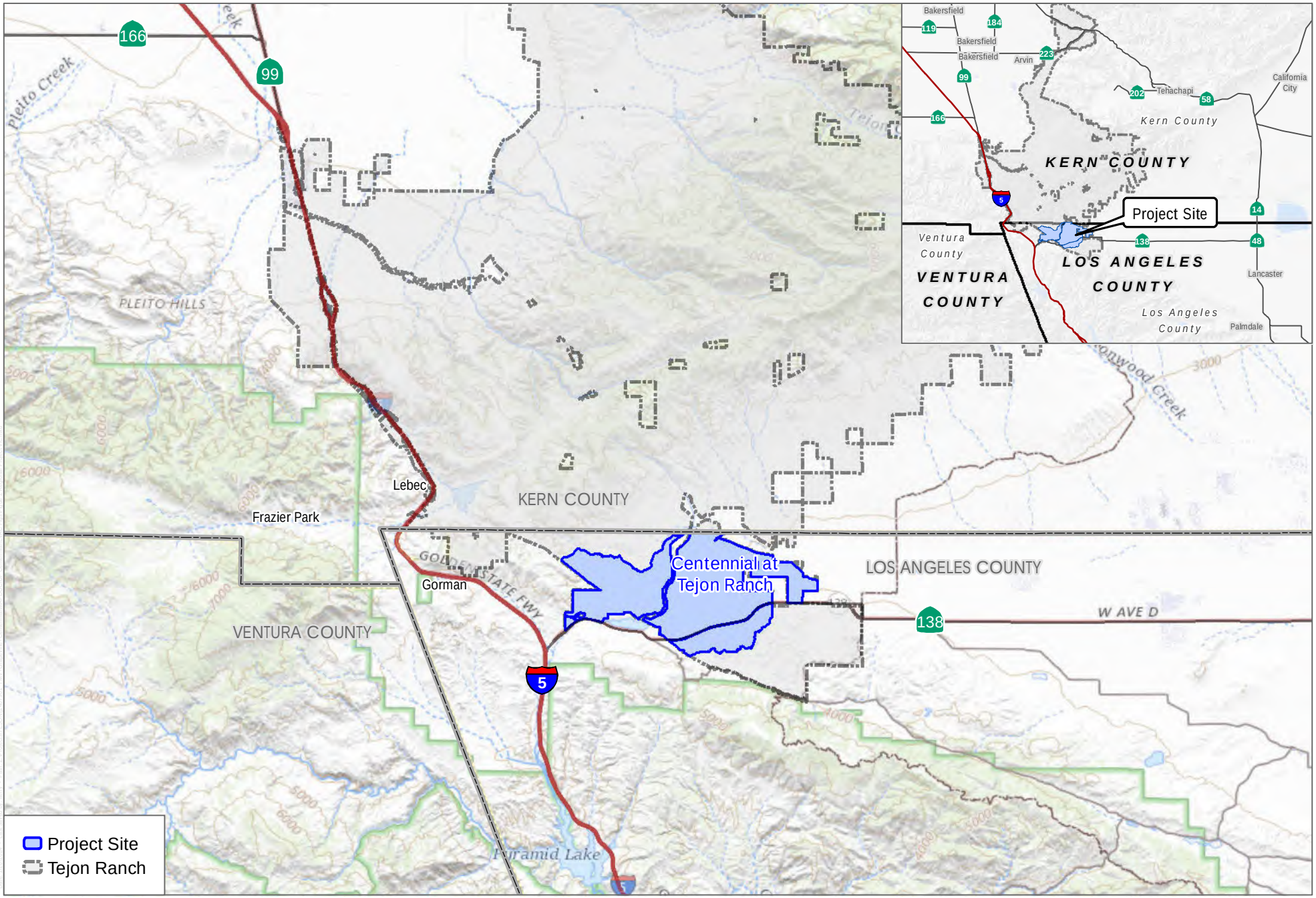

SOURCE: AERIAL-NAIP 2020

DUDEK

0 55,000 110,000 Feet

FIGURE 2

Regional Project Vicinity

Wildfire Evacuation Study for the Centennial Project

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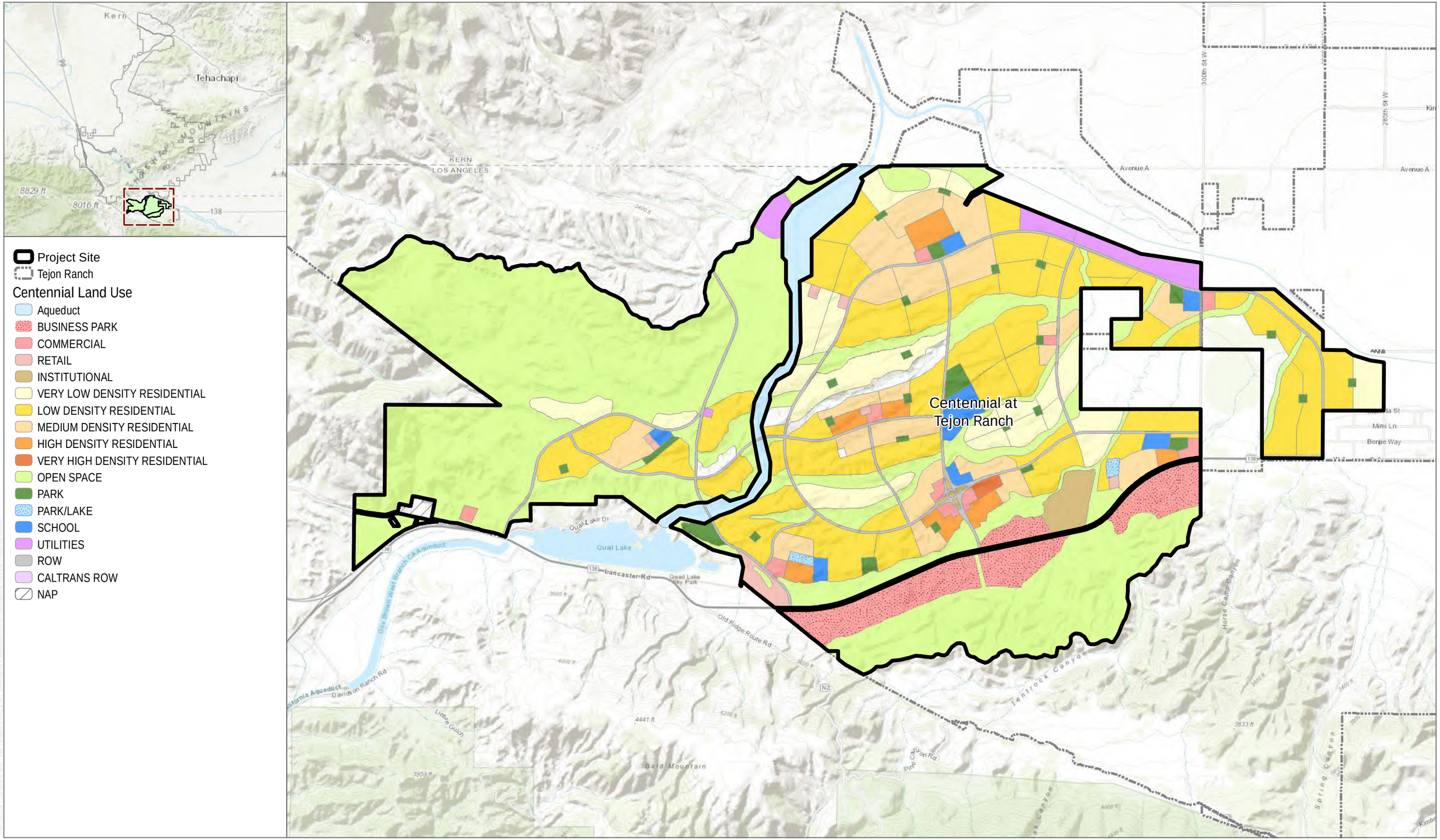

SOURCE: BASEMAP-ESRI MAPPING SERVICE 2023; LAND USE-TEJON RANCH 2023

DUDEK

0 1,950 3,900 Feet

FIGURE 3

Centennial Project Site Plan

Wildfire Evacuation Study for the Centennial Project

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3 Introduction

This Wildfire Evacuation Technical Report (WETR) was prepared based on the County of Los Angeles Operational Area Emergency Operations Plan (2023). The format and content of this report is consistent with the recommendations of the County's EOP. A complete copy of the County's EOP can be downloaded here:

County EOP:

https://ceo.lacounty.gov/wp-content/uploads/2023/11/County-of-Los-Angeles-OAEOP-2023-Final-for-Website.pdf

Evacuation is a process by which people are moved from a place where there is immediate or anticipated danger, to a place of safety, and offered appropriate temporary shelter facilities. When the threat to safety is gone, evacuees are able to return to their normal activities, or to make suitable alternative arrangements. The overarching goal of evacuation planning is to maximize the preservation of life while reducing the number of people that must evacuate and the distance they must travel to seek safe refuge.

This WETR for the Centennial Project will outline strategies, procedures, recommendations, and organizational structures that can be used to implement a coordinated evacuation effort in the case of a wildfire or similar emergencies that require movement of people out of the area or temporary sheltering in place in protected structures.

3.1 Project Description

The Centennial Specific Plan is a large-scale master-planned community, resulting in roughly 54% of the site converted to urbanized uses while approximately 46% of the site is either left undisturbed or will be active recreation open areas. The Project would develop many on-site infrastructure and utility improvements to support the various housing, business, and institutional uses. In summary, the proposed 12,323-acre Project area would include the following land uses at build out

- Up to 19,333 residential units
- 1,034,550 square feet of commercial
- 7,363,818 square feet business park
- 1,568,160 square feet institutional/Civic uses on 110 acres
- 146 acres for schools
- 75 acres of commercial recreation
- 163 acres of parks
- 5,624 acres of open space
- 327 acres for streets
- 191 acres for utilities

As described in the Supplemental Environmental Impact Report (SEIR) the Project will make minor adjustments to the previously approved 2019 Centennial Specific Plan, which includes: (1) allowing utility-scale battery storage and microgrids to improve the resilience of the Project's onsite renewable energy electricity program in support of the Net-Zero GHG program, and (2) modifying internal roadway design standards to improve evacuation capacity for future subdivision maps.

With regard to wildfire risk on the Project site, an important component is the planned wildland urban interface nature of this community. Planned development resembles a clustered design with continuous edges between development areas and undeveloped vegetation. Large expanses of open space in the extreme northwest and southeast as well as in the far western portions of the project include wildland fuels. These open space areas represent potential exposed interfaces to the wildland with the remainder of the interior project areas represented by built and maintained landscape. In addition to these perimeter open space areas, minor and major greenways are planned for integration within the Centennial communities. In most cases, these interior greenways will be fully disturbed and graded during construction and then reseeded and will include managed landscapes presenting minimal wildfire hazard. Nonetheless, the structures planned adjacent to these areas are providing fuel modification, interior sprinklers and ignition resistant construction that is appropriate for the types of wildfires that may occur in these areas. Other large expanses of open space in the extreme northwest and southeast as well as in the far western portions of the project include wildland fuels. These open space areas represent potential exposed interfaces to the wildland with the remainder of the interior project areas represented by built and maintained landscape.

The proposed land use improvements previously described will be completed according to the then current California Fire Code and Building Codes (as adopted by the County, per Title 32) as well as the 2021 International Fire Code. At the time of this report, the current California Fire and Building Codes require that land use improvements include ignition-resistive construction, interior sprinklers, structure set-backs, and required fire flow, along with a designated fuel modification area which varies throughout the Project based on modeled fire intensity and site features such as vegetation and topography (Dudek 2024). The following descriptions provide additional detail regarding the proposed land uses.

Residential

Residential units will be provided within land use categories ranging from very low to very high residential. As such, densities will range from as low as 2 dwelling units per acre to as high as 50 dwelling units per acre. There will be detached as well as attached units.

Public Uses

The Centennial Specific Plan Project public uses include recreation areas, parks, golf courses, library, and hospital, amongst others.

Schools

Seven public school sites will be constructed within the project. Five of the school sites will be designated K–8, one K- 5 and there will be one high school.

Public Safety Sites

The Centennial Specific Plan Project also includes proposed public facilities locations including three fire stations, with an option for a fourth if determined necessary by LACoFD, and a temporary sheriff sub-station open day one of the Project that will be upgraded to a full sheriff station as the community builds out. Details related to final location, funding, phasing, specific fire station facility components, equipment, and staffing will be determined with LACoFD direction.

Project Open Space

The largest component of open space in the overall Centennial Specific Plan Project area is comprised of the areas outside the individual residential lots. The development concept is described in detail in the Centennial Specific Plan.

Additionally, proposed off-site improvements include:

- Widening SR-138, one of the primary access roads to the Project site
- Undergrounding an existing off-site powerline
- Providing connections to existing off-site utility systems

3.2 Applicable Emergency Evacuation Regulations, Standards and Planning Tools

3.2.1 Federal

3.2.1.1 Disaster Mitigation Act

The Disaster Mitigation Act of 2000 requires that a state mitigation plan, as a condition of disaster assistance, add incentives for increased coordination and integration of mitigation activities at the state level through the establishment of requirements for two different levels of state plans: “Standard” and “Enhanced.” States that develop an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program. The Disaster Mitigation Act also established a new requirement for jurisdictions to prepare local mitigation plans.

3.2.1.2 National Incident Management System (NIMS)

The NIMS guides all levels of government, nongovernmental organizations and the private sector to work together to prevent, protect against, mitigate, respond to and recover from incidents. NIMS provides community members with a shared vocabulary, systems and processes to successfully deliver the capabilities described in the National Preparedness System. The National Preparedness System is a Presidential Policy Directive establishing a common goal to create a secure and resilient nation associated with prevention, protection, mitigation, response and recovery to address the greatest risks to the nation. One core area is fire management and suppression.

NIMS defines operational systems that guide how personnel work together during incidents.

3.2.2 State

3.2.2.1 Fire Hazard Severity Zones

To assist each fire agency in addressing its responsibility area, California Department of Forestry and Fire (CAL FIRE) uses a severity classification system to identify areas or zones of severity for fire hazards within the state. CAL FIRE is required to map these zones for State Responsibility Areas and identify Very High Fire Hazard Severity Zones (VHFHSZ) for Local Responsibility Areas. The Specific Plan is located within a Moderate Fire Hazard Severity Zone (MFHSZ), High Fire Hazard Severity Zone (HFHSZ), and Very High Fire Hazard Severity Zone (VHFHSZ).

3.2.2.2 California Wildland-Urban Interface Code

On September 20, 2005, the California Building Standards Commission approved the Office of the State Fire Marshal's emergency regulations amending the California Building Code (CBC) (California Code of Regulations [CCR] Title 24, Part 2). Section 701A of the CBC includes regulations addressing materials and construction methods for exterior wildfire exposure and applies to new buildings located in State Responsibility Areas or Very High Fire Hazard Severity Zones in Local Response Areas.

3.2.2.3 California Fire Code

The 2022 California Fire Code (CCR Title 24, Part 9) establishes regulations to safeguard against the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The Fire Code also establishes requirements intended to provide safety for and assistance to firefighters and emergency responders during emergency operations. The provisions of the Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout California. The Fire Code includes regulations regarding fire-resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire services features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and wildland-urban interface areas. The County has adopted the California Fire Code as Chapter 15.56, as amended, including appendices addressing fire-flow requirements for buildings.

Note: The Project will be compliant with the then current California Fire and Building Codes. This WETR is written to include current code standards including Chapter 7A of the 2022 California Building Code (CBC); the 2022 California Residential Code, Section 327; and the 2018 Edition of the International Fire Code as adopted by the County. The Project would currently also be subject to the provisions of Section 4291 of the Public Resources Code; Chapter 12-7A of the CA Reference Standards Code, Title 14, Division 1.5, Chapter 7, Subsection 2, Articles 1-5 and Title 14, Division 1.5, Chapter 7, Subsection 3, Section 1299 of the CA Code of Regulations; Title 19, Division 1, Chapter 7, Subchapter 1, Section 3.07 of the CA Code of Regulations; and Sections 51175-511829 of the CA Government Code, or the then current versions of each code.

3.2.2.4 California Emergency Services Act

The California Emergency Services Act (California Government Code §8550, et seq.), provides for the creation of an Office of Emergency Services, assign and coordinate functions and duties to be performed during an emergency, facilitate mutual aid, and assign resources (including manpower and facilities) throughout the state for dealing with any emergency that may occur.

3.2.2.5 California Office of Emergency Services

The California Office of Emergency Services (OES) is responsible for the coordination of overall state agency response to disasters. Assuring the state's readiness to respond to, recover from all hazards and assisting local governments in their emergency preparedness, response, recovery and mitigation.

3.2.2.5.1 Standardized Emergency Management System (SEMS)

SEMS is the cornerstone of California's emergency response system and the fundamental structure for the response phase of emergency management. The system unifies all elements of California's emergency management community into a single integrated system and standardizes key elements. SEMS incorporates:

- **Incident Command System (ICS)** - A field-level emergency response system based on management by objectives
- **Multi/ Inter-agency coordination** - Affected agencies working together to coordinate allocations of resources and emergency response activities
- **Mutual Aid** - A system for obtaining additional emergency resources from non-affected jurisdictions.
- **Operational Area Concept** - County and its sub-divisions to coordinate damage information, resource requests and emergency response.

3.2.2.6 Attorney General Guidance

The California Office of the Attorney General issued (October 2022) guidance (Guidance) outlining best practices for analyzing and mitigating wildfire impacts of development projects under the California Environmental Quality Act (CEQA). The Guidance is intended to help local governments' evaluation and approval considerations for development projects in fire-prone areas, and to help project design in a way that minimizes wildfire ignition and incorporates emergency access and evacuation measures. Importantly, the Guidance does not impose additional legal requirements on local governments, nor does it alter any applicable laws or regulations.

The Guidance states that evacuation modeling and planning should be required for all projects located in HFHSZ/ VHFHSZ that present an increased risk of ignition and/or evacuation impacts. It further states that local jurisdictions should require evacuation modeling and planning to be developed prior to project approval to provide maximum flexibility in design modifications necessary to address wildfire risks and impacts. The Project is in an area partially within an area designated as high and very high fire hazard severity zone and adjacent to open space areas, which is why this WETR was prepared for the Project and includes the analysis of several scenarios, including existing and with Project conditions. The Project would provide important road network improvements including widening SR 138. These improvements assist Project access as well as provide a public benefit for existing occupants of adjacent developed areas.

The Guidance further states that evacuation modeling and analysis must augment existing information when necessary to include adequate analysis of the following:

- Evaluation of the capacity of roadways to accommodate project and community evacuation and simultaneous emergency access. Existing and future roadway capacities are analyzed in Section 4 of this Emergency WETR.
- Assessment of the timing for evacuation. Analysis of evacuation timing is detailed in Section 4.3.

- Identification of alternative plans for evacuation. Alternative plans for evacuation would be feasible due to the designated on-site sheltering in the Institute Building as well as other buildings.
- Evaluation of the Project's impacts on existing evacuation plans. Published and publicly available existing evacuation plans were not available to Dudek during the preparation of this plan. The Project would utilize primary evacuation routes that would be available to other evacuees, but with improved capacities, new connections and better flexibility and options. This Evacuation Study is based on the County's EOP.

Consideration of the adequacy of emergency access, including the project's proximity to existing fire services and the capacity of existing services. Emergency access is provided that is consistent with the fire code requirements. As further discussed in the Project's Fire Protection Plan (Dudek 2024), per LACOFD response targets the first responding engine should be within 1.5 miles of the Project Site and the first due truck company should be within 2 miles. Based on these criteria, the Project is out of compliance with the LACOFD response target due to the distance from the closest fire station. However, the Project plans to build a minimum of three fire stations on site, which will result in compliance with response time standards and a potential forth is response time is not met.

- Traffic modeling to quantify travel times under various likely scenarios. The Emergency Wildfire Evacuation Travel Time Technical Analysis (Appendix C) utilizes VISSIM, a microscopic, multimodal traffic flow modeling software used to simulate different traffic conditions under several different scenarios including Existing, Existing + Project, Existing + Cumulative, and Existing + Cumulative + Project.

3.2.3 Local

3.2.3.1 Los Angeles County Multi-Jurisdictional Local Hazard Mitigation Plan

The purpose of the County's Multi-Jurisdictional Hazard Mitigation Plan (2020) is to identify the County's hazards, review and assess past disaster occurrences, estimate the probability of future occurrences, and set goals to mitigate potential risks to reduce or eliminate long-term risk to people and property from natural and human-made hazards.

3.2.3.2 Los Angeles County Operational Area Emergency Response Plan

The 2012 Los Angeles County Operational Area Emergency Response Plan describes a comprehensive emergency management system that provides for a planned response to disaster situations associated with natural disasters, technological incidents, terrorism, and nuclear-related incidents within the County of Los Angeles. These plans delineate operational concepts relating to various emergency situations, identify components of the Emergency Management Organization, and describe the overall responsibilities for protecting life and property and providing for the overall well-being of the population. The plan also identifies the sources of outside support that might be provided (through mutual aid and specific statutory authorities) by other jurisdictions, state and federal agencies, and the private sector.

3.2.3.3 County of Los Angeles Fire Code

The County of Los Angles Fire Code adopts the 2022 California Fire Code with additions, deletions and amendments. Provisions of the California Fire Code are described under State Regulations, above.

3.2.3.4 County of Los Angeles Building Code

The County Building Code is intended to regulate the construction of applicable facilities and encompasses (and formally adopts) associated elements of the 2022 California Building Code. Specifically, this includes regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, use, height, area and maintenance of all structures and certain equipment therein.

4 Los Angeles County Evacuation Procedures - Background

This WETR has been prepared based on the Los Angeles County Office of Emergency Management's Operations Area (OA) Emergency Operations Plan (EOP).

To establish a framework for implementing well-coordinated evacuations, the OEM addresses evacuations as part of the County's OA EOP. Large-scale evacuations are complex, which often require multi-departmental and/or multi-jurisdictional efforts, and involve coordination between many departments, agencies, and organizations. Emergency services and other public safety organizations play key roles in ensuring that an evacuation is effective, efficient, and safe. OEM is charged with emergency management and is responsible for maintaining situational awareness of threats that may necessitate a citizen evacuation.

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

Evacuation during a wildfire is not necessarily directed by the fire agency, except in specific areas where fire personnel may enact evacuations on scene. The Los Angeles County Sheriff's Department has primary responsibility for evacuations and, when necessary, will be supported by LACoFD, Los Angeles Department of Public Works, and other cooperating departments and law enforcement agencies. LACSD, OEM and responding fire department personnel work closely within the Unified Incident Command System to assess fire behavior and spread, which ultimately guides evacuation decisions. During an evacuation effort, if necessary, the LACSD will be assisted by other law enforcement and support agencies. As described in Section 2 above, a number of County departments will support evacuation efforts. Procurement, regulation, and allocation of resources will be accomplished by those designated in the County's EOP.

For mass evacuations several Los Angeles County departments have primary agency responsibility and authority for providing services. These departments include OEM, LACoFD, LACSD, Department of Public Works (LACDPW), Department of Children and Family Services (LACDCFS), Community and Senior Services (LACCSS), Health Services (LACDHS), Mental Health (LACDMH), Public Health (LACDPH), Public Social Services (LACDPSS), Department of Animal Care & Control (DACC) and County Department of Parks and Recreation (LACDPR). A description of each of these department's area of responsibility is provided below, and a full list of responsibilities by County Department can be found in Section 5 of the OA EOP – Roles and Responsibilities.

- **OEM:** Will activate the OA Emergency Operations Center (EOC) to support larger-scale evacuations, coordinates the Specific Needs Awareness Planning (SNAP) program, and coordinates requests for resources through SEMS.
- **LACoFD:** The Fire Department's mission is to "proudly protect lives and property and the environment providing prompt, skillful, cost-effective protection and life safety services." This includes response to emergencies of all types: fires, floods, earthquakes, wildland fires, hazardous materials incidents, civil disturbances, emergency medical rescues, Urban Search and Rescue incidents and ocean lifeguard rescues.

  The County of Los Angeles Fire Chief is designated as the Region I Coordinator and is primarily responsible for the overall coordination of mutual aid fire and rescue resources during major emergencies.

- **LACSD:** During an emergency where the OA EOC is activated, the Sheriff is the Director of Emergency Operations. The supportive law enforcement departments are: Superior and Municipal Courts, District Attorney, Public Defender, Alternate Public Defender and Probation.
- **LACDPW:** The Department of Public Works is the lead County department in conducting Damage Assessment and Construction and Engineering Recovery activities and has a lead role in responding to major emergencies. DPW is responsible for maintenance and repair of infrastructure, including the road network, flood control system, general aviation airports administered by the department, sewer and waterworks districts and building and safety functions.
- **LACDCFS:** The primary concern of the Department of Children and Family Services is the safety and well-being of the children in its care, and children, otherwise known as "unaccompanied minors", who may be left unsupervised as a result of a disaster. In a major disaster, DCFS is a support for DPSS and provides a variety of services for displaced children and offer various programs, including: 1) deployment of DCS staff to designated Red Cross shelters to process the initial intake and registration of unaccompanied minors, including follow-up action to reunite them with their parents/guardians or to provide appropriate placement; 2) support the DPSS, on request, in the provision of emergency welfare services, including assigning staff to emergency shelters or relief programs to assist in interviewing victims, processing requests for disaster assistance and other related tasks; and 3) continuing commitment to provide services to children under DCFS care, including the placement of children affected by a disaster.
- **LACCSS:** The Department of Community and Senior Services is designated as a support department to DPSS for disaster-response efforts. CSS will provide liaison through a human services community-based network of contractors through the operational units (Aging and Adult Services, Employment and Training, Community Services Block Grant) at Senior Centers, Community Centers, Senior Congregate and Home-Delivered Meals, Food Pantries and shelters throughout the County. CSS also manages Adult Protective Services (APS) for high-risk individuals aged 18 and over, who are a danger to themselves and others. APS social workers will conduct health and safety checks on high-risk individuals, in coordination with DPSS In Home Supportive Services (IHSS) social workers immediately following a disaster, to determine their status and need for assistance.
- **LACDHS:** The mission of the Department of Health Services during disaster response is to provide for the medical and health needs of the population of the OA by organizing, mobilizing, coordinating and directing public and private medical and health resources. The Director of Health Services, as the OA Coordinator, is responsible for the countywide management and allocation of medical and health resources, both public and private.
- DHS is unique in that a majority of its medical response capability is provided by private sector health facilities. These facilities include hospitals, clinics and skilled nursing facilities that may also be designated as Field Treatment Sites to handle mass casualties.
- **LACDMH:** The mission of the Department of Mental Health during a disaster is to coordinate and provide mental health services to the community, emergency responders and maintain continuity of care to existing consumers. The department is responsible for the countywide management and allocation of mental health resources to the community.
- **LACDPH:** This Department of Public Health directs and coordinates public health actions and services during disaster response conditions. Public health actions may include:
  - Management and command of disease control operations
  - Activation of mass dispensing operations
  - Activation of quarantine and isolation options

- Issuance of Health Officer Orders
- Activation of seizure orders in support of health operations
- Activation of radiological response plans and management of radiation incident operations

Public Health services may include:

- Managing of radioactive sources
- Coordinating inspection of health hazards in damaged buildings
- Inspecting foodstuffs and issuance of disposal orders
- Inspecting potable water delivery systems
- Inspecting and certifying medications
- Providing vector control
- Inspecting emergency sheltering and feeding operations
- Detecting and identifying possible sources of contamination dangerous to the general physical and mental health of the community

- **LACDPSS:** The Department of Public Social Services is the OA coordinator for care and shelter. DPSS is the OA liaison with private, not-for-profit human services agencies, including Community Based Organizations. DPSS is also the OA liaison with the grocery industry. DPSS manages the CalFresh (formerly the Emergency Food Stamp program) program when activation is requested by the County and approved by the USDA. DPSS In-Home Supportive Services Social Workers conduct health and welfare checks on high risk IHSS consumers immediately following a disaster.
- **LACDACC:** During emergencies, the Department of Animal Care and Control responds to disaster areas to rescue domestic animals, and provides support for the placement of exotic animals, birds, reptiles displaced by catastrophic events and provides support to fire and law enforcement agencies responding to the crisis. Additionally, the Department offers emergency animal housing at its shelters. Depending on the circumstances, the Department may also set up temporary emergency animal shelters to assist persons who have taken their pets from evacuated areas. This department also acts as a support department to the Sheriff as needed.
- **LACDPR:** In the event of a disaster, the Department of Parks and Recreation will make its parks and facilities available to relief and disaster agencies to provide care and shelter for disaster victims. Park Rangers will act as the primary security resource at these facilities.

  In a widespread disaster, the Department of Public Social Services and Parks and Recreation personnel may be used to assist staff from the relief agencies. Parks and Recreation are a support for DPSS during an emergency.

Every evacuation scenario will include some level of unique challenges, constraints, and fluid conditions that require interpretation, fast decision making, and alternatives. For example, one roadway incident that results in blockage of evacuating vehicles may require short-term or long- term changes to the evacuation process. Risk is considered high when evacuees are evacuating late, and fire encroachment is imminent. This hypothetical scenario highlights the importance of continuing to train responding agencies, model various scenarios, educate the public, and take a conservative approach to evacuation decision timelines (evacuate early) while providing contingency plans.

Equally important, the evacuation procedures should be regularly updated with lessons learned from actual evacuation events, as new technologies become available that would aid in the evacuation process, and as changing landscapes and development patterns occur adjacent to the Project area that may impact how evacuation is accomplished. This WETR is consistent with the County's evacuation planning standards and will remain current through regular updates to the Project's Emergency Response Plan.

As demonstrated during evacuations throughout Los Angeles County over the last several years, an important component to successful evacuation is early assessment of the situation and early notification via managed evacuation declarations. Los Angeles County utilizes early warning and informational programs to help meet these important needs. Among the methods available to citizens for emergency information are Alert LA County, radio, television, social media/internet, neighborhood patrol car, and public address notifications.

4.1 Evacuation Response Operations

An evacuation of any area requires considerable coordination among numerous public, private, and community/non-profit organizations. Wildfire evacuations will typically allow time for responders to conduct evacuation notification in advance of an immediate threat to life safety; giving occupants time to gather belongings and make arrangements for evacuation. On the other hand, other threats, including wildfires igniting nearby, may occur with little or no notice and certain evacuation response operations will not be feasible. Evacuation assistance of specific segments of the population may also not be feasible.

4.1.1 Evacuation Points and Shelters

When the LACSD or IC implements an evacuation order, each would coordinate with Los Angeles Department of Public Social Services, the OA EOC, and others to decide on a location to use as a Temporary Evacuation Point (TEP) or shelter. The Office of Emergency Management will utilize the Alert LA County system and will notify local television and radio stations; the County will also use social media (e.g., Facebook, Twitter) and will direct evacuees to the established TEPs or shelters, which may include schools or other facilities. TEPs will provide basic needs such as food, water, and restrooms. In addition to designated shelters, other points of temporary refuge may include large, well-known sites such as shopping centers and libraries.

Subject to field decisions by LACSD, possible shelters that could provide short-term refuge for evacuated occupants of the Project might include:

- Hungry Valley State Vehicular Recreation Area North Kiosk & Visitor Center, 5301 Ralphs Ranch Rd, Gorman, CA 93243 (10.2 miles)
- Outlets at Tejon, 5701 Outlets at Tejon Pkwy, Arvin, CA 93203 (25.9 miles)
- Del Sur School, 9023 W Avenue H, Lancaster, CA 93536 (28.8 miles)
- Diamond Jim's Casino, 118 20th St W, Rosamond, CA 93560 (34.9 miles)

Potential evacuation shelters and assembly areas that could provide a longer stay for refuge are:

- AV Fair & Event Center, 2551 W Avenue H, Lancaster, CA 93536 (36.1 miles)

- Palmdale Regional Airport, 41000 20 St E, Palmdale, CA 93550 (49.1 miles)

These potential shelters and assembly areas are what currently exist around the proposed Project area. The areas that may ultimately serve as evacuation shelters will likely be built as part of the Project.

If there are occupants unable to evacuate and need transportation assistance to get to a TEP or shelter, the LACSD or IC may establish transportation points to collect and transport people without transportation resources to evacuation points. Transportation should be accessible to all populations, including people with disabilities and other access and functional needs.

5 Standard Evacuation Procedures

5.1 Relocation/Evacuation

Wolshon and Marchive (2007) simulated traffic flow conditions in the WUI under a range of evacuation notice lead times and housing densities. To safely evacuate more people, they recommended that emergency managers (1) provide more lead-time to evacuees and (2) control traffic levels during evacuations so that fewer vehicles are trying to exit at the same time. In some emergencies, more lead-time will be possible while in others it will not. Traffic controls may be possible with longer lead times but may be limited to controlling some intersections during short notice events.

Wildfire emergency response procedures will vary depending on the type of wildfire and the available time in which decision makers (IC, LACoFD, LACSD, and/or OEM) can assess the situation and determine the best course of action. Based on the development, its road network, and the related fire environment, the primary type of evacuation envisioned is an orderly, pre-planned evacuation process where people are evacuated from the Project to urban areas further from an encroaching wildfire well before fire threatens. This type of evacuation must include a conservative approach to evacuating, i.e., when ignitions occur and weather is such that fires may spread rapidly, evacuations should be triggered on a conservative threshold. This threshold must include time allowances for unforeseen, but possible, events that could slow the evacuation process.

Evacuation is considered by many to offer the highest level of life protection to the public, but it can result in evacuees being placed in harm's way if the time available for evacuation is insufficient (Cova et al. 2011). The second type of evacuation is a short-notice evacuation, which from a public safety perspective is highly undesirable. This type of evacuation occurs when fire ignites close to vulnerable communities. This type of situation is inherently dangerous because there is generally a higher threat to persons who are in a vehicle on a road when fire is burning in the immediate area. Conditions may become so poor, that the vehicle drives off the road or crashes into another vehicle, and flames and heat overcome the occupants. This type of evacuation must be considered a very undesirable situation by law and fire officials in all but the rarest situations where late evacuation may be safer than seeking temporary refuge in a structure (such as when there are no nearby structures, the structure(s) is/are already on fire, or when there is no other form of refuge).

The third potential type of evacuation is a hybrid of the first two. In cases where evacuation is in process and changing conditions result in a situation that is considered unsafe to continue evacuation, it may be advisable to direct evacuees to pre-planned temporary refuge locations, including their own home if it is ignition resistant and defensible, such as those within future development of the Project. As with the second type of evacuation discussed

above, this situation is considered highly undesirable, but the evacuation pre-planning must consider these potential scenarios and prepare decision makers at the IC level and at the field level for enacting a contingency to evacuation when conditions dictate.

Indications from past fires and related evacuations in Los Angeles County and throughout Southern California, which have experienced large wildfires, are that evacuations are largely successful—even with a generally unprepared populace. It then stands to reason that an informed and prepared populace would minimize the potential evacuation issues and related risk to levels considered acceptable from a community perspective.

Evacuation orders or notifications are often triggered based on established and pre-determined buffers. These buffers are often hard or soft lines on a map and are based on topography, fuel, moisture content of the fuels, and wind direction. Evacuations are initiated when a wildfire reaches or crosses one of these pre-determined buffers. Evacuations can also be very fluid. The IC, law enforcement, and OEM would jointly enact evacuations based on fire behavior.

5.2 Evacuation Baseline

For purposes of this WETR, the first and most logical choice for all occupants within the boundaries of the Project is to adhere to the principals and practices of the "READY! SET! GO!" Program previously mentioned in this document. As part of this program, each household should develop a plan that is clearly understood by all individuals, as well as participating in the educational and training programs sponsored by OEM, and LACoFD. In addition, the "READY! SET! GO!" information should be reviewed on a routine basis along with the accompanying maps illustrating evacuation routes, temporary evacuation points, and pre-identified safety zones. It must be kept in mind that conditions may arise that will dictate a different evacuation route than the roads used on a daily basis.

Occupants are urged to follow the directions of emergency notices and personnel and to evacuate as soon as they are notified to do so or earlier, if they feel uncomfortable. Directions on evacuation routes will be provided in most cases but, when not provided, occupants will proceed according to known available routes away from the encroaching fire as detailed in Section 1 of this plan. Occupants are cautioned not to rely on navigation apps which may inadvertently lead them toward an oncoming fire.

5.3 Civilian and Firefighter Evacuation Contingency

As of this document's preparation, no community in California has been directed to shelter in place during a wildland fire. This is not to say that people have not successfully sheltered in place during wildfire; there are numerous examples of people sheltering in their homes, in hardened structures, in community buildings, in swimming pools, and in cleared or ignition resistant landscape open air areas. The preference for all future developments of the Project will always be early evacuation following the "Ready, Set, Go!" model, but there exists the potential for unforeseen civilian evacuation issues, and having a contingency plan will provide direction in these situations that may result in saved lives.

It is recommended that LACSD and LACoFD conduct concerted pre-planning efforts focusing on evacuation contingency planning for civilian populations when it is considered safer to temporary seek a safer refuge than evacuation.

5.3.1 Safety Zones

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

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

> **Safety Zone.** An area cleared of flammable materials used by trained firefighters for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity.
>
> **Escape Route.** A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged).

According to NWCG, Safety Zone(s):

- Must be survivable without a fire shelter
- Can include moving back into a clean burn
- May take advantage of natural features (rock areas, water, meadows)
- Can include Constructed sites (clear-cuts, roads, helispots)
- Are scouted for size and hazards
- Consider the topographic location (larger if upslope)
- Should be larger if downwind
- Should not include heavy fuels
- May need to be adjusted based on site specific fire behavior

The definition for a safety zone includes provisions for separation distance between the firefighter and the flames of at least four times the maximum continuous flame height. Distance separation is the radius from the center of the safety zone to the nearest fuels. As described in the Project's Fire Protection Plan, a 200-foot Fuel intg provide the necessary separation from fuel beds. Additionally, all future developments of the Project will provide areas of temporary refuge on-site.

The ignition resistant and maintained landscaping within each of the Project's future developments, along with the adjacent fuel modification zones, and Chapter 7A of California Building Code compliant structures provide an inherent level of protection by design. The Project's future developments would provide Safety Zones available to

responding firefighters, such as interior roads, large parking lots, Quail Lake, structures. The Safety Zones associated with each of the Project's future developments can be part of the County's pre-planning efforts, although during a fire, the identified safety zones may not be feasible due to distance, location, fire behavior, etc.

Identification of potential safety zones will require additional focused study by LACoFD and other fire and law enforcement agencies when responding to an event.

5.3.2 Temporary Firefighter Refuge Areas

Firescope California (Firefighting Resources of Southern California Organized for Potential Emergencies) was formed by legislative action to form a partnership between all facets of local, rural, and metropolitan fire departments, California Department of Forestry and Fire Protection (CAL FIRE), and federal fire agencies. Firescope defines a contingency plan when it is not possible to retreat to a safety zone. This contingency includes establishment of firefighter Temporary Refuge Areas (TRA), which are defined as:

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

Examples of a TRA may include the lee side of a structure, inside of a structure, large lawn or parking areas, or cab of fire engine, amongst others. Differences between a TRA and a Safety Zone is that TRA's are closer to the immediate firefighting area, are considered a contingency to being able to get to a Safety Zone, do not include a requirement for a large area set back four times the flame lengths of adjacent fuels, and cannot be feasibly pre-planned until firefighters arrive on scene and size up the situation.

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

TRAs are pre-planned areas (planned shortly after firefighters arrive on scene) where firefighters may take refuge and temporary shelter for short-term thermal relief, without using a fire shelter in the event that escape routes to an established safety zone are compromised. The major difference between a TRA and a safety zone is that a TRA requires another planned tactical action, i.e., TRAs cannot be considered the final action, but must include self-defense and a move out of the area when the fire threat subsides. A TRA should be available and identified on site at a defended structure. TRAs are NOT a substitute for a Safety Zone. TRA pre-planning is difficult, at best because they are very site and fire behavior specific. For future developments of the Project, TRAs would likely include navigating to the interior roadways of neighborhoods where 200-foot-wide fuel modification zones provide defensible space and maintained landscapes are provided, along with ignition resistant structures that offer numerous opportunities for TRA.

The developed portions of the Project site, but especially the interior areas of neighborhoods are considered TRAs. This is an important concept because it offers last-resort, temporary refuge of firefighters and, in a worst-case condition, occupants. This approach would be consistent with Firescope California (2013) which indicates that

firefighters must determine if a safe evacuation is appropriate and if not, to identify safe refuge for those who cannot be evacuated, including civilians.

The Project's residential and commercial structures and areas can be considered for TRA because they include the following features:

- Ignition Resistant Construction
- Annual landscape inspections
- Wide roadways with fire hydrants
- Maintained landscapes and roadside fuel modification
- Ember resistant vents
- Interior fire sprinklers

Because there is the possibility that evacuation of the project may be less safe than temporarily refuging on site, such as during a fast-moving, wind or slope driven fire, including temporary refuge within structures or elsewhere on site is considered a contingency plan for the Project. This concept is considered a component of the "Ready, Set, Go!" model as it provides a broader level of "readiness" should the ability to execute an early evacuation be negated by fire, road congestion, or other unforeseen issues. This approach would be considered a last-resort contingency during wildfire with the primary focus being on early evacuation. The decision for evacuation or temporarily refuging onsite will be made by responding law enforcement and/or fire personnel.

5.4 Social Aspects of Wildfire Evacuation

Orderly movement of people is the result of planning, training, education, and awareness, all of which are promoted in Los Angeles County. Evacuation has been the standard term used for emergency movement of people and implies imminent or threatening danger. The term in this WETR, and under the "Ready, Set, Go!" concept, indicates that there is a perceived threat to persons and movement out of the area is necessary, but will occur according to a pre-planned and practiced protocol, reducing the potential for panic.

Citizen reactions may vary during an evacuation event, although several studies indicate that orderly movement during wildfire and other emergencies is not typically unmanageable. Evacuation can be made even less problematic through diligent public education and emergency personnel training and familiarity. Social science research literature indicates that reactions to warnings follow certain behavior patterns that are defined by people's perceptions (Aguirre 1994, Drabek 1991, Fitzpatrick and Mileti 1994, Gordon 2006, Collins 2004) and are not unpredictable. In summary, warnings received from credible sources by people who are aware (or have been made aware) of the potential risk, have the effect of an orderly decision process that typically results in successful evacuation. This success is heightened when evacuations are not foreign to residents (Quarantelli and Dynes 1977; Lindell and Perry 2004) as will occur within the Project. Further, in all but the rarest circumstances, evacuees will be receiving information from credible sources during an evacuation. Further, it would be anticipated that law enforcement and/or fire personnel would be onsite to help direct traffic and would be viewed by evacuees as knowledgeable and credible. The importance of training of law enforcement and fire personnel cannot be understated and annual education and training regarding fire safety and evacuation events will be essential for successful future evacuations.

5.4.1 Evacuation of Special Populations

Vogt (1990 and 1991) defines special populations as those groups of people who, because of their special situations or needs, require different planning strategies from those of the general population. Special needs populations include those in institutions or special facilities, those with disabilities in homes, those who need care, children, elderly and others who cannot provide for their own evacuation if necessitated. The special needs population is concentrated in facilities but is also widespread in terms of facility locations and those who live in residences. Special needs populations for the Project include the hearing or visually impaired, foreign speaking, visitors passing through the area, and temporary visitors (e.g., day workers), and the non-ambulatory confined to residences either temporarily or permanently.

Temporary occupants may not have knowledge of the area's fire hazard, they may not know how to react in a fire emergency, and they may not understand what they are being told to do. Conversely, this segment of the population would typically be easier to evacuate quickly as they have no possession or pets that they would need to prepare. They can get in their cars and be directed out of the area.

The reasons why special needs populations may fail to respond to warnings to take protective actions is that they may require special transportation while others require different types of warnings or technologies to receive a warning. Some groups must rely on caregivers to hear the warning and respond.

Senior citizens face unique challenges during wildfire evacuations. Mobility problems and chronic health conditions are more likely to impact older individuals. Further, care providers and support services may be temporarily unavailable during a wildfire emergency. Evacuation concerns are exacerbated through the presence of vision and hearing problems and cognitive impairment, all of which are more likely to impact senior citizens and limit the ability to understand and respond to emergency evacuations.

Project Approach:

The Fire Safety Coordinator(s) for each of the future developments should provide information to occupants regarding how to notify the County OEM and Health and Human Services of special needs residents so that accommodations for their notification (Accessible Alert LA County, CERT programs, or other), transportation or other special requirements can be provided during an emergency evacuation. Occupants will be advised of their options during an emergency by law enforcement or fire officials.

5.4.2 Animal Evacuations

Animal evacuations present a host of challenges that may affect the overall successful movement of people and their possessions out of harm's way. For example, livestock owners do not always have the means to load and trailer their livestock out of the area. Further, most wildfire evacuation relief shelters or commercial lodging facilities do not allow people to bring in pets or other animals. Sorensen and Vogt (2006) indicate that an issue receiving increasing attention is what evacuees do with pets or other animals such as livestock when they leave their homes and whether having pets or animals impacts their decision to evacuate. The Pets Evacuation and Transportation Standards Act of 2006 amends the Stafford Act, and requires evacuation plans to take into account the needs of individuals with household pets and service animals prior to, during, and following a major disaster or emergency. Although evacuation planning attempts to include the needs of pets and animals, the primary responsibility of public agencies is the protection of human life and prevention of loss or damage to property. Primary responsibility for

basic care and sheltering of pets and small animals, including exotic animals, during a major disaster or emergency is that of the pet owner.

The LADACC supports all animal evacuation, sheltering, and care. Under Section 5 – Roles and Responsibilities of the OA EOP, Animal Care and Control, plans are in place to transport and shelter pets in a disaster. Animal Control Officers, trained volunteers, the Humane Society, and private animal care shelters will assist in the rescue, transport, and sheltering of small and large animals. In addition, potential volunteer resources and private groups should be identified and tracked. Service animals will be evacuated with their owners. Animal Services is available to assist with the evacuation of service animals if requested by the owner.

In the event temporary emergency small animal shelters need to be activated, the Animal Care & Health Unit Leader will identify potential shelter locations. A Public Information Officer will coordinate with LADACC and media outlets to broadcast information regarding the location of these shelters.

The Project would not accommodate livestock; however, household pets would be a common occurrence.

Project Approach:

Develop a strong outreach program for pet owners so they understand their responsibilities and the fact that they will not likely be allowed re-entry once evacuated.

Develop a registration for owners of animals who cannot evacuate them without assistance so that volunteer organizations or individuals can provide resources.

5.4.3 Re-Entry Procedures

An important component of evacuations is the occupant re-entry process. Re-entry will be initiated by the Incident Commander/Unified Command of the Incident Management Team, with the support of the Director of the Office of Emergency Management, the OA EOC Director, and the Operations Section Chief at the OA EOC. In most cases, the OA EOC will remain activated until full re-entry is complete. In the event the OA EOC has been deactivated, the Incident Commander will initiate re-entry procedures.

Incident Commander/Unified Command of the Incident Management Team, with the support of the Director of the Emergency Management Department, the OA EOC Director, and the Operations Section Chief at the OA EOC is responsible for coordinating the re-entry procedures with all involved agencies and ensuring effective communication. Priorities for re-entry include:

- The impacted areas must be thoroughly investigated to ensure it is safe for residents to return and normal operations have been restored. This assessment will verify:
  - The public will be notified of the re-entry status through the notification measures previously mentioned in this annex, including https://lacounty.gov/emergency/alert-la/, emergency broadcast radio, television, press releases, informational phone-lines such as 3-1-1, community briefings, and informational updates at shelters.

Once evacuees are permitted to return, it is important that procedures are established to properly identify residents and critical support personnel, as well as ensure the legitimacy of contractors, insurance adjustors, and other personnel. Re-entry points should be staffed by law enforcement personnel.

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6 Centennial Evacuation Scenario Modeling Analysis

This section provides a summary of an evacuation scenario modeling analysis completed by Chen Ryan Associates (CRA) and Dudek for the Centennial Project. The complete analysis is provided in Appendix C. The purpose of the analysis was to determine evacuation times for the Project's population at phased construction completion milestones and whether there would be impacts on the surrounding communities' population evacuation times. This analysis was performed in accordance with the requirements of the County of Los Angeles Operational Area Emergency Operations Plan November 2023 for the calculation of evacuation times.

Phased Evacuation

Although mass evacuation events have become less common as wildfire evacuation technology and capabilities have improved dramatically in the last 15 years, it can still serve as a conservative scenario under which to analyze evacuation impacts. The roadway network and vehicle input assumptions also have been selected to simulate a "worst-case" evacuation scenario that would occur during a weekend day (Saturday) when the Project's residents are home, and nearby homes are likely to be fully occupied. While evaluation of the "worst-case" scenario is not required by law, out of an abundance of caution, the Project has opted to consider this scenario. The assumption that an evacuation would occur when the Project is in operation at full buildout and all residents in the surrounding community are at home when the evacuation order is provided represents an extreme, worst-case condition. In an actual wildfire event, it is most likely that phased evacuation orders would be given to provide for a more orderly evacuation. It is also likely that fewer residents would be present nearby if the evacuation happened during a time that the Project was not at full occupancy such as a weekday afternoon. Phased Evacuation, by targeting the area in immediate danger allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. Under this approach, first responders or law enforcement personnel will direct traffic at all major intersections during the evacuation process.

Based on the review of the County of Los OA EOP, the County All-Hazards Mitigation Plan (2020), recent wildfire evacuation efforts, and other relevant information, the current evacuation practices are led by the local incident commander or the incident command post (ICP). These practices involve collaboration between fire departments and various law enforcement agencies. Depending on the nature of the emergency, multiple departments may work together during the evacuation process. The responsibilities of these departments are detailed in the County OA EOP and summarized below:

Fire Department Responsibilities

- Establish command of the Incident
- Conduct a situation assessment and evaluate the need for evacuations
- Establish an Incident Command Post (ICP) with sufficient room for representatives from other assisting agencies and announce its location
- Request Agency Representative from Law Enforcement to respond to the ICP.

Law Enforcement Responsibilities

- Assign supervisor of the rank of Sergeant or above to the Incident Command Post and request a Deputy to locate with Operations Section Chief
- Maintain ingress and egress routes for emergency vehicles
- Establish perimeter control, keeping unauthorized vehicles and pedestrians out of the involved area. Conduct evaluations, if required, at the direction of the Incident Commander
- Establish anti-looting security patrols, when safe to do so, for evacuated areas within the perimeter
- Maintain a Unit log

Joint Fire and Law Enforcement Responsibilities

- Evaluate and determine whether Law Enforcement role will be as an Agency Representative or Unified Incident Commander, depending on the scope of the Incident
- Assign a Law Enforcement supervisor to work closely with the Operations Section Chief or Incident Commander, whomever is determining the areas to be evacuated
- Assess and validate the need for an Evacuation Warning, Evacuation Order, and/or Shelter in Place — Determine the location, potential size, and direction of Incident travel or spread
- Unified Commanders determine potential for Incident spread and request the appropriate resources to complete the evacuation and mitigate the Incident concurrently

Methodical and strategic evacuation orders ensure that resources are deployed where needed and ensure a manageable traffic flow out of the area under threat. This approach is demonstrated through several recent wildfires where evacuation orders were issued. One example is the Border Fire 32, which was detected at 2:15 p.m. on August 31, 2022. At 2:57 PM, the San Diego County Sheriff's Department shut down SR-94 within the vicinity of the fire and issuing an evacuation order at 3:28 p.m. Systematic approaches such as those taken for the Border Fire 32 allow for a more orderly evacuation and prioritize those in higher risk area, while maintain clear pathways for law enforcement, first responders, and firefighting equipment.

Another example is the Lilac Fire, which was detected at 11:15 a.m. on December 7, 2017, by applying strategic evacuation and closed down crucial roadway to non-essential traffic, San Diego County law enforcement and fire fighters was able to evacuate more than 14 different areas within San Diego County via 14 separate evacuation campaigns (notifications sent to affected areas) – sequencing of evacuation areas occurring between 12/7/2017 at 1:52 pm to 12/7/2017 10:17 pm. Thanks to the orderly evacuation, efforts from law enforcement and fire fighters, there was zero reported fatality during the Lilac Fire.

Another example of a systematic approach and strategic evacuation order can be observed during the Thomas Fire in 2017 in Ventura County. Selective evacuation orders were issued only for areas in immediate danger. Law enforcement first issued evacuation orders near the Carpinteria area, emphasizing that the order was specific to this region to minimize the number of evacuees on the road. Similarly, the timeline of significant events for the Woolsey Fire, as documented in the Woolsey Fire After Action Report, demonstrates the same strategic evacuation approach. In some instances, the Incident Command Post (ICP) issued voluntary evacuation notices instead of orders for areas deemed to be at higher risk.

The Department of Homeland Security (2019) provides supporting data for why jurisdictions have moved to the targeted evacuation approach that leverages the power of situational awareness to support decision making. According to their Planning Considerations: Evacuation and Shelter in Place document, they indicate that delineated

zones provide benefits to the agencies and community members. Evacuation and shelter-in-place zones promote phased, zone-based evacuation targeted to the most vulnerable areas, which allows jurisdictions to prioritize evacuation orders to the most vulnerable zones first and limit the need to evacuate large areas not under the threat. Zones help:

- Jurisdictions to understand transportation network throughput and capacity, critical transportation and resource needs, estimated evacuation clearance times, and shelter demand.
- Planners to develop planning factors and assumptions to inform goals and objectives.
- Community members to understand protective actions to take during an emergency.
- Shelters to limit traffic congestion and select locations suitable for the evacuated population.

Additionally, targeted evacuation order/warning aims to ensure proper traffic flow and reduce stress at evacuation sites, some people may still choose to evacuate even if they are not facing an immediate threat. These individuals are known as shadow evacuees, and they increase the demand on the roadway network. The number of shadow evacuees varies from incident to incident, depending on their proximity to the actual fire, though it can be assumed that approximately 30% of evacuees fall into this category.

While the amount of time needed to evacuate the Project would vary by the type of incident, the number of evacuation routes utilized, the amount of mobilization time taken by occupants, actual areas at risk, and other factors, the targeted approach would minimize the size of the area being evacuated and use a phased approach, which would likely reduce evacuation time below the above evacuation time estimates. Accordingly, roadway capacity would remain adequate to undertake safe and effective evacuations with development of the Project and would not expose people or structures to a significant risk of loss, injury or death.

Shelter In Place as a Contingency Plan

Sheltering-in-place is the practice of going or remaining indoors during or following an emergency event. This procedure is recommended if there is little time for the public to react to an incident and it is safer for the public to stay indoors for a short time rather than travel outdoors. Sheltering-in-place also has many advantages because it can be implemented immediately, allowing people to remain in their familiar surroundings, and providing individuals with everyday necessities such as telephone, radio, television, and food. However, the amount of time people can stay sheltered-in-place is dependent upon availability of food, water, medical care, utilities, and access to accurate and reliable information.

The decision on whether to evacuate or shelter-in-place is carefully considered with the timing and nature of the incident. Sheltering-in-place is the preferred method of protection for people that are not directly impacted or in the direct path of a hazard. This will reduce congestion and transportation demand on the major transportation routes for those that have been directed to evacuate by police or fire personnel. Like all new master planned communities that incorporate ignition-resistant construction and provide defensibility throughout, responding fire and law enforcement personnel have the option to direct existing residents to temporarily refuge in Project structures.

Options when evacuation is not considered feasible or when occupants are not in direct threat that may be available to responding fire and law enforcement personnel may include temporary refuge/sheltering on site where residents are instructed to remain in their homes while firefighters perform their structure protection function if it is considered unsafe to evacuate. Given the scale of the Project, fire environment, and ignition resistant construction,

it is likely that only populations along the perimeter of the Project site would be required to evacuate, while remaining populations would be directed to remain onsite.

6.1 Evacuation Modeling Methodology, Assumptions, and Scenarios

The following provides a summary of the methodology, assumptions and scenarios considered in the evacuation time analysis presented herein.

Worst-Case Evacuation Scenario- Saturday Afternoon Evacuation; Full Project Operation

The Project at buildout will be an urban area with residential, commercial and open spaces. Accordingly, to evaluate a "worst-case" scenario, the model assumes that the evacuation would transpire on a Saturday afternoon, a time when commercial uses on the Project would likely still be in operation and residents from the villages are home, meaning all residential vehicles would be required to evacuate. In an actual evacuation scenario, the total number of vehicles needing to evacuate may actually be less. The IC would prioritize evacuation of land uses located closest to the area with immediate risk, depending on the location of the fire. However, by assuming a "worst case scenario," the modeling accounts for any other vehicles that may be on the road and/or voluntarily evacuating from other areas. For example, shadow evacuees may leave regardless of a threat to their location. The model accounts for this by assuming that all populations are on-site and would be evacuating.

Primary Evacuation Routes and Capacity

CRA assumed that traffic evacuating from both the Project and nearby communities/land uses would use the closest evacuation routes to leave the area. Evacuation routes were selected based upon review of the project site, available evacuation routes, and the quickest way to leave the at-risk areas.

The number of evacuation roadways accessible to each village depends on the development phase of the specific plan. Appendix C outlines the evacuation roadways by development phases, and shows all available roadways at the full buildout of the specific plan.

No contraflow lanes[2] were assumed to provide access for first responders and law enforcement. Two-way travel was assumed, with evacuating vehicles traveling outbound to the designated Safe Zone. It is assumed that first responders or law enforcement will direct traffic at all major intersections during the evacuation process. Should evacuation managers determine whether contraflow is preferred or necessary, evacuation capacity would increase while evacuation times would decrease.

The Centennial Specific Plan Traffic Study conducted by Stantec in May 2017 and the Centennial Specific Plan Supplemental Traffic Study, both collectively referred to as 2017 Traffic Studies, assumed that the Project would improve SR-138 to a four-lane expressway from I-5 to 240th Street West and to a limited access conventional four-lane highway from 240th Street West to 190th Street West, with right-of-way reserved for a six-lane expressway

[2] Contraflow or lane reversal involves directing traffic to use lanes coming from the source of a hazard to move people away from the hazard. Such a strategy can be used to eliminate bottlenecks in communities with road geometries that prevent efficient evacuations or to facilitate traffic flow out of a major urban area. Among the considerations in planning emergency contraflow are whether sufficient traffic control officers are available, potential negative impact on responding fire apparatus, access management, merging, exiting, safety concerns, and labor requirements. Contraflow configurations must be carefully planned based on on-site factors and should not be implemented in an *ad-hoc* fashion. Dudek July 2014. "Wildland Fire Evacuation Procedures Analysis" for City of Santa Barbara, California, page 65.

between Gorman Post Road and 300th Street West, or comparable improvements consistent with the Northwest 138 Corridor. However, due to uncertainty regarding the timing of the improvements it is assumed that SR-138 would remain as a two-lane highway for all analysis scenarios.

The study assumed that evacuees would use the proposed roads, as well as SR-138 to head towards the I-5 or other developed communities such as the Neenach community. It is likely to assume Project occupants would utilize the major transportation arteries to evacuate. It is likely that a wildfire would ignite to the north of the Project site, so it is unlikely that Project occupants would evacuate to the north.

No contraflow lanes were assumed so that access would be fully maintained for first responders and law enforcement. Two-way travel was assumed, with evacuating vehicles traveling outbound to the Safe Zone and first responders and law enforcement provided the opportunity to travel inbound to the fire. Should evacuation managers determine that contraflow is preferred or necessary in a wildfire evacuation scenario, evacuation capacity would increase while evacuation times would decrease.

Control of Downstream Intersections

As part of evacuations operations, as demonstrated in Border Fire #32, first responders or law enforcement will direct traffic at all major downstream intersections out of the area during the evacuation process. As possible, intersection traffic signals may be managed at appropriately equipped signals to assist in the movement of traffic from areas of higher potential exposure to areas of lower exposure.

Safe Zone

Based on Dudek's review of the area's fire history, fires have halted along areas adjacent to wildland fuels and have not historically progressed into the more densely urbanized, irrigated, and hardscaped areas. Specifically, none of the historical fires encroached beyond the periphery areas within the wildland urban interface area of the Los Angeles County. Recent fires such as the Jerry Fire (2019), Merwin Fire (2015), Lago Fire (2011), Max Fire (2024) were all stopped prior to reaching the urbanized area. Thus, it is assumed that during the earlier phases of the specific plan, evacuees are considered "safe" once their vehicles reach an area outside the evacuation order zone. For scenarios 1 through 3, this would be when the vehicles arrive at either the SR-138/I-5 interchange to the west or the community of Neenach to the east. In the later scenarios, evacuees are considered "safe" once they arrive at the respective villages or evacuation point indicated in Table 1.

Evacuation Scenarios

A total of fifteen evacuation scenarios were analyzed, which are shown in Table 1 below and graphically represented in Figures 1-15 of Attachment C in Appendix C.

Targeted Evacuation

Current evacuation practice typically targets the scope of the evacuation only to the area in immediate danger and placing a larger area on standby for evacuation. This practice allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. The Project evacuation model utilizes a worst-case simultaneous evacuation of all existing uses/occupants within the modeled area. However, the likelihood of each of these populations being evacuated at the same time is low. In an actual evacuation scenario, the IC would

prioritize evacuation of land uses located closest to the area with immediate risk, depending on the location of the fire, which may result in reduced evacuation timeframes compared to this modeling.

Table 1. Evacuation Travel Time Analysis Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
1	Phase 1-2	Village 1 & Village 3	South/Southeast	75% via SR-138 westbound toward I-5	Village 1	3,783
				25% via internal road toward I-5	Village 3	3,878
				—	Existing	200
2	Phase 1-2	Village 1 & Village 3	North/Northeast	25% via SR-138 westbound toward I-5	Village 1	3,783
				25% via internal road toward I-5	Village 3	3,878
				25% via internal road toward Lancaster	Existing	200
				25% via SR-138 eastbound toward Lancaster	—	—
3	Phase 1-2	Village 1 & Village 3	West/Northwest	75% via SR-138 eastbound toward Lancaster	Village 1	3,783
				25% via internal road toward Lancaster	Village 3	3,878
				—	Existing	200
4	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	South/Southeast	50% via SR-138 westbound toward I-5	50% of Village 7	1,490
				50% via internal roadway toward Village 1	Business Park West	1,875
				—	Institutional & Civic	2,958
5	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5	50% of Village 3	2,085
				50% via internal roadway toward Village 1	Village 7	2,979
				25% via SR-138 eastbound toward Lancaster	Existing	200
6	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional/Civic land use	Village 1	3,783
				50% via SR-138 eastbound toward Lancaster	30% of Village 3	1,251
				—	Business Park West	1,875
				—	Existing	200
7	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park	South/Southeast	25% via SR-138 westbound toward I-5	50% of Village 7	1,490
				25% via internal roadway toward Village 1	Business Park West	1,875
				25% via internal roadway toward Village 3	Business Park Central	1,250
				25% via internal roadway toward Village 6	Institutional & Civic	2,958

Table 1. Evacuation Travel Time Analysis Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
		Central, Institutional & Civic				
8	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5	Village 6	3,488
				50% via internal roadway toward Village 1 and Village 3	Village 7	2,979
				25% via SR-138 eastbound toward Lancaster	—	—
9	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional & Civic	Village 1	3,783
				50% via SR-138 eastbound toward Lancaster	Village 9 West	2,218
				—	Existing	200
10	Phase 1-8	Village 1, 3, 7 E & West, Village 9 West, Village 6, Village 9 East, Village 8 West, Village 2, Village 4 South	South/Southeast	25% via SR-138 westbound toward I-5	50% of Village 7	1,490
				25% via internal roadway toward Village 1	Business Park West	1,875
				25% via internal roadway toward Village 3	Business Park Central	1,250
				25% via internal roadway toward Village 6	Business Park East	1,186
				—	30% of the Institutional & Civic	887
11	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business	North/Northeast	25% via internal roadway toward Village 1	30% of Village 2	738
				25% via internal roadway toward Village 3	Village 4 South	2,269
				25% via internal roadway toward Village 7	50% of Village 6	1,744
				25% via internal roadway toward Institutional & Civic	Village 8 West	1,922
				—	30% of Village 9	979

Table 1. Evacuation Travel Time Analysis Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
		Park East, Institutional & Civic				
12	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	West/Northwest	25% via internal roadway toward Village 3	30% of Village 1	1,135
				25% via internal roadway toward Village 7	30% of Village 2	738
				25% via internal roadway toward Business Park	Village 4 South	2,269
				25% via internal roadway toward Institutional & Civic	Village 9	3,264
13	Phase 1-10	Buildout	South/Southeast	25% via SR-138 westbound toward I-5	Business Park West	1,875
				25% via internal roadway toward Village 1	Business Park Central	1,250
				25% via internal roadway toward Village 3	Business Park East	1,186
				25% via internal roadway toward Village 6/Village 5	30% of the Institutional & Civic	887
				—	50% of Village 7	1,490
				—	Village 8 East	3,678
14	Phase 1-10	Buildout	North/Northeast	25% via internal roadway toward Village 1/ Village 2	30% of Village 4	1,284
				25% via internal roadway toward Village 3	Village 5	10,333
				25% via internal roadway toward Village 7/Institutional & Civic	30% of Village 6	1,046
				25% via SR-138 Westbound toward Business Park	Village 8 West	1,922
				—	Village 8 East	3,678
15	Phase 1-10	Buildout	West/Northwest	25% via internal roadway toward Village 3	30% of Village 2	738
				25% via internal roadway toward Village 7	50% of Village 4	2,140

Table 1. Evacuation Travel Time Analysis Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
				25% via internal roadway toward Business Park	50% of Village 5	5,167
				25% via internal roadway toward Institutional & Civic	Village 9	3,264

Sources: CR Associates 2024, US Census Bureau 2023, Google Maps 2023

Evacuating Vehicles

The projected number of vehicles evacuating from the study area is based on a combination of various data sources: Parcel Quest's parcel map data for land use, vehicle ownership averages from the US Census Bureau, aerial imagery from Nearmap, and relevant environmental documents. Breakdown of the calculations for evacuating vehicles is as follows:

Existing Residential: This is obtained by multiplying the total number of households (from Parcel Quest parcel map data) with the average vehicle ownership, which stands at 2.07 vehicles per household as per the US Census Bureau.

For this analysis, it is assumed that during the earlier phases of the Project, existing land use to the east of the Project site will evacuate in the same direction as the Project's traffic. Once the Project is developed, the Project site can serve as an evacuation zone for existing land use that need to evacuate westward toward the Project site. Therefore, the evacuation times for existing land uses are only included in scenarios where the Project's traffic would potentially share the same evacuation roadway as the existing land uses.

Proposed Project: This is calculated by multiplying the quantities of land use by the following sources:

- Residential Land Use: Total number of dwelling units x average vehicle ownership.
- Nonresidential Land Uses: Total square footage x parking rate derived from the Institute of Transportation Engineer (ITE) Parking Generation Manual.

Land use quantities were obtained from Stantec and Appendix E of the Centennial Specific Plan Traffic Study (November 2017).

Shadow Evacuees: These are individuals who choose to evacuate out of an abundance of caution, even without an official evacuation order. The "Review of California Wildfire Evacuations from 2017 to 2019" report found that approximately 30% of evacuees fall into this category.

For a reasonable analysis, these scenarios assumed that two percent (2%)[3] of the evacuating vehicles are heavy vehicles (trucks with trailers). Two percent is the nationally acceptable ratio of heavy vehicles to all vehicles.

Average vehicle ownership, residential units, and evacuating vehicles calculations are provided in Appendix C. Table 1 displays the number of vehicles evacuating under each scenario. Figure 4 demonstrates phasing of the Project, and Figure 5 shows the proposed villages.

Under emergency evacuation conditions and consistent with the OEP and practices employed during prior emergency evacuation events in the County, traffic signals would revert to special timing plans and/or traffic personnel will be deployed at key intersections to help regulate traffic flow for primary evacuation approaches.

[3] https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_599.pdf (p.5).

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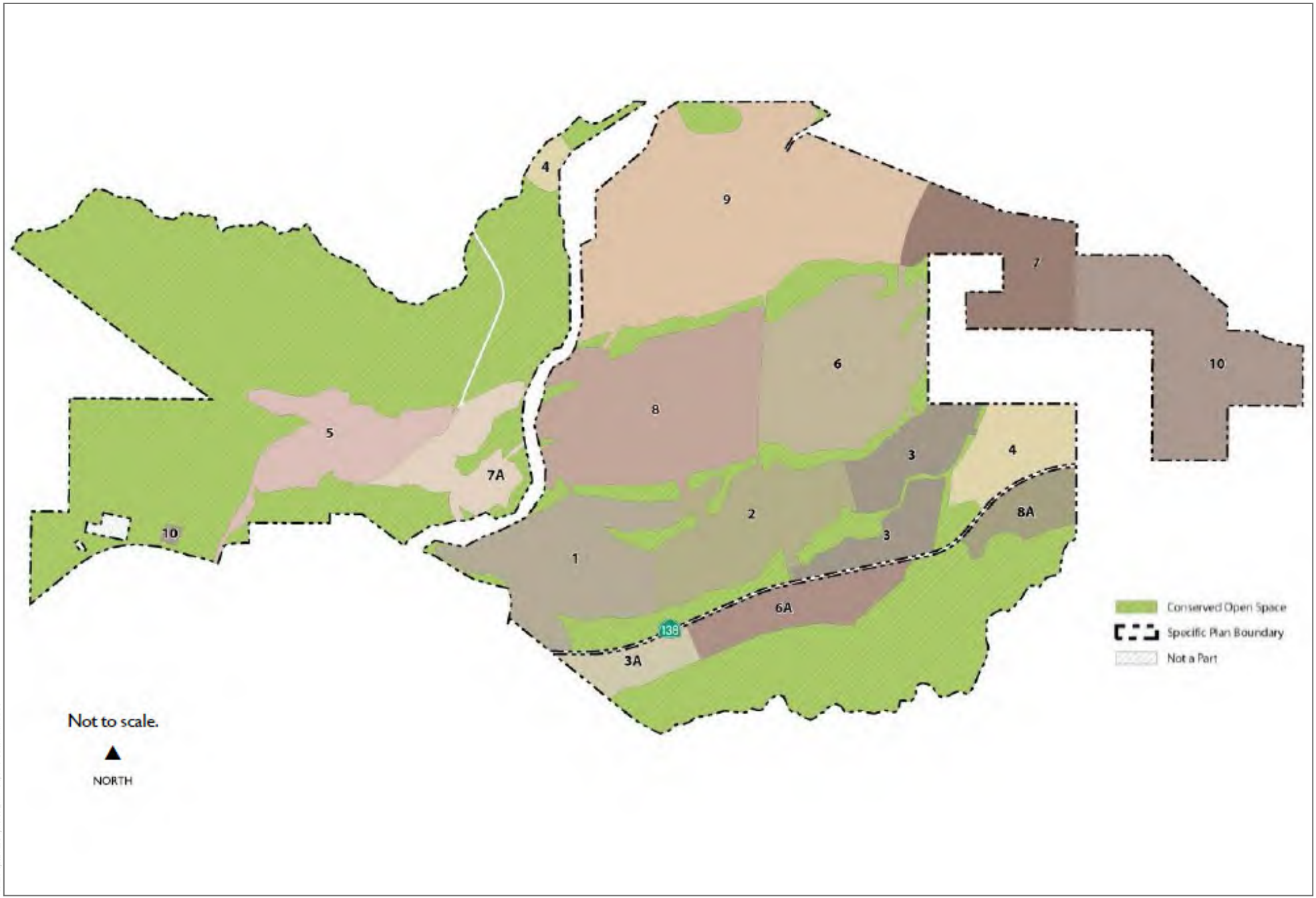

FIGURE 4

Conceptual Project Phasing Plan

Centennial Wildfire Evacuation Study

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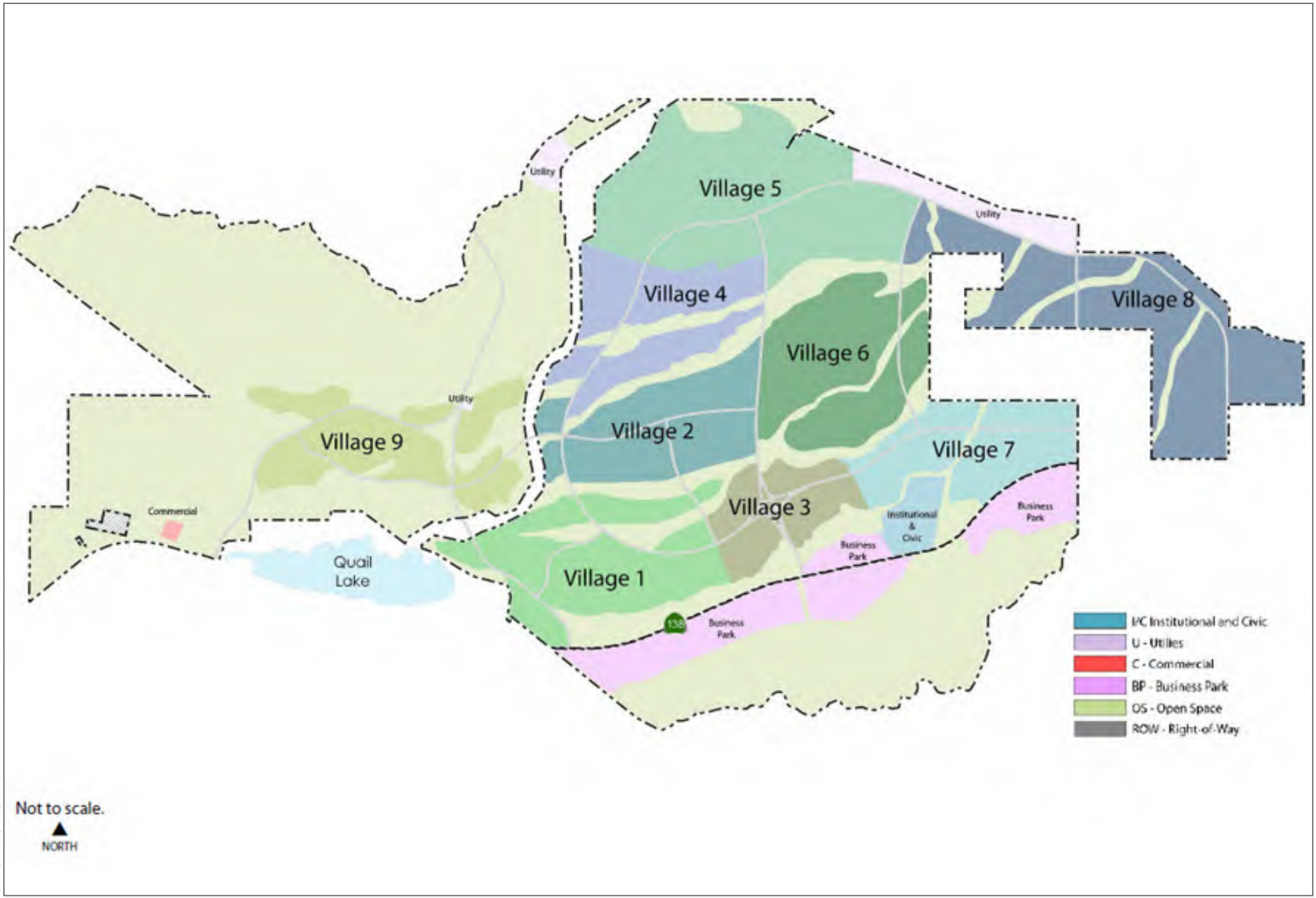

FIGURE 5

Proposed Villages

Centennial Wildfire Evacuation Study

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6.2 Potential for Project Evacuation Impact

Based on the analysis methodology described in the previous section, Table 2 summarizes the evacuation time for each analysis scenario. The evacuation time does not depict the evacuation time for each individual person within an evacuation area, but rather the total amount of time needed to evacuate all populations modeled from an area. Populations located in closer proximity to the IC designated safe zone will safely evacuate sooner than the total calculated evacuation time identified in Table 2. Detailed evacuation travel time analysis information is provided in Appendix C.

Table 2. Evacuation Time Summary

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/ Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hr:Min)
1	Phase 1-2	Village 1 & Village 3	South/ Southeast	75% via SR-138 westbound toward I-5	Village 1	3,783	2:04
				25% via internal road toward I-5	Village 3	3,878	3:37
				—	Existing	200	0:42
2	Phase 1-2	Village 1 & Village 3	North/Northeast	25% via SR-138 westbound toward I-5	Village 1	3,783	1:33
				25% via internal road toward I-5	Village 3	3,878	1:34
				25% via internal road toward Lancaster	Existing	200	0:17
				25% via SR-138 eastbound toward Lancaster	—	—	—
3	Phase 1-2	Village 1 & Village 3	West/Northwest	75% via SR-138 eastbound toward Lancaster	Village 1	3,783	2:03
				25% via internal road toward Lancaster	Village 3	3,878	1:36
				—	Existing	200	0:17
4	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	South/ Southeast	50% via SR-138 westbound toward I-5	50% of Village 7	1,490	1:00
				50% via internal roadway toward Village 1	Business Park West	1,875	1:54
				—	Institutional & Civic	2,958	1:46
5	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5	50% of Village 3	2,085	1:07
				50% via internal roadway toward Village 1	Village 7	2,979	1:23
				25% via SR-138 eastbound toward Lancaster	Existing	200	0:17

Table 2. Evacuation Time Summary

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/ Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hr:Min)
6	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional/Civic land use	Village 1	3,783	2:26
				50% via SR-138 eastbound toward Lancaster	30% of Village 3	1,251	0:41
				—	Business Park West	1,875	2:21
				—	Existing	200	0:17
7	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	South/ Southeast	25% via SR-138 westbound toward I-5	50% of Village 7	1,490	0:39
				25% via internal roadway toward Village 1	Business Park West	1,875	0:50
				25% via internal roadway toward Village 3	Business Park Central	1,250	1:07
				25% via internal roadway toward Village 6	Institutional & Civic	2,958	1:20
8	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5	Village 6	3,488	3:27
				50% via internal roadway toward Village 1 and Village 3	Village 7	2,979	1:49
				25% via SR-138 eastbound toward Lancaster	—	—	—
9	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional & Civic	Village 1	3,783	1:22
				50% via SR-138 eastbound toward Lancaster	Village 9 West	2,218	1:11
				—	Existing	200	0:17

Table 2. Evacuation Time Summary

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/ Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hr:Min)
10	Phase 1-8	Village 1, 3, 7 E & West, Village 9 West, Village 6, Village 9 East, Village 8 West, Village 2, Village 4 South	South/ Southeast	25% via SR-138 westbound toward I-5	50% of Village 7	1,490	1:21
				25% via internal roadway toward Village 1	Business Park West	1,875	1:07
				25% via internal roadway toward Village 3	Business Park Central	1,250	0:47
				25% via internal roadway toward Village 6	Business Park East	1,186	1:19
				—	30% of the Institutional & Civic	887	0:26
11	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	North/Northeast	25% via internal roadway toward Village 1	30% of Village 2	738	0:53
				25% via internal roadway toward Village 3	Village 4 South	2,269	0:53
				25% via internal roadway toward Village 7	50% of Village 6	1,744	0:53
				25% via internal roadway toward Institutional & Civic	Village 8 West	1,922	1:02
				—	30% of Village 9	979	0:49
12	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	West/Northwest	25% via internal roadway toward Village 3	30% of Village 1	1,135	0:52
				25% via internal roadway toward Village 7	30% of Village 2	738	0:57
				25% via internal roadway toward Business Park	Village 4 South	2,269	0:48
				25% via internal roadway toward Institutional & Civic	Village 9	3,264	2:58

Table 2. Evacuation Time Summary

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/ Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hr:Min)
13	Phase 1-10	Buildout	South/ Southeast	25% via SR-138 westbound toward I-5	Business Park West	1,875	1:07
				25% via internal roadway toward Village 1	Business Park Central	1,250	0:55
				25% via internal roadway toward Village 3	Business Park East	1,186	1:32
				25% via internal roadway toward Village 6/Village 5	30% of the Institutional & Civic	887	0:26
				—	50% of Village 7	1,490	1:32
				—	Village 8 East	3,678	2:20
14	Phase 1-10	Buildout	North/Northeast	25% via internal roadway toward Village 1/Village 2	30% of Village 4	1,284	0:51
				25% via internal roadway toward Village 3	Village 5	10,333	6:41
				25% via internal roadway toward Village 7/Institutional & Civic	30% of Village 6	1,046	0:34
				25% via SR-138 Westbound toward Business Park	Village 8 West	1,922	4:32
				—	Village 8 East	3,678	3:06
15	Phase 1-10	Buildout	West/Northwest	25% via internal roadway toward Village 3	30% of Village 2	738	1:11
				25% via internal roadway toward Village 7	50% of Village 4	2,140	1:08
				25% via internal roadway toward Business Park	50% of Village 5	5,167	2:37
				25% via internal roadway toward Institutional & Civic	Village 9	3,264	1:53

In any populated area, safely undertaking large-scale evacuations may take several hours or more and require moving people long distances to designated areas. Further, evacuations are fluid and timeframes may vary widely depending on numerous factors, including, among other things, the number of vehicles evacuating, the road capacity to accommodate those vehicles, residents' awareness and preparedness, evacuation messaging and direction, and on-site law enforcement control. The "Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act" guidance from the California Office of the Attorney General suggests that jurisdictions set benchmarks of significance based on past successful evacuations or on those from communities in similar situations. Safely undertaking large-scale evacuations is a complicated process that involves many factors that cannot necessarily be determined in advance. A large scale evacuation may take several hours or more and require moving people long distances to designated areas. Further, evacuations are fluid and timeframes may vary widely depending on numerous factors, including, among other things, the number of vehicles evacuating, the road capacity to accommodate those vehicles, occupants' awareness and preparedness, evacuation messaging and direction, and on-site law enforcement control.

Technological advancements and improved evacuation strategies learned from prior wildfire evacuation events have resulted in a system, reflected in the EOPs and the experience of the people tasked with coordinating events, that is many times more capable of managing evacuations. With the technology in use today in the City and County, evacuations are more strategic and surgical than in the past, evacuating smaller areas at highest risk and phasing evacuation traffic so that it flows more evenly and minimizes the surges that may slow an evacuation. Mass evacuation scenarios where large populations are all directed to leave simultaneously, resulting in traffic delays, are thereby avoided, and those populations most at risk safely evacuate.

Due to its location, the Project would also provide the responding emergency managers (e.g., incident commander, Los Angeles County Sheriff) the alternative option of recommending that all or a portion of the onsite population shelter in place. This on-site sheltering option is a contingency plan, but an important option in the scenario when evacuation is considered infeasible or the less safe option. This would provide emergency managers with a safer alternative to risking a late evacuation.

Overall, as presented in this WETR, safe evacuation of the Project and surrounding community is possible in all modeled scenarios and would not be expected to expose people or structures to a significant risk of loss, injury or death. Also, because the Project site is a large area of ignition resistant, urbanized landscapes, it is not anticipated that the entire community would be relocated off-site during a wildfire event in the grasslands that are adjacent to the Project's protective fuel modification zones. Further, like any new, large community or larger, urbanized area, Centennial will provide numerous opportunities throughout the site for on-site relocation and sheltering in place as a contingency option to evacuation off-site.

In support of this WETR's analysis that sheltering in place is a viable contingency option during most wildfire events anticipated to be experienced at the Centennial site, the following section provides an overview of how master planned communities built to the ignition resistant standards required for Centennial have performed during wildfires. These results indicate a lack of significant fire impacts within these communities.

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7 Wildfire Safety of Master Planned Communities

7.1 History of Master Planned Communities

Master-planned communities are large developments, often in rural or remote areas, made of multiple residential and building use types. The residential buildings may include single family or multi-family homes, that are all built to meet a similar aesthetic standard. These communities also often include amenities such as restaurants, parks, pools, recreation areas, office space and retail shops within walking distance of the residential areas. The Centennial master-planned community at Tejon Ranch will include amenities zones such as business parks, commercial, retail, institutional, open spaces, parks, lakes, and schools.

Almost 50% of the master planned community is designated as a preserved open space area, that will be regularly grazed and maintained through brush removal. The open space that surrounds the proposed development, as seen in Figure 3- Project Site Plan, allows for proper defensible space regulations, fuel modification zones (FMZ), to be met for the protection of homes and other buildings in the community.

A FMZ is a strip of land where combustible vegetation has been removed and/or modified and partially or totally replaced with more adequately spaced, drought tolerant, fire-resistant plants, in order to provide a reasonable level of protection to structures from wildland fire. FMZs are designated to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures. New Fire and Building Codes

Newly developed master-planned communities will follow all new housing laws, building codes and fire codes to ensure the safety of occupants in the event of a wildfire or hazard. As stated above, many master-planned communities are developed in rural areas, new housing laws and legislature do not preclude the development of these communities in high or very high fire hazard severity zones, instead they abide by the stringent regulations that now apply to modern development.

Being in the Wildland Urban Interface (WUI) places these communities at a higher risk for facing the threat of a nearby wildfire encroaching on homes. Stringent building regulations aid in the process of making homes ‘ignition-resistant’, the process is also commonly known as ‘home hardening’. In the event a wildfire does burn near these communities, the homes are more likely to withstand flames, extreme heat, or potential ember-cast. Following these regulations also allows for residents to shelter in place, in the event of an emergency in which they are not able to evacuate.

The following is a list of current applicable codes and regulations to the Project; however the Project will be required to comply with the code edition in effect at the time of the building permit submittal.

California Building Code 2022

Title 24, Part 2, Chapter 7A includes regulations addressing the acceptable materials and construction methods for exterior wildfire exposure and applies to new buildings located in a State Responsibility Area in any Fire Hazard Severity Zone or any Wildland Urban Interface area. Chapter 7A details regulations for required Fire Protection Plans, fire resistant vegetation, ignition resistant construction, and requirements on buildings size and distance from buildings of accessory buildings and miscellaneous structures.

California Fire Code 2022

Title 24, Part 9 establishes regulations to safeguard against the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structures, and premises. The Fire Code also establishes requirements intended to provide safety for and assistance to firefighters and emergency responders during emergency operations. The provisions of the Fire Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure throughout California. The Fire Code includes regulations regarding fire-resistance-rated construction, fire protection systems such as alarm and sprinkler systems, fire services features such as fire apparatus access roads, means of egress, fire safety during construction and demolition, and wildland-urban interface areas.

International Fire Code 2018

The 2018 International Fire Code (IFC) addresses regulations for fire prevention, protection, life safety, and the safe storage and use of hazardous materials. IFC also addresses regulations related to emergency planning, fire department emergency access, water supply, automatic sprinkler systems, and fire alarms.

California Public Resources Code

CPRC Section 4291 addresses requirements for the ownership, operation and/or maintenance of buildings in, upon or adjoining to a mountainous, forested, brush or grass covered land, or land that contains flammable material areas, specifically the on and off-site vegetation to prevent wildfire damage. Section 4291 discusses the regulations of defensible space, fuel modification zones, clearance beyond the property line, insurance company requirements for vegetation clearance away from homes, and chimney and stovepipe safety.

California Reference Standards Code (2019)

Title 24, Part 12, Chapter 12-7A discusses the materials and construction methods for exterior wildfire exposure, as well as regulations to thoroughly test for fire resistance. This section details the minimum design, construction and performance standards for exterior windows, and wall siding and sheathing.

California Code of Regulations

Title 14, Division 1.5, Chapter 7, Subsection 2, Articles 1-5 detail fire safe regulations for building, construction and development in a Cal Fire State Responsibility Area. Specifically, these articles discuss the classification of private lands, fire extinguisher test standards and procedures, fire prevention standards for multi-position small engines, fire prevention standards for electric utilities, and standards for cooperative fire protection contracts during the non-fire season.

Title 14, Division 1.5, Chapter 7, Subsection 3, Section 1299 discusses the regulations of fire hazard reduction around buildings and structures, specifically defensible space requirements, additional clearance, and alternative methods that may be acceptable if minimum defensible space requirements cannot be met.

Title 19, Division 1, Chapter 7, Subchapter 1, Section 3.07 discusses the regulations for clearances around buildings regarding safe storage of combustible materials. The regulation states that no combustible material shall be places or stored within 10 feet of any building, and all buildings and structures must have a defensible space around them.

California Government Code

Title 5, Division 1, Part 1, Chapter 6.8, Sections 51175-51182 discuss the process of determining how Very High Fire Hazard Severity Zones are designated, as well as regulations for building and maintaining defensible space in areas designated by Cal Fire as a Very High Fire Hazard Severity Zone.

California Residential Code 2022

Section 327 addresses aging in place design. This code addresses the regulations for newly constructed dwellings stating they must be designed and constructed with aging-in-place considerations such as reinforcement for grab bars in bathrooms, and spacing requirements for individual units within a structure must be separated by at least 3 feet. The code also details compliance with fire safety measures.

Assembly Bill 2011, Extension of Senate Bill 35

Assembly Bill 2011, the primary housing production bill of the 2022 legislative session, creates a ministerial, California Environmental Quality Act (CEQA)-exempt, time-limited approval process for multifamily housing developments on commercially zoned property. AB 2011 is an extension of Senate Bill 35. AB 2011 allows SB 35 to continue facilitating new housing beyond the initial time frame of until 2025.

7.1.1 Fire Resilience and Evacuation Preparedness in Centennial

Built in accordance with the CFC and CBC stated above, the Centennial master-planned community will be built to the highest standards of safety, with fire protection and evacuation readiness at the forefront of their building goals.

As detailed in the Centennial Specific Plan, a minimum of 5,620 acres of preserved open space at Centennial will be actively and professionally managed using grazing and brush clearance techniques with the goal of preventing fires.

Modern construction and infrastructure practices will meet the most recent standards of the CBC and CFC. All planned utility lines will be buried undergrounded, and the Highway 138 road improvements will be built and maintained to help further reduce fire risk and provide better emergency egress, while also serving as a fuel break and hardened defensible space for the community nearby.

A fuel modification plan will be prepared and coordinated with Los Angeles County Fire Department to incorporate Fuel Modification Zones and buffer zones of between 100-200' wide, for wildfire prevention. Landscaping throughout the Project is recommended to be native, drought tolerant species, optimally fire-resistant plants, and have specific requirements for maintenance and irrigation. Landscaping shall not use plants listed in the Southern California Undesirable Plants List (Appendix D). Fuel modification zones will be implemented and maintained by the HOA(s) of the Project, following guidance provided by the Los Angeles Fire Department.

Furthermore, Centennial plans to construct a minimum of three and up to four fire stations in the community, that would be available to assist in the event a wildfire began. These new fire stations would have the capability to deploy a rapid initial attack and decrease the probability of wildfire spread into the community.

7.1.2 Shelter in Place Capabilities

Although evacuation is typically advised as the first response to an emergency, it is not always the safest. If evacuating would lead evacuees into the path of the fire, or if people needing to evacuate did not have ample time to do so safely, sheltering in place may become the next best option to staying safe during a wildfire. Shelter-in-Place is the use of a structure to temporarily separate individuals from a hazard or threat. Sheltering in place should only occur when the first responders, emergency management team, or incident command inform occupants that it is the safest option.

In order for entire communities to be considered for Shelter-in-Place, they must abide by certain regulations. The entire community must be designed and built to have ignition-resistant design qualities including, but not limited to:

- A well-maintained, irrigated, fire department approved landscape
- Adequate roadway and driveway widths, designed to accommodate two-way traffic and large firefighting apparatus
- Adequate water supply and water flow for firefighting efforts
- Fuel modification zones surrounding the community and individual homes

In addition, each home should be built with the following ignition resistant features:

- Ignition resistant exterior walls. Any wood siding must be treated.
- Eaves must be boxed or constructed of heavy timber and all vents must be screened to prevent fire embers from entering the inside of your home
- Windows must be dual pane, tempered glass
- Chimneys must have spark arrestors

- Roofs must be comprised of Class A, non- combustible materials like tile, slate, cement, asphalt or metal. Wood shingles are unacceptable materials for roofing.
- Wood fences must be at least 5 feet from the house
- Trellises, patio covers and other auxiliary structures must be made with non-combustible materials. Structures covering must remain at least 50% open or a Class A roof
- Decks must be non-combustible or constructed of heavy timber or fire retardant wood
- Landscape must be well maintained, irrigated and fire resistant
- A minimum requirement of 100 feet of defensible space around the home, following the Cal Fire protocol for defensible space zones.
- If it is impossible to evacuate and the situation requires a shelter in place order, the following list details suggestions by SafeHome (SafeHome 2024) on how to do so safely.
- Turn off the house's propane and/or natural gas
- If possible, wet the yard and roof with a sprinkler. Fill sinks and bathtubs with water
- Close all inside doors to slow the spread of fire in the house
- Turn off devices that circulate air through the house (i.e., fans)
- Have a cellphone, fire extinguisher, bottled water, battery powered radio, and flashlight with extra batteries on-hand
- Shelter in a hallway or room in the middle of the home- avoid the homes perimeter walls

7.2 CBIA Fire Safety Analysis

In January 2022, the Coalition of California Home Builders and Businesses, along with former State Fire Marshall and CalFire Director, Ruben Grijalva, commented on the Board of Forestry's Fire Safe Regulations (Grijalva 2022). Their efforts were aimed at achieving the following modifications to the current Fire Safe Regulations:

1. Approved master- planned communities that address fire safety and protection should be grandfathered to avoid a regulatory do-loop that would severely harm the production of much needed housing.
2. The regulations must account for (and take advantage of) the differences and fire safety benefits associated with master-planned communities.
3. The regulations must provide flexibility and a right to seek exceptions to avoid unintended consequences, the risk of which is high given the substantial expansion in regulatory scope from the State Responsibility Area (SRA) to the Local Responsibility Area (LRA).

To support these comments, an analysis was conducted to determine how new homes built following new WUI regulations (conservatively, after January 1, 2010) fared in the 10 worst property -loss fires compared to homes built prior to 2010 (Grijalva 2022a). Data was obtained from the State Fire Marshall (SFM). Regulatory standards for new construction include the SFM's fire hardening building standards, defensible space mandates and Cal Fire's Fire Safe Development Standards. The analysis proved that on average, for the 9 worst property loss fires dating back to 2017, only ~1% of the homes and apartments destroyed, damaged, or affected were new dwellings. Additionally, it was commonly found, aside from one instance, that new homes built next to each other were not both destroyed. This analysis shows that new homes are fire protective individually, but also help resist the spread of fire within residential areas.

Case studies were also provided in support of their comments (Grijalva 2022b). The case studies show aerial "before and after the fire" images of the communities at risk by the Silverado Fire (2020), Freeway Complex Fire (2008), and the Simi Fire (2003). The communities at risk survived the fire with no homes lost or damaged. The case study accredited: the Fire Protection Plans role in the development, Fuel Modification Zones including perimeter orchards, perimeter roads, and fire-resistant homes with non-combustible roofs as the reason the homes survived these fires. Other relevant articles were cited with excerpts pulled from the texts stating that wildfire preparedness at the forefront of building initiatives have proven to be extremely useful in protecting homes during a wildfire event.

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8 Wildfire/Evacuation Awareness

The Project should be active in its outreach to all occupants regarding fire safety and general evacuation procedures. There are aspects of fire safety and evacuation that require a significant level of awareness by all occupants in order to reduce and/or avoid problems with an effective evacuation. Mitigating potential impediments to successful evacuations requires focused and repeated information through a strong educational outreach program. The Project will engage occupants and coordinate with local fire agencies for fire safety awareness through a variety of methods.

The Project will implement an Emergency Response Plan informing residents, employees and visitors of potential emergency response scenarios that would typically occur during large wildfire events, including on and off-site evacuation procedures and other information included in this WETR. The Project is recommended to conduct an annual fire relocation and evacuation drill to train staff and fire personnel, and the procedures will be enforced through pre-drill public relations and post-drill information dissemination. Homeowners will receive ongoing outreach from the HOA along with coordination with LACoFD for fire safety awareness from the Firewise Committee/Board.

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

- **"READY" – Preparing for the Fire Threat:** Take personal responsibility and prepare long before the threat of a wildfire so that residents are ready when a wildfire occurs. Occupants will create defensible space by clearing brush away from buildings as detailed in the Project's FPP (Dudek 2024). Additionally, occupants will use only fire-resistant landscaping and maintain the ignition resistance of buildings onsite. Residents should assemble emergency supplies and belongings in a safe spot, confirm registration with the County's Alert LA County system, and the HOA should provide awareness of the evacuation study for all individuals residing within the Project and guests.
- **"SET" – Situational Awareness When a Fire Starts:** If a wildfire occurs and there is potential for it to threaten the Centennial community, pack vehicles with emergency items. Stay aware of the latest news from local media, County of Los Angeles and LACSD for updated information on the fire. If uncomfortable, one should leave the area.
- **"GO!" – Leave Early!** Following an evacuation plan provides one with knowledge of the situation and how to approach evacuation. Leaving early—well before a wildfire is threatening the community—provides one with the least delay and results in a situation where, if a majority of individuals also leave early, firefighters are now able to better maneuver, protect and defend structures, evacuate other residents who couldn't leave early, and focus on citizen safety.

"READY! SET! GO!" is predicated on the fact that being unprepared and attempting to flee an impending fire late (such as when the fire is physically close to the community) is dangerous and exacerbates an already confusing situation. This WETR provides key information that can be integrated into the evacuation plans, including the best available routes for them to use in the event of an emergency evacuation.

Situational awareness requires a reliable information source. One of the most effective public notification methods is Reverse 9-1-1. The Los Angeles County OEM operates the notification system that provides a recorded message over landline telephone systems relating to evacuation notices. In addition, the OEM operates a program known as Alert LA County that has the capability to send emergency notifications over both landlines as well as to cell phones and via text messages. The Project's Fire Safety Coordinators will encourage residents to register cell phone numbers and email addresses with Alert LA County annually. The registration of cell phones can be done online at https://lacounty.gov/emergency/alert-la/.

As part of the Project, this WETR will be accessible on the website (e.g. HOA or Property Management) for all future developments. It is also recommended that all future HOAs or Property Management Companies identify a Fire Safety Coordinator(s) that is responsible for:

1. Preparing and distributing the annual reminder notice that shall be provided to each occupant encouraging them to review this WETR and be familiar with community evacuation protocols.
2. Coordination with local fire agencies to hold an annual fire safety and evacuation preparedness informational meeting for occupants. The meeting should be attended by representatives of appropriate fire agencies and important fire and evacuation information should be reviewed.
3. Maintaining fire safety information on the development's website, including the WETR and materials from the "Ready, Set, Go!" Program.

For non-residential uses, Fire Safety Coordinators should also be responsible for:

1. Coordinating an annual fire evacuation drill/fire exercise to confirm proper safety measures have been implemented, facility awareness and preparation of a community-wide "Ready, Set, Go!" plan. The Fire Safety Coordinators will also organize employee training and awareness through various practices:
    a. New hire fire awareness and evacuation training
    b. Ongoing staff training
    c. Strategically placed fire safety and evacuation/sheltering protocol information, as determined by the Fire Safety Coordinators.

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9 Project Funded Evacuation Outreach

1. All Project implementing developments will include a proactive wildfire education program utilizing a multi-pronged approach to fire safety following the "**Ready, Set, Go!**" approach to wildfire evacuation, to include, but not limited to:
   i. Annual wildfire and evacuation safety awareness meeting in coordination with local fire agencies.
   ii. Annual reminder notices will be provided to each occupant encouraging them to review this WETR and be familiar with evacuation protocols.
   iii. The development's website will host a webpage dedicated to wildfire and evacuation education and awareness, which should include a copy of this WETR and the resources provided herein.
2. All HOAs and Property Managers for developments within the Project will designate a Fire Safety Coordinator(s) to oversee implementation of the wildfire education program. The Fire Safety Coordinator(s) will:
   a. Prepare and distribute the annual reminder notice that shall be provided to each occupant encouraging them to review this WETR and be familiar with community evacuation protocols.
   b. Coordinate with local fire agencies to hold an annual fire safety and evacuation preparedness informational meeting for occupants. The meeting should be attended by representatives of appropriate fire agencies and important fire and evacuation information should be reviewed.
   c. Maintaining fire safety information on the development's website, including the WETR and materials from the "Ready, Set, Go!" Program.

   For non-residential uses (e.g., commercial, institutional) Fire Safety Coordinator(s) will also:

   a. Coordinate an annual fire evacuation drill/fire exercise to ensure proper safety measures have been implemented, facility awareness and preparation of a community-wide "Ready, Set, Go!" plan. The Fire Safety Coordinator(s) will also organize employee training and awareness through various practices:
      i. New hire fire awareness and evacuation training
      ii. Ongoing staff training
   b. Strategically place fire safety and evacuation/sheltering protocol information
3. The Project includes a contingency plan for the rare occurrence that evacuation is not safe that includes occupants sheltering in place within onsite structures.

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10 Limitations

Wildfire Evacuation Technical Report ("WETR")

This section details basic evacuation information that will familiarize Project occupants with alternate bodily and property options that may be available to them during an emergency; mindful, however, that real-time law enforcement and fire personnel/agencies' decision-making and direction during an emergency requiring evacuation is of utmost importance and must be adhered to.

This WETR analyzes the existing community's evacuation times currently, and assuming the construction of the Project as it relates to wildfires; however, the components of the plan may also be useful in similar situations, as noted above. The estimated evacuation times are based on several assumptions detailed further below in this WETR. However, actual evacuation times may be faster or slower than the estimates, depending on the type of emergency, the extent of the evacuation, its gravity, the time of day, and other factors. A collective, community–wide evacuation of existing populations and the proposed population from the Project would include congested roads in its existing condition that are improved, but still congested with the Project. Congested roads are normal in any urban setting when a large evacuation is declared unless it is managed appropriately (*e.g.*, evacuation areas are staggered to reduce the potential traffic surges that can significantly impact evacuations), and thus potentially could be counterproductive. Therefore, there would still be the potential for congestion and delays.

This WETR promotes the "Ready, Set, Go!" model, adopted by County of Los Angeles, CAL FIRE, and many fire agencies statewide. The goal is to raise agency and citizen awareness of potential evacuation issues and get a majority of the public "Ready" by taking a proactive stance on preparedness, training drills, and resident education, and evacuation planning efforts.

The Project populace will be "Set" by closely monitoring the situation whenever fire weather occurs and/or when wildfire occurs and elevating pre-planned protocol activities and situational awareness.

Lastly, fire or law enforcement officials will mandate that populations "Go" by executing pre-planned evacuation procedures. The preferred alternative, initially, may well be early evacuation. However, there may be instances when evacuation is not possible, is not considered safe, or is not an option based on changing conditions, or other factors.

The Project also is designed specifically to maintain an enhanced resistance to wildfire ignition and perform as a fire adapted Project, offering fire and law officials with additional options for safety to the populace compared to those options available to less thought-through projects.

As noted, this WETR does not and cannot provide a guarantee that all persons and property will be unaffected because of the considerations presented herein for further development and refinement, including, as noted, in-place versus evacuation protocols, suggested roadway enhancements, increased effectiveness of traffic measures, ignition resistance measures, public outreach, program maintenance and updates by local authorities in conjunction with owner, occupant, and worker input and participation, with an overall goal of instilling a heightened sense of awareness and preparedness in the event of an incident. Fire is a dynamic and unpredictable occurrence, and it is important for those in a high fire severity zone to educate themselves on practices that will improve safety and that will be able to be implemented at the individual level rapidly and effectively, albeit in combination with protocols and "in-the-field" decision making of emergency responders.

Summary – Vehicle Travel Time Scenarios

This WETR presents a reasonable vehicle travel time estimate based on professional judgments made by CRA, taking into consideration input from Dudek and other resources. Changing any number of these assumptions can lengthen or shorten the average vehicle travel time. For instance, a situation could arise in which professionals *may* choose to utilize additional roadways for evacuation not utilized in the Dudek/CRA analysis and *may also* choose to send more vehicle trips to certain evacuation routes and *may also* choose to guide vehicle trips to more or different route permutations relative to what has been modeled in this the Dudek/CRA analysis. The net result of changing the variables selected could yield an average evacuation travel time shorter or longer than the results detailed in the Dudek/CRA analysis.

Many factors can shorten or lengthen the vehicle time from the results shown herein. For example:

Changing the possible evacuation routes selected would affect the results. For instance, utilizing roads for ingress and/or egress that are not utilized in this analysis could shorten vehicle travel times relative to the results shown herein.

Increasing or decreasing the number of path permutations and percentage of the population utilizing each route that leads out of the immediate area could shorten or lengthen vehicle travel time relative to the results shown herein.

Emergency professionals electing to reserve certain road lanes for emergency vehicle ingress for portions of time could affect the travel time relative to the results shown herein.

Assuming evacuees utilize fewer or more vehicles to evacuate from the Project or surrounding communities relative to the Vehicle Utilization Rate selected in the analysis would shorten or lengthen vehicle travel time relative to the results shown herein.

Changing the mix of vehicle trips allocated to each evacuation route could shorten or lengthen vehicle travel time relative to the results shown herein.

Assuming a different road capacity adjustment factor could shorten or lengthen the vehicle travel time relative to the results shown herein.

Assuming fewer people are at home when the evacuation notice is given would reduce the number of vehicle trips and shorten vehicle travel time relative to the results shown herein. For instance, an evacuation during daytime hours would typically result in fewer outbound trips than assumed in this analysis.

Assuming some portion of vehicle trips are made in advance of the evacuation notice would reduce the number of vehicle trips relative to the results shown herein.

Assuming some homeowners and their families are not in the Study Area when evacuation notice is given (most likely in a daytime evacuation event), could reduce the number for vehicle trips relative to the results shown herein.

Limitation On Reliance or Dependence Upon Report

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

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

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

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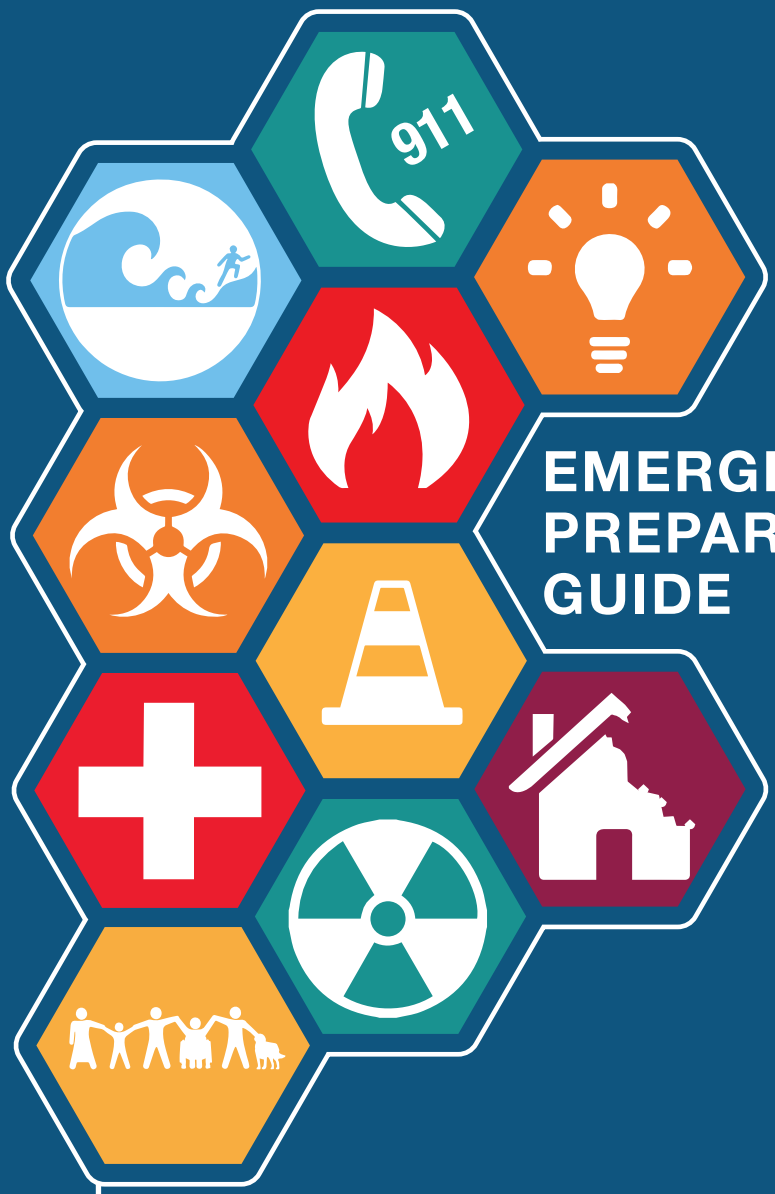
Appendix A-1 through A-2

LACoFD Emergency Preparedness Guide
"Ready, Set, Go!" Wildfire Action Guide



EMERGENCY PREPAREDNESS GUIDE

LOS ANGELES FIRE DEPARTMENT

www.lafd.org

For more Fire Department information, visit www.lafd.org

Los Angeles is susceptible to a variety of emergencies both natural and man made. Not only should we all be prepared and ready for these emergencies, but we should also know what to do before, during, and after an incident occurs. It is extremely important to also be aware of emergency plans that may already exist in your school, work, house of worship, or wherever you may be. This guide will help you get informed, have a plan, and get involved.

EMERGENCY PREPAREDNESS GUIDE

FOR NON-EMERGENCIES & EVERYTHING ELSE

CALL 3-1-1

Or go to www.myla311.lacity.org

- City Services & Programs
- Animal Services
- Child & Adult Services
- Permits & Property Violations
- Illegal Dumping & Vandalism
- Parking & Vehicle Services
- Street Problems & Repairs
- Community Disturbances

For the hearing impaired dial TDD, (Telecommunication Device for the Deaf): (213) 473-5990

FOR EMERGENCIES ONLY

For police, fire, or paramedics...

CALL 9-1-1

Or if you can't, TEXT to 9-1-1

What is the address of the emergency?
State the type of location.

House? Business? Apartment?

What is the phone number?

(___) ___ - ____

What is happening?

Accident? Fire? Medical? Crime?

Meet with the first responders.
Help is on the way.

If it is safe, meet with the first responder

If possible, open the garage door & turn on the light

EMERGENCY PREPAREDNESS GUIDE

www.lafd.org

LOS ANGELES FIRE DEPARTMENT

EMERGENCY PREPAREDNESS GUIDE

GET INFORMED

IMPORTANT ALERT SYSTEMS

It is important to know how the City of Los Angeles will notify the community before, during and after an emergency. Here are some of the ways you can expect to find important emergency information:

WIRELESS EMERGENCY ALERTS (WEA)

During an emergency, alert and warning officials need to provide the public with life-saving information quickly. Wireless Emergency Alerts (WEAs), made available through the Integrated Public Alert and Warning System (IPAWS) infrastructure, are just one of the ways public safety officials can quickly and effectively alert and warn the public about serious emergencies.

NOTIFY LA

A Community Mass Notification System that will be used in emergencies to contact City residents and businesses through phone messages, text messages and e-mail.

www.notifyla.org

COMMERCIAL MEDIA

Listen to broadcast stations for regional emergency alert information for Los Angeles City and surrounding areas. Because power failures are likely in an emergency, keep at least one battery powered radio in your household.

AMATEUR RADIO

The City of Los Angeles created the LAFD Auxiliary Communications Service (ACS) which expands and supplements emergency communications capabilities. ACS is recognized as a state disaster group. **more at www.lafdacs.org**

WEBSITES

www.nws.noaa.gov
Sign up for weather related web feeds that are sent directly by text or email.

www.lacounty.gov
LA County updates after a disaster will list shelter locations and other essential information.

TIP: Remember that your car radio might be the easiest way to listen to emergency broadcasts.

EMERGENCY INFORMATION

ALERT SYSTEMS:

lafd.org/alerts

lapdonline.org

www.weather.gov/alerts

redcross.org

fema.gov

ready.gov/alerts

BROADCASTERS:

AM / FM / SATELLITE RADIO

KPCC 89.3 FM	**KFI** 640 AM
KCBS 93.1 FM	**KABC** 790 AM
KIIS 102.7 FM	**KNX** 1070 AM
KROQ 106.7 FM	

SATELLITE RADIO

SiriusXM Channels
FOX NEWS CH. _____
CNN NEWS CH. _____

AMATEUR RADIO SERVICE

FREQ. 147.3 + 110.9 (LAFD ACS CH. 1)

FREQ. _____

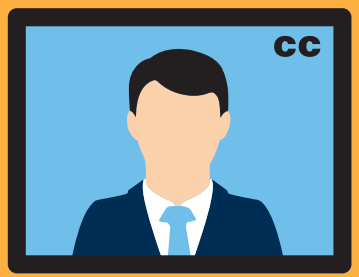
FREQ. _____

SMARTPHONE ALERTS

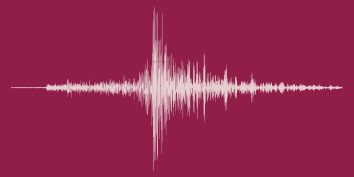
Smartphones have alerting apps for emergency notifications.

These apps may warn you of earthquakes, wild fires or other hazardous emergencies.

TV : LOCAL NEWS



EARTHQUAKE HISTORY



EARTHQUAKE MAGNITUDE SCALE

1-1.9	2-2.9	3-3.9	4-4.9	5-5.9	6-6.9	7-7.9	8-8.9	9-9.9
Micro	Minor		Light	Moderate	Strong	Major	Great	
Vibration detected			Building damage		Building damage		Devastating	

DID YOU KNOW?

Each year the Southern California area has about 10,000 earthquakes. The majority of which go unnoticed. However, if there is a large earthquake the aftershock sequence will produce many more earthquakes of all magnitudes for months.

Information cited from www.usgs.gov

EUREKA
November 8, 1980
2:27 AM
Magnitude 7.4

NAPA VALLEY
August 24, 2014
3:20 AM
Magnitude 6.0

SAN FRANCISCO
April 18, 1906
5:12 AM
Magnitude 7.8

LOMA PRIETA
October 17, 1989
5:04 PM
Magnitude 6.9

KERN COUNTY
July 21, 1952
4:52 AM
Magnitude 7.5

FORT TEJON
January 9, 1857
8:20 AM
Magnitude 7.9

SYLMAR
February 9, 1971
6:00 AM
Magnitude 6.6

NORTHRIDGE
January 17,1994
4:30:55 AM
Magnitude 6.7

WHITTIER
October 1st, 1987
7:42 AM
Magnitude 5.9

LANDERS
June 28, 1992
4:57 AM
Magnitude 7.3

LONG BEACH
March 10, 1933
5:54 PM
Magnitude 6.4

SAN ANDREAS FAULT

The San Andreas Fault extends 750 miles through California. It forms the tectonic boundary between the Pacific Plate and the North American Plate.

NEWPORT-INGLEWOOD FAULT

The Newport–Inglewood extends for 47 miles from Culver City through Inglewood and other coastal cities towards Newport Beach.

PUENTE HILLS FAULT

The Puente Hills Fault extends 25 miles from Puente Hills through downtown Los Angeles, ending in Griffith Park.

**Map details for reference only.*

EARTHQUAKES

BEFORE THE EARTHQUAKE

1. SECURE YOUR PLACE
By identifying hazards and securing movable items.

2. PLAN TO BE SAFE
By creating a disaster plan and deciding how you will communicate in an emergency.

3. ORGANIZE DISASTER SUPPLIES
In convenient locations.

4. MINIMIZE FINANCIAL HARDSHIP
By organizing important documents, strengthening your property, and considering insurance.

DURING THE EARTHQUAKE

1. DROP COVER AND HOLD ON
When the earth shakes. See illustrations on the next page.

2. IMPROVE SAFETY
After earthquakes by evacuating if necessary, helping the injured, and preventing further injuries or damage.

TIP: Learn the 7 steps to earthquake safety.
Go to: **www.shakeout.org** for more information.

PROTECT YOURSELF DURING EARTHQUAKES!

IF POSSIBLE

USING WHEELCHAIR

For more information: www.earthquakecountry.org

AFTER THE EARTHQUAKE

1. CHECK AREAS
If it is safe, check for gas and water leaks, and broken electrical wiring or sewage lines. If there is damage, turn the utility off at the source and immediately report gas leaks to your utility company.

2. STAY CLEAR
Stay away from downed power lines and warn others to stay away. **AVOID GAS**, do not attempt to re-light the gas pilot unless your gas line has been thoroughly inspected. Call the Gas Company for assistance.

3. PUBLIC SAFETY
Cooperate fully with public safety officials and follow instructions; they are trained to ensure safety. **AVOID DRIVING**, do not use your vehicle unless there is an emergency.

4. AFTER SHOCKS
Be prepared for aftershocks. Stay calm and help others. **NOTIFY CONTACTS** if you evacuate, leave a message at your home telling family members and others where you can be found.

CITY LA DBS
DEPARTMENT OF BUILDING AND SAFETY

After a major earthquake, Building and Safety (LADBS) will evaluate damaged buildings (dwelling, apartment or commercial building) to determine if buildings are safe to occupy. LADBS will then post one of the following placards on the damaged building(s):

BUILDING ASSESSMENT SIGNS

UNSAFE
Do not enter or occupy

RESTRICTED USE
Entry or occupancy is restricted as specified

INSPECTED
No apparent structural hazard, may have minor damage

more info at www.ladbs.org

TSUNAMIS

TSUNAMI EVACUATION ROUTE

WHAT IS A TSUNAMI

Tsunamis, also known as seismic sea waves, are a series of enormous waves created by an underwater disturbance such as a landslide, volcanic eruption, and most commonly, an earthquake. After a disturbance has occurred, the first wave in a series could reach the beach in a few minutes, even before a warning is issued. Areas are at greater risk if they are less than 25 feet above sea level and within a mile of the shoreline. Drowning is the most common cause of death associated with a tsunami. Tsunami waves and the receding water are very destructive to structures in the run-up zone.

SIGNS OF A TSUNAMI

Rapid change in water levels may be an indication of an approaching tsunami.

An earthquake may be your only warning of an approaching tsunami, so act quickly.

If you notice water has pulled back or run out, creating an empty beach, this may be tsunami warning.

BEFORE

Build an emergency kit and make a family communications plan.

If you are a tourist, familiarize yourself with local tsunami evacuation routes.

After an earthquake, turn on your radio and listen for tsunami warning.

DURING

Move to high ground or inland and away from water immediately. Never go to the beach to watch or surf a tsunami wave.

If you are a tourist, familiarize yourself with local tsunami evacuation protocols.

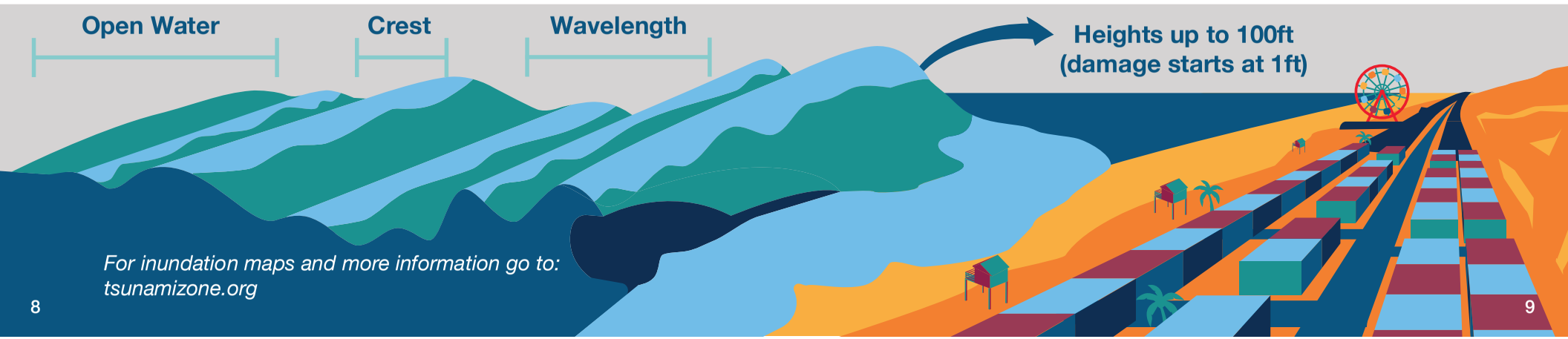
Help your neighbors who may require assistance.

AFTER

Return home only after local officials tell you it is safe.

Go to a designated public shelter if you have been told to evacuate or you feel it is unsafe to remain in your home.

Stay away from debris in the water; it may pose a safety hazard to people or pets.



For inundation maps and more information go to: tsunamizone.org

ADVERSE WEATHER

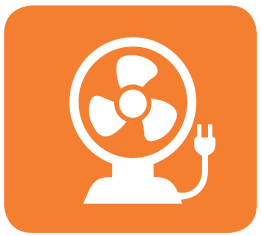
6 TIPS FOR EXTREME HEAT

When temperatures are high, prolonged sun exposure may cause dehydration, heat cramps, heat exhaustion, and heat stroke. Never leave children, elderly people, or pets unattended in closed vehicles, even with the windows cracked open.

TO STAY COOL

Hydrate by drinking water or sports drinks. Avoid drinking alcohol.

Offer help to those in your neighborhood with limited access to air conditioning and transportation, such as seniors or those who are ill.



During peak heat hours stay in an air conditioned area. Visit public facilities such as shopping malls, parks, and libraries to stay cool.

Stay out of the sun if you do not need to be in it. When in the sun, wear a hat, preferably with a wide brim.

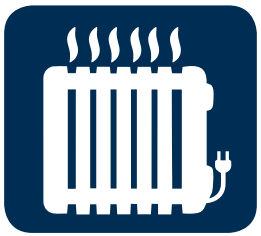
Avoid unnecessary exertion, such as vigorous exercise during peak sun hours.

Wear light, loose-fitting clothing.

6 TIPS FOR EXTREME COLD

Every year in Los Angeles there are carbon monoxide poisonings from a barbecue, stove, or oven used as a source of warmth. A safe way to stay warm is by using central heating, electric heaters, and ventilated fireplaces.

TO STAY WARM



Check to make sure heating appliances are in good working condition before using them.

Furnaces and fireplaces should be checked to ensure that chimneys or flues are not blocked to allow for proper ventilation.

A winter shelter program is available for seniors and those looking for a place to beat cold weather.

Install a carbon monoxide detector in your home to reduce the risk of poisoning.

If you use an outdoor generator, place it as far away from the home as possible.

Never use a barbecue, stove, or oven to heat your home.

TIP: For shelter locations during extreme heat or cold weather events, call 3-1-1 or search www.laparks.org

TIP: A power outage may occur during extreme heat or cold weather events.

STORMS & FLOODS

Los Angeles County contains some of the steepest and most erosive mountains in the world. With elevations reaching 10,000 feet above sea level. Below steeply walled canyons lie large coastal plains with a high population density. When heavy rains come, there is a significant potential for floods and mudslides.

6 TIPS SAFETY TIPS FOR FLOODS

Have a plan in place before an evacuation is ordered.

Avoid walking or driving through flood waters.

Talk to your neighbors about their plans, and encourage them to evacuate early.

If there is a chance of flash flooding, move immediately to higher ground.

Turn on your TV/radio. You will receive the latest weather updates and emergency instructions.

Disconnect electrical appliances and do not touch electrical equipment.

WHEN ITS RAINING

Plan to arrive at your home or destination in a safe neighborhood. Remain there until well after the storm has ended.

This could be hours or sometimes even days after the rain has stopped. Be particularly alert when driving. Watch the road for collapsed pavement, mud, fallen rocks, and other hazards.

Bridges may be washed out, and culverts over stopped. When you see water across a roadway, there is no way to see whether the road is under the water has been washed away.

BEFORE THE FLOOD

Assess the safety of your residence and belongings.

Clean drains and gutters around the house.

Plan for sandbags. Visit your local fire station if sandbags are needed.

Maintain all slopes in a safe manner. Roots bring stability to soil.

DURING THE FLOOD

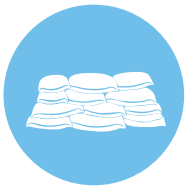
Do not cross rapidly flowing streams.

Check drainage systems at your home and driveways.

Watch for mudslides and adjust drainage to reduce mudslides.

AFTER THE FLOOD

Don't return to your flood damaged home if area is not safe.



Sandbags may help divert flood water, however they are meaningless when there is significant debris flow.

Drive slowly and carefully as many roads may have mud, debris, holes, and washed-out areas.

Assess damage; check hillsides, houses.

POWER OUTAGES

BEFORE A POWER OUTAGE

1. BUILD

Build or restock your emergency preparedness kit, including a flashlight, batteries, cash, and first aid supplies.

2. CHARGE

Charge cell phones and any battery powered devices. Also keep alternative charging methods at all times.

3. LEARN

Learn about the emergency plans by following dwp.web for additional information postage.

4. FUEL UP OR CHARGE UP

Maintain the proper fuel or charge for your vehicle. If you use your car to re-charge devices, do NOT keep the car running in a garage, partially enclosed space,or close to a home, this can lead to carbon monoxide poisoning.

5. BUY

Purchase ice or freeze water-filled plastic containers to help keep food cold during a temporary power outage.

DURING A POWER OUTAGE

1. NO FLAMES

Open flames are dangerous during a power outage. Only use flashlights for emergency lighting; candles can cause fires.

2. FOOD

Keep refrigerator and freezer doors closed. Most food requiring refrigeration can be kept safely in a closed refrigerator for several hours. An unopened refrigerator will keep food cold for about 4 hours.

3. POWER OFF

Turn off or disconnect appliances and other equipment in case of a momentary power “surge” that can damage computers and other devices. Consider adding surge protectors.

4. PURCHASE

If you are considering purchasing a generator for your home, consult an electrician or engineer before purchasing and installing. Make sure it remains outside of the house.

5. DRESS

Dress to prepare for the weather, if it’s cold outside layer clothing to stay warm and never use the oven as a source of heat. During a heatwave find places where it is cool, and avoid layering clothes.

TIP: www.ladwp.com for reported power outages & wait times.

POWER OUTAGES

AFTER A POWER OUTAGE

1. THROW AWAY

Throw away any food that has been exposed to temperatures 40° F (4° C) for 2 hours or more or that has an unusual odor, color or texture. When in doubt, throw it out!

2. CHECK

If food in the freezer is colder than 40° F and has ice crystals on it, you can refreeze it.

3. RESTOCK

Restock your emergency kit with fresh batteries, canned foods and other supplies.

4. CONTACT

Contact your doctor or your local pharmacist if you're concerned about medications having spoiled.

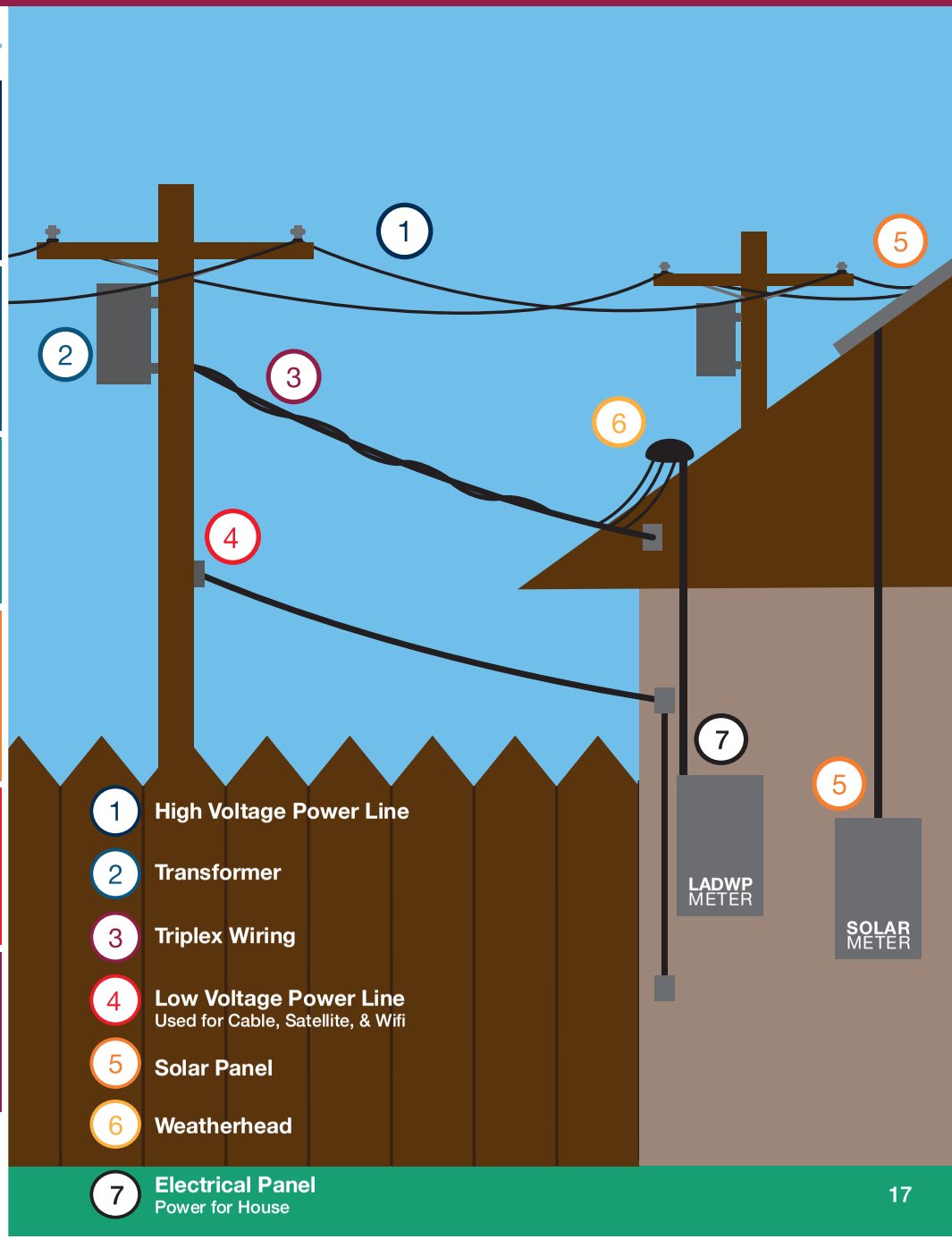
5. RESET

Unplug any electrical appliances before resetting your circuit breaker to protect them from a power surge.

6. INFORMATION

Do not call 9-1-1 for information—call only to report a life threatening emergency. If you do need to make a call, use the 3-1-1 number instead for any additional information.

TIP: If electrical power lines are down, don't touch them. Keep your family and pets away. Report downed lines to 9-1-1.



WILDLAND FIRES

BEFORE THE FIRE

Park your car heading out and keep your keys with you.

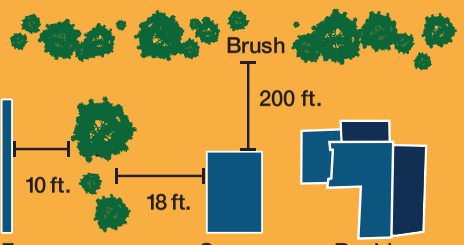
Place important documents, records, and digital files inside the car.

Unplug automatic garage door openers in case of power failure.

Have pet carriers & trailers ready to go.

Close all doors and windows inside your home. Leave all drapes & coverings open but leave lights on.

Move combustible materials away from exterior of home.



FIRE CODE (L.A.M.C. 57.322)

Maintain required clearance from brush, shrubbery, and trees around your home.

*Diagram not to scale.

Visit lafd.org/brush for more info.

DURING THE FIRE

EVACUATE

Follow evacuation instructions from Law Enforcement and Fire Department officials. Call 911 if you are unable to evacuate.

STAY TOGETHER

Gather your family, pets, and disaster supply kit. Leave your home or business immediately.

STAY CALM

Drive carefully at normal speeds. Do not park your vehicle in a traffic lane or safety area. Monitor road closures.

TIP: Pre-wetting your home and surrounding areas will not improve the safety of your home. It wastes valuable time and water.

AFTER THE FIRE

Check with the City of Los Angeles to find out what roads are closed or damaged.

RETURN SAFE

Do not return home until authorities say it's safe. Wear appropriate shoes and clothing, and wet debris down to minimize breathing in dust particles.

CLEAN UP

Make sure your utilities are operational. Do not use contaminated water. Throw out any food exposed to heat, smoke, or soot.

STAY ALERT

Maintain a "fire watch." Check your home (including the roof and attic) for smoke, sparks or hidden embers—hot spots and other hazards can flare up without warning. Leave at once if you smell smoke. Call 911 to report fire.

RECORD DAMAGES

Be sure to photograph any damages to your property for insurance purposes.

HOUSE FIRES

BEFORE A FIRE

E. D. I. T. H

E. Exit
D. Drills
I. In
T. The
H. Home

WINDOWS

Make sure that windows are not stuck, screens can be taken out quickly, and that security bars can be properly opened.

1

ESCAPE ROUTES

Find two ways to get out of each room (door or window)

2

DURING A FIRE

CRAWL, EXIT & CALL 911

Crawl low under any smoke to your exit. If you see, smell or hear a fire, exit immediately and call 911.

EVACUATE & ASSIST

Evacuate early. Remove loved ones, pets, and assist neighbors and those with disabilities.

CALL 911

If you can't get to someone needing assistance, call 9-1-1 for help.

3

SEAL DOORS & VENTS

If unable to evacuate, shelter in place, call 9-1-1 to report your location, seal doors or vents if possible.

4

FEEL THE DOOR FOR HEAT

Feel the doorknob with the back of hand, if hot leave the door closed and use another way out.

5

*Read BEFORE, DURING, AFTER tips and compare them to the home diagram below.

AFTER A FIRE

CHECK FOR SAFETY

Check with the Fire Department to make sure your residence is safe to enter. Be watchful of any structural damage caused by the fire.

RELIEF SERVICES

LAFD will contact Red Cross, if you need temporary housing, food and medicines.

6

UTILITIES

The fire department should see that utilities are either safe to use or are disconnected before they leave. DO NOT attempt to reconnect utilities yourself.

7

RECOVERY

Contact your insurance company for detailed instructions on protecting the property. If you are not insured, contact private organizations for aid.

INVENTORY DAMAGES

Maintain an inventory of damaged property and items .Protect valuable documents and records.

8

COLLECT DOCUMENTS

Save receipts for any money you spend related to fire loss. They may be needed by your insurance to verify loss claims on income tax.

HOUSE FIRES

TIPS ABOUT FIRE

FIRE IS FAST!

In less than 30 seconds a small flame can turn into a major fire. It only takes minutes for thick black smoke to fill a house or for it to be engulfed in flames.

FIRE IS DEADLY!

Fire starts bright, but quickly produces black smoke and complete darkness.

FIRE IS HOT!

Heat is more threatening than flames. Room temperatures in a fire can be 100 degrees at floor level and rise to 600 degrees at eye level. Inhaling this super-hot air will scorch your lungs and melt clothes to your skin.

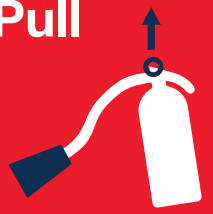
FIRE MAKES DEADLY SMOKE!

Smoke and toxic gases kill more people than flames do. Fire produces poisonous gases that make you disoriented and drowsy. Asphyxiation is the leading cause of fire deaths, exceeding burns by a three-to-one ratio.

OPERATING A PORTABLE FIRE EXTINGUISHER

P.A.S.S

Pull



Pull the pin

Aim

Aim the nozzle or horn low at the base of the fire

Squeeze

Squeeze the handle to release the agent

Sweep

Sweep from side to side at the base until the fire is out.

SMOKE ALARMS

NEVER DISABLE

Never disable a smoke alarm while cooking – it can be a deadly mistake.

ALARM BATTERIES

Test batteries monthly. Replace batteries in battery-powered and hard-wired smoke alarms at least twice a year at daylight savings.

ALARMS ON EVERY FLOOR

Install smoke alarms on every level of your home, including the basement, both inside and outside of sleeping areas.

REPLACE ALARMS

Replace the entire smoke alarm unit every 8-10 years or according to manufacturer's instructions.

Fire burns but smoke kills. Smoke alarms save lives. That's why it's important you have functioning smoke alarms throughout your home.

SMOKE ALARM SAFETY FOR PEOPLE WITH DISABILITIES

AUDIBLE ALARMS

Audible alarms for people with visual disabilities should pause with a small window of silence between each successive cycle so that they can listen to instructions or voices of others.

VIBRATING /FLASHING ALARMS

Smoke alarms with a vibrating pad or flashing light are available for people who are deaf or hard of hearing.

Smoke alarms with a strobe light outside the home may be to catch the attention of neighbors. Emergency call systems for summoning help are also available.

TIP: Do not touch the plastic discharge horn on CO2 extinguishers; it gets very cold and may cause skin damage. Lay used fire extinguisher on their side so no attempt will be made to use them until they are recharged.

ACTIVE SHOOTER RESPONSE

CALL 911

RUN | **HIDE** | **FIGHT**

TEXT 911 ONLY WHEN SAFE

HIDE IF ESCAPE IS NOT POSSIBLE

Stay out of the shooter's view.

Silence your electronics.

Block entrances & turn off lights.

Groups should spread out when hiding.

Text to 911 and text message others to silently communicate.

Stay in place until given the all-clear signal.

TIP: The very first officers on scene will not stop to help the injured. Their top priority is to end the incident as fast as possible. Rescue teams will move in after the first officers. They will treat and move the injured to safety.

RUN AND ESCAPE IF POSSIBLE

Getting away is your top priority.

Leave behind any heavy belongings.

Help others if you can, but you must escape.

Warn others to stay away from the area.

FIGHT AS A LAST RESORT

Commit to your actions. FIGHT. Do not hesitate.

Rally others & attack together.

Be prepared to inflict severe injury to shooter.

Throw objects or improvise weapons.

TERRORISM

As we've seen in the last several years, domestic and international terrorists can strike at any time. To combat the threat of terrorism, emergency services officials across all levels of government continue to work together to develop and implement effective strategies for preventing and responding to incidents.

TYPES OF TERRORISM

- Arson
- Bioterrorism
- Chemical Attacks
- Cyberterrorism
- Hijackings
- Suspicious Packages
- Nuclear Attacks
- Radiological Attacks
- Shootings

TIP: Report a tip, lead, or threat directly to the Joint Regional Intelligence Center at: www.JIRC.org, *(Select Private Sector/General Public Reporting.)*

BEFORE AN ATTACK

SEE SOMETHING, SAY SOMETHING!

OBSERVE SURROUNDINGS

Terrorists look for high visibility targets such as sporting events, political conventions, international airports, and high-profile landmarks.

REPORT THREATS

- Call or text to 911 or 1-877-A-THREAT
- Submit a tip, lead, or threat at: www.jirc.org

WHEN TRAVELING

Keep track of your belongings—do not accept packages from strangers. Locate emergency exits and stairways for buildings, subways, and crowded public areas.

TIP: Preparing for terrorist attacks is the same as preparing for fires, earthquakes, and other emergencies.

- Keep emergency supply kits.
- Train in how to use fire extinguishers.
- Practice evacuation drills and procedures.
- Obtain training in CPR and first aid.
- Establish a family meeting place.
- Create an emergency communications plan.

DISEASE OUTBREAK

BEFORE A PANDEMIC

Have any nonprescription drugs and other supplies on hand, such as pain relievers, stomach remedies, cough and cold medicines and vitamins.

Store two weeks worth of supplies.

Refill your perscription medications.

Maintain health records in a safe place.

Consider vaccinations.

DURING A PANDEMIC

Practice other good health habits. Get plenty of sleep, be physically active, manage your stress, drink plenty of fluids, and eat nutritious food.

Stay away from others already sick.

Cover your cough.

Keep hands clean.

Visit a doctor.

Visit these sites to learn about how to prevent the spread of disease.

www.cdc.gov
www.flu.gov
www.hhs.gov
www.redcross.org

EMERGENCY PREPAREDNESS GUIDE

NOTES

HAVE A PLAN

DISASTER SUPPLY KITS

A Disaster Supply Kit is any pre-assembled group of items that will improve the health and safety of your family during a disaster. Kits can be purchased, or homemade in a variety of styles and sizes. They can be as small as a shaving kit for your glove compartment or as big as 50-gallon drums for your business, or home. In general, kits should be easy to carry and as lightweight as possible. You can have many kits, each suited to a different purpose.

THE EVACUATION CHECKLIST

EMERGENCY SUPPLY KIT

CASH AND CREDIT CARDS

OUT OF STATE CONTACT LIST

FAMILY PHOTOS

IMPORTANT DOCUMENTS
social security card, driver license, passport, medical card and records of insurance information

CHANGE OF CLOTHING
each family member

PERSONAL HYGIENE
toothbrush, toothpaste, shampoo, soap, lotion, deodorant, and tissues

MEDICAL NEEDS
wheelchair, canes, walkers, medications, hearing aids, and extra batteries

BABY
diapers, formula, food, change of clothing

PET CARE
identification, and immunization records, carrier, or cage, muzzle, leash, food and water

TIP: If time permits, prior to evacuating, consider taking photos or videos of your residence to assist in documentation of property. This may help provide information during the claims process.

EVACUATIONS

EVACUATION WARNING OR VOLUNTARY EVACUATION

Prepare to leave your home and the area. Gather your family, pets, basic needs and important paperwork and listen for instructions from emergency responders.

If you have special medical needs or have limited mobility, you should prepare to leave the area when an Evacuation Warning is issued, Those with the horses or large animals should also begin to evacuate.

EVACUATION ORDER OR MANDATORY EVACUATION

A directive from Police Department or Fire Department to leave your home or business immediately.

Failure to Evacuate may result in endangerment to the lives of others, personal injury, or death. Once you evacuate you will not be able to return until the order has been lifted.

EVACUATION SHELTER

Shelter may be set up by the Amercian Red Cross at the request of the City if an area must be evacuated for an extended amount of time. The location for an evacuation shelter will be announced by local officials.

SHELTER IN PLACE

Shelter indoors. Turn off air-conditioner or heater, seal the gaps around windows and doors. Listen to the radio for authorities to announce the threat has passed. You may also receive emergency alerts to your cellular telephone, or a reverse 911 system on your landline telephone. Call 9-1-1 if you are unable to evacuate.

FLASH FLOODS

A flash flood WATCH means flash flooding is possible in your area. Be ready to evacuate.

If you evacuate, remember to leave your information inside your home so others know where you are planning to go. Be sure to include your out of area contact.

Learn about **READY, SET, GO!** program on LAFD.org

10 ESSENTIAL EMERGENCY SUPPLIES

At a minimum your emergency supply kit should include these **10** essential items.

1. **WATER FOR 3-10 DAYS**
   (1 gallon per person per day)
2. **FOOD FOR 3-10 DAYS**
   (including pet food)
3. **MEDICATIONS**
   (prescription & non-prescription)
4. **RADIO**
   (& extra batteries)
5. **FLASHLIGHTS**
   (& extra batteries)
6. **FIRST AID KIT**
   (bandages, disinfecting wipes gauzes, medical tape)
7. **CASH & IMPORTANT DOCUMENTS**
   (small bills, coins, birth certificates, medical cards, licenses, USB)
8. **SANITATION & HYGIENE SUPPLIES**
9. **TOOLS**
   (wrench, duct tape, fire extinguisher, sturdy gloves)
10. **CLOTHING & STURDY SHOES**

TIP: When purchasing a fire extinguisher, the best type is ABC, which covers combustibles. liquids, and electrical fires. Be sure to check the expiration date on your extinguisher

PERSONALIZE IT

Camping stove fuel, pots and pans, aluminum foil, paper cups, plates and plastic utensils

Emergency blankets or sleeping bags

Pet Carriers and supplies for your animals and pets

Extra set of car, home and safe deposit box keys

List for emergency telephone numbers and contacts

Medication, portable toilet, toilet paper and plastic bags for human waste

Compass and maps

Pens, pencils, paper tablet to document incident

Toys, candy, crayons and books to keep children busy

Include items in you disaster kit that will help your family be comfortable and self-sufficient after a disaster. At minimum your emergency supplies should include these 10 essential items.

WATER STORAGE

STORE WATER
Keep bottled water in its original container and do not open it until you need to use it. Be sure to notice the expiration date or "use by" date. Store off the ground.

In an emergency situation, tap water may be safe to drink or use. It is important to prepare for possible emergency situations ahead of time. It is also essential to know how to make contaminated water safe to drink and how to find alternative sources of water.

- Generally a person needs to maintain 1 gallon to drink water each day. Children, nursing mothers, and others may need more.
- Consider water storage for your pets.
- Very hot temperatures can double the amount of water needed.

- Store water in thorougly washed plastic, glass, or enamel-lined metal containers.
- Before you access the water in your plumbing, locate the water inlet/shutoff valve for the house, condominium or appartment and turn off the water.

Pools, spas, toilet resevoirs and similar sources of water can be used for sanitary purposes only. **Do not drink** water frome these sources. Water from these sources contain toxic chemicals and have a high potential of giving you diarrhea, causing dehydration.

TIP: Water from water heater tank may be boiling hot.

Recycle self-stored water every six months. Recycle commercially bottled water every 12 months. WARNING: The water stored in the water heaters is VERY HOT. Take precautions to avoid injury!

For more information about Water, Sanitation, and Hygiene visit the Centers for Disease Control and Prevention at: **www.cdc.gov**

DRINKING WATER

In an emergency you can use water already in your heater tank, plumbing, and in ice cubes. Do not drink water from the reservoir tank of you toilet.

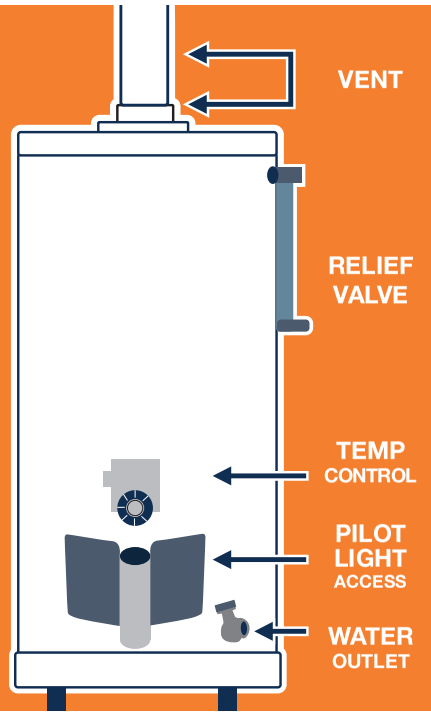
ACCESS WATER

ACCESS RESERVES IN THE WATER HEATER:
- Use extreme caution. Let the water cool.
- Turn off cold water supply to the tank.
- Open the drain valve near the bottom.

Remember: Some sediment at the bottom of the tank may flow at first, continue to drain water until it becomes clear.

Don't forget to clean and sanitize your food and water containers before using them. Wash with soap and water then fill them with a 10% bleach unscented solution. After 5 min empty the bleach solution and let air dry.

Water that is dirty should be first strained through a coffee filter, cheesecloth, or a paper towel to remove suspended matter.



RATIOS FOR PURIFYING WATER WITH BLEACH

8 drops of pure unscented liquid bleach per gallon of water will reduce the contaminants in the water.

1 Quart Water: 4 Drops of Bleach

1 Gallon Water: 8-16 Drops of Bleach

5 Gallon Water: 1 TSP of Bleach

If water continues to be murky or had an odor, add 1/8th teaspoon (or 8 drops of regular, unscented liquid household bleach for each gallon of water, stir it well, and let it stand for 30 minutes before you use it.

UTILITIES

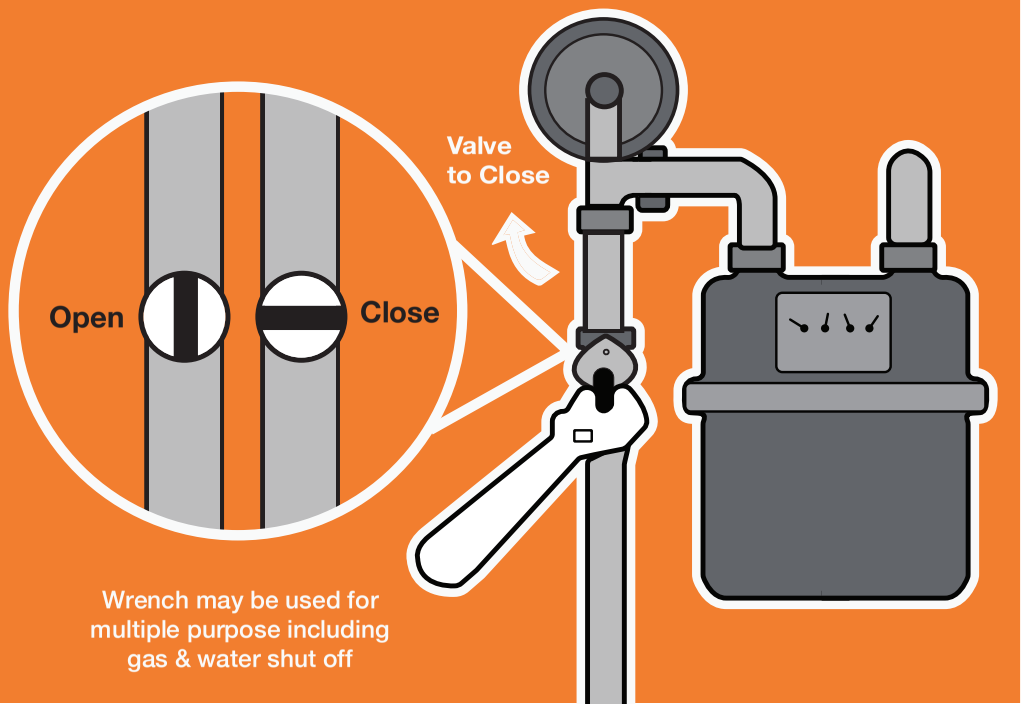
GAS SHUT OFF

LOCATE GAS METER

Learn the location of your gas meter and how to shut off the supply valve. **DO NOT shut off the gas supply valve** unless you smell or hear gas leaking. If you have “Natural Gas” (a line from the street) the main shut-off valve is located next to your meter.

TURN OFF GAS SUPPLY

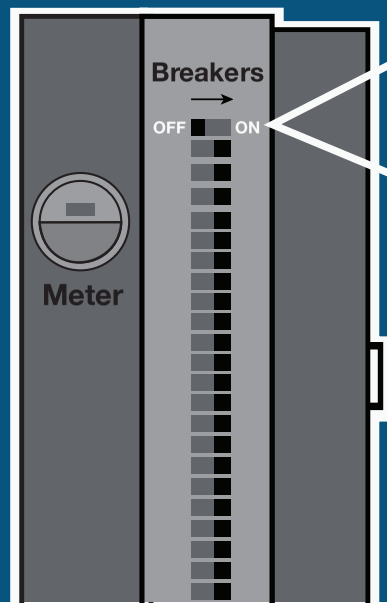
Use a wrench and carefully give it a quarter turn in either direction so that the bar runs crosswise on the pipe. Shut off valves covered with paint should be tapped gently to break the seal; forcing the valve can break it. If you have propane (gas in a tank), **turn off the main gas supply valve** if it is safe to do so.



Wrench may be used for multiple purpose including gas & water shut off

TIP: Walk carefully around your property; look for downed power wires, water or gas leaks and damage to the structure(s). DO NOT enter severely damaged buildings, especially alone. Wait for help and use safety gear.

ELECTRICITY SHUT OFF

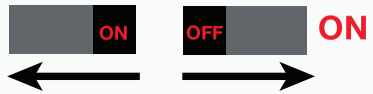


1. TURN POWER OFF

Turn off individual breakers FIRST, then the main switch.

2. TURN POWER ON

Turn on the main switch FIRST, then individual breakers.

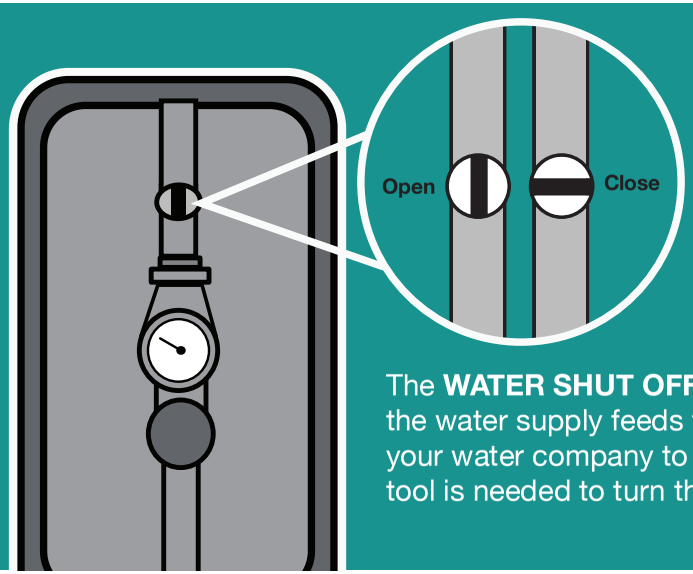


ELECTRICAL PANEL

Know where your electrical panel is and which breakers control power to your home. *(Be aware of sub panels in your garage or basement)*

Remember **Do Not** operate any electrical switches if a gas leak is suspected.

WATER SHUT OFF



The **WATER SHUT OFF valve** is found where the water supply feeds the house. Check with your water company to determine if a special tool is needed to turn the valve.

HOME SAFETY CHECK

GAS

Learn the location of your gas meter and how to shut off the supply valve.
DO NOT shut off the gas supply valve unless you smell or hear gas leaking.

FIRE EXTINGUISHERS

Keep a fire extinguisher in plain view and on every floor of your home.

SMOKE ALARMS

Make sure to install smoke alarms on every floor of the house, including the basement and near rooms where people sleep.

Carbon monoxide detectors are vital because this gas is tasteless and odorless.

WATER

If pipes are damaged, turn off the main water valve.

Check with local authorities before using any water. The water could be contaminated.
DO NOT flush toilets until you know that sewage lines are intact.

APPLIANCES

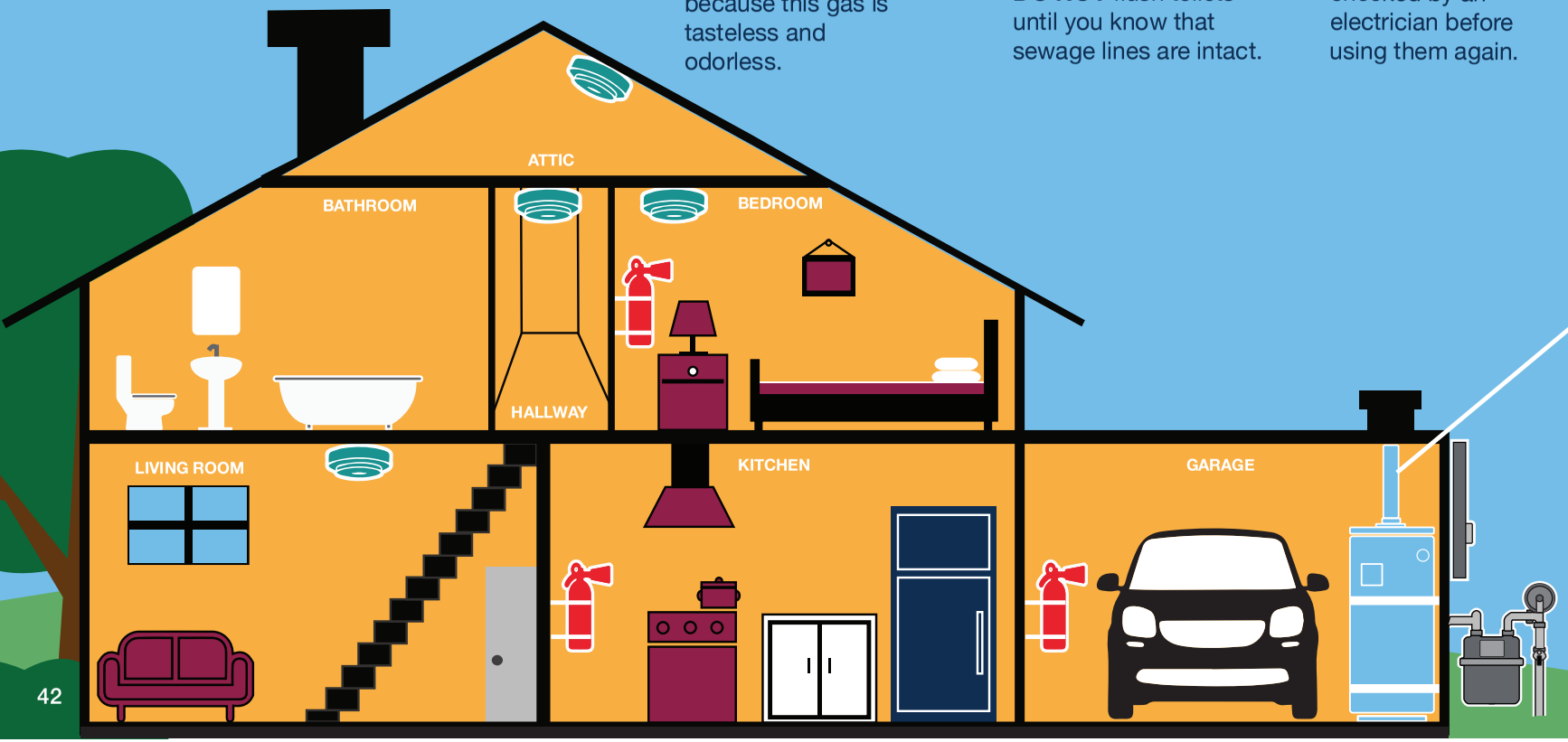
If appliances are wet, turn off the electricity at the main fuse box or circuit breaker. Then, unplug appliances and let them dry out.

Have appliances checked by an electrician before using them again.

FOOD

Throw out all food and other supplies that you suspect that may have been contaminated or come into contact with flood water.

Be alert that stored food and supplies may shift and fall.



TIP:
BROKEN WATER HEATER may leak carbon monoxide always make sure your detectors are working properly.

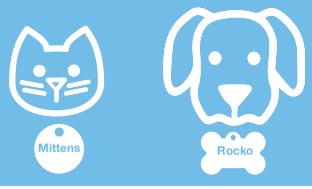
SMALL ANIMAL PREPAREDNESS

SHELTERING

Before the emergency, make arrangements to shelter your animals at two different locations far apart from each other.

COLLAR

Be sure all dogs and cats are wearing collars with securely fastened current identification, attach the telephone phone number and address.



TRAINING

Train both dogs and cats to feel comfortable going in and being in a crate for fast transportation during a disaster

OUTDOORS

Always bring pets indoors at the first sign or warning of a storm or disaster. Pets can become disoriented and wander away from home in a crisis.

SERVICE ANIMALS

A service animal is any dog that is individually trained to perform tasks for the benefit of an individual with a disability.

PET KIT & STORAGE

Keep an emergency pet kit and leashes and that it is clearly labeled and easy to carry in an accessible place and store them in sturdy containers that can be carried easily (duffel bags, covered trash containers, etc.)

TIP: Identification microchips are highly recommended for all pets

For more information go to www.laanimalservices.com

SUPPLY KIT

Name tags and phone numbers for collars and harnesses

Water and food for 3-10 days

Leashes, harnesses, gloves and carriers to transport pets safely and securely

Supplies like bowls, cat litter and pans, manual can opener, foil or plastic lids for cans

3-10 day supply of medications. Medical records stored in a waterproof container

Current photos of your pets in case they get lost

Keep information on feeding schedules, medical conditions, behavior problems, and the name and number of your vet in case you have to board your pets.

First Aid Kit (including large/small bandages with elastic tape, scissors, tweezers, Q-tips, antibiotic ointment, saline eyewash, & hydrogen peroxide)

LARGER ANIMALS PREPAREDNESS

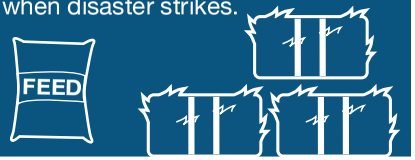
Make sure your horse is identifiable with a bracelet or microchip.

Train horses to lead and trailer so that they become comfortable with the process.

Identify alternate ways that you can trailer and/or walk your horse(s) to nearby stables or other designated safety zones.

Prearrange for boarding at stables outside the City of Los Angeles, if possible.

Have a surplus of feed available. Don't let yourself get down to the last bale when disaster strikes.



Have an emergency three day supply of water available (use drums or barrels).

Keep a leather halter near the corral that's easy to find for emergency responders in case you are not able to evacuate your horses yourself.

Never turn your horse or livestock loose during a wildfire. You do not know how they will react and they could be a danger to you or others.

TIP: If there is an emergency in your area and you believe evacuation is likely, or if you have been ordered to evacuate, please contact one of the animal Shelters below to get current information on large animal evacuation sites for your area.

West Valley Center : (818) 756-9325 from 8 a.m. to midnight.
East Valley Center : (818) 756-9323 24 hours a day

For more information go to www.laanimalservices.com

SHELTER-IN-PLACE

PREPAREDNESS TIPS

DO NOT TURN HORSES LOOSE
Horses may return home to a burning barn. Loose horses also cause serious problems for first responders.

MAINTAIN ADEQUATE CLEARANCE
The Los Angeles Fire Department recommends 200 ft. clearance around your property.

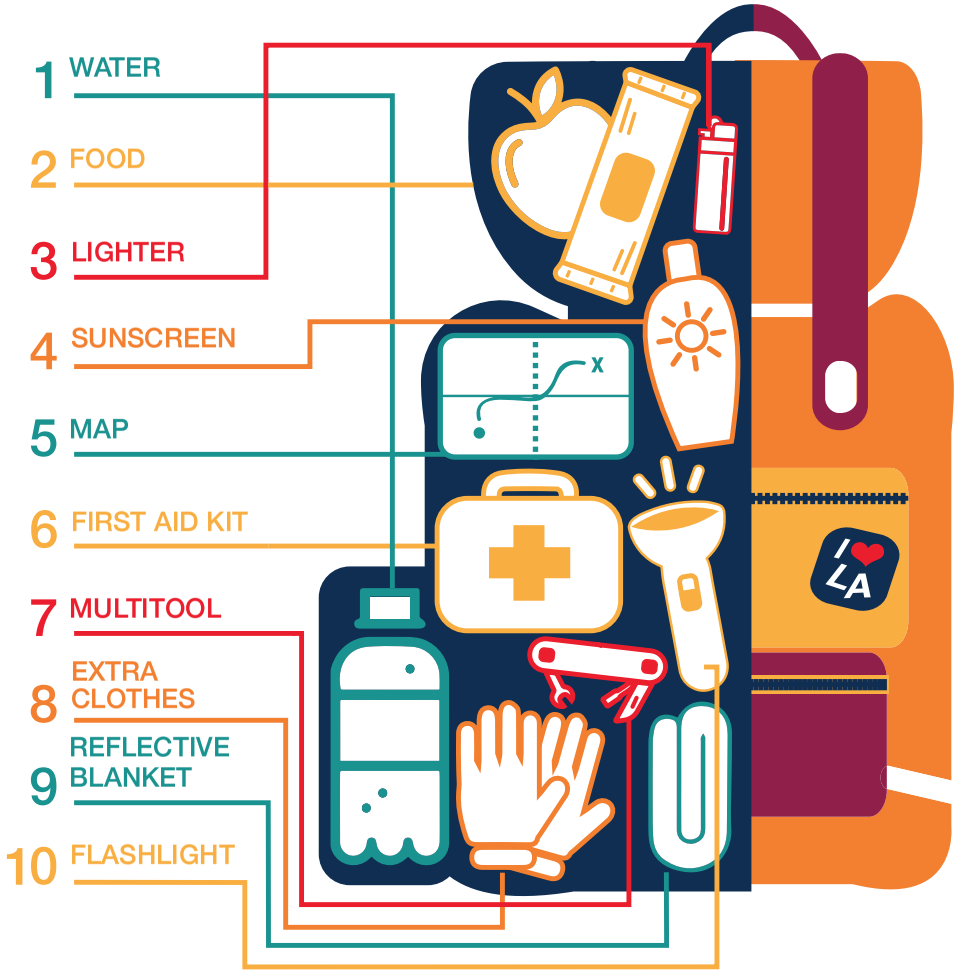
BRING HORSES INTO ARENA WITH SUFFICIENT BRUSH AND TREE CLEARANCE
Your horse corral should be made with metal pipes, not PVC or wood.

SUGGESTED SUPPLIES

- Fire hose(s)
- Generator
- Shovels axes, hoe, rake, broom
- Ladders
- Portable AM/FM radio with spare batteries
- Hand-held FRS radios
- Masks, goggles, work gloves and bandannas
- Use leather halters

DAY HIKING SAFETY GUIDE

DAY HIKING CHECKLIST:
10 KEY ITEMS



TIP: Call the ranger station closest to the trailhead before your hike to find out about possible road closures, hiking conditions, or required wilderness permits.

HIKE WITH A FRIEND OR FAMILY MEMBER.

It makes hiking more safe and fun.
Encourage one another to meet your goals!

TAKE PLENTY OF DRINKING WATER.

Don't drink stream water, it can make you sick.
Save enough water for the way back on long hikes.

LET SOMEONE KNOW WHERE YOU ARE GOING AND WHEN YOU PLAN ON RETURNING.

Bring a cell phone and let that person know you made it home safely.
Check phone battery and reception before leaving.

DON'T WALK OFF-TRAIL.

Cutting across switchbacks erodes the hillside and destroys the trail.
Walking off-trail increases your chance of suffering an injury or getting lost.

BE AWARE OF THE WILDLIFE THAT LIVES IN ALL OF OUR STATE PARKS.

Black bears, mountain lions, and rattlesnakes are rarely encountered. If seen, keep your distance, back away slowly, and do not run. Report your sightings to a park ranger.

POISON OAK IS COMMON THROUGHOUT CALIFORNIA.

Avoid touching this shiny, three leafed shrub. If you touch poison oak wash it with soap and water immediately and pat dry. Remember "leaves of three, let it be".

For more information visit www.LAparks.org/hiking

GET INVOLVED

NOTES

COMMUNITY TRAINING

WHAT IS CERT?

The Community Emergency Response Team (CERT) Program trains residents on disaster preparedness and the hazards that may impact their area.

The Los Angeles Fire Department is the authorized program manager of the CERT program in the City of Los Angeles.

WHAT WILL I LEARN?

- Disaster Preparedness
- Fire Safety
- Medical Operations
- Patient Assessment
- Light Search and Rescue
- Disaster Psychology
- Terrorism
- Natural/Manmade Hazard Response

WHAT WILL IT TAKE?

- Commitment to 1 day a week for 2.5 hours, for a total of 17.5 hours.
- This free training is offered mornings, afternoons, or nights.
- All classes taught by LAFD firefighters.
- Certification upon completion.
- Must be 18 or older.

For more information on CERT Training and classes near you, please visit www.CERT-LA.com or email LAFDCERT@lacity.org (213) 202-3136.

BASIC FIRST AID

CPR EMERGENCY PROCEDURE

Check if alert, breathing & pulse. | Call 911 | CPR if needed. Push hard & fast in center of chest. | Continue until help arrives.

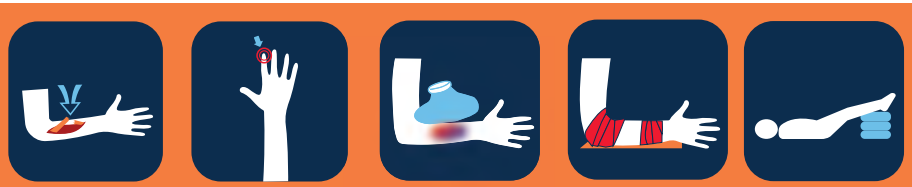
HEAD, NECK AND BACK INJURIES

Call 911 | Hold still. | Watch for vomiting. | May have unequal pupils.

CONTROLLING BLEEDING

Call 911 | Apply direct pressure. | Elevate injured area. | Wrap with bandage. | TIP: Use tourniquet if needed.

AIDING FRACTURES



Help/ support area. | Check pulses & sensation. | Apply ice or a cold pack. | Immobilize the area. | Treat for shock.

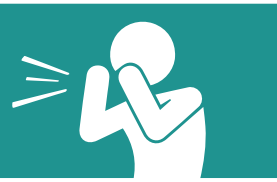
TRIAGE PROCEDURE

Triage is the sorting of patients according to urgency of their need for care.
• Airway and breathing • Circulation and bleeding • Mental status

1. STOP, LOOK, LISTEN & THINK

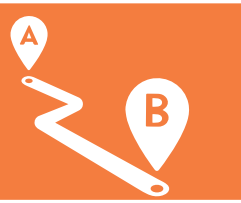
- Size up the situation by looking around and listening.
- If it is safe to proceed, quickly make a plan for your approach.

2. CALL OUT FOR SURVIVORS



- Call out loudly and clearly, “Does anyone need help?”
- Tag survivors that are able to walk with “M” (minor) and direct them to a designated location.

3. START WHERE YOU STAND AND FOLLOW AN ORGANIZED ROUTE



- Evaluate the medical condition of the closet survivor.
- Work outwards in a organized matter, evaluating the next closet survivor and so on.

4. EVALUATE & TAG EACH SURVIVOR

- Identify yourself and ask for permission to treat their injuries.
- Remember to evaluate the survivors that are wounded and those that are not.

5. IMMEDIATELY TREAT SURVIVORS TAGGED “I”

- Apply first aid to category “I” survivors with life threatening injuries.

6. DOCUMENT THE RESULTS

- Note where resources have been deployed.
- Mark the location of survivors.
- List the numbers of casualties by degree of severity.

TRIAGE CATEGORIES

In mass casualty events, categorize the priority of treatment.

TAG	CATEGORY	CONDITION
“I” or Red tag	Immediate	Life Threating Injury
“D” or yellow tag	Delayed	Serious/ Non-Life Threating
“M” or green tag	Minor	Walking Wounded
“DEAD” or black tag	Deceased	Pulse-less/ Non-Breathing

INDIVIDUALS IN NEED OF ASSISTANCE

INDIVIDUALS WITH UNIQUE SUPPORT

PREGNANT

MOBILITY DEVICE

ELDERLY

INJURED

HEARING IMPAIRMENT

TEMPORARY DISABILITIES

NON-ENGLISH SPEAKERS

NO ACCESS TO TRANSPORTATION

BABY/CHILD

DISASTER RELATED STRESS

COMMON REACTIONS TO DISASTERS

NAUSEA

HEADACHES

SADNESS

ALCOHOL/DRUG CONSUMPTION

ANGER/IRRITATION

INSOMNIA

LOSS OF APPETITE

ANXIETY

LACK OF FOCUS

- Ensure that your Family Emergency Plan includes the needs of all the members of your household.
- Consider your neighbors as part as your plan.

- First responders will notify a neighborhood that needs to be evacuated, at this time... PLEASE prepare to leave.
- NEIGHBORS typically perform 70% of all rescues.

HOW TO COPE

- Seek help from professional counselors who deal with post-disaster stress.
- Don't hold yourself responsible or feel that you can not help in any of the disastrous events.
- Restock your disaster supplies and update your family plan.

- Maintain a normal daily routine and spend time with your family and friends.
- Take steps to promote your own physical and emotional health by healthy eating, rest, and exercising.
- Start a plan and prepare for future disasters.

TIP: For more information visit: www.disability.lacity.org on "Stay Safe, Stay in Control" or Dial 7-1-1.

DISASTER ASSISTANCE INFORMATION

FEMA

FEMA (Federal Emergency Management Agency) may offer several types of assistance including services and grants to help people repair homes and gain replacement housing.

After a Presidentially Declared Disaster, call the FEMA registration number and apply for FEMA and Small Business Administration (SBA) assistance programs. FEMA assistance does not make you whole again, but it can give offer a helping hand while recovering.

HOW TO APPLY?

Apply online at www.disasterassistance.gov
Call 1-800-621-FEMA (3362) or TTY 1-800-462-7585 to apply by telephone.

They will mail you a copy of your application and a copy of Help After a Disaster: Applicant's Guide to the Individuals and Households Program.

LOOKING FOR FAMILY?

FEMA's National Emergency Family Registry and Locater System (NEFRLS) helps reunite families separated during a disaster. It allows displaced individuals to register and provide information about their current location and situation.

Affected individuals, or those seeking information about friends or family, can visit the NEFRLS website or call 1-800-588-9822 to register themselves or another person.

HOME DESTROYED?

Finding shelter is critical in times of disaster. Shelter outside of the hazard area could include staying with family or friends, seeking a hotel room, or staying in a mass shelter. The following resources can help you find emergency shelter.

Search for open shelters near you by texting SHELTER and your zip code to 4FEMA (43362).

LOST JOB? CAN'T WORK?

People who lose their jobs due to a disaster may apply for Disaster Unemployment Assistance (DUA). DUA provides weekly benefits to unemployed individuals who are not eligible for regular insurance compensation. Unemployment Insurance (UI) claims, including claims for Disaster Unemployment Assistance (DUA), can be filed online, by phone, by mail, or by fax.

To file a claim by phone,
English: 1-800-300-5616
TTY: 1-800-815-9387
Online: www.edd.ca.gov

NEED LEGAL HELP?

Local non-profits often give legal assistance to people who have been impacted by disasters. Local members of the American Bar Association offer free legal counseling to low income individuals. You can get more info at a Local Assistance Center or Disaster Recovery Center that is set up after the President declares a major disaster.

American Red Cross

The American Red Cross and other volunteer agencies set up shelters for people who cannot return to their homes. These volunteer agencies will provide food, water, and clothing to the best of their ability. Listen to or watch local news for distribution locations.

Visit www.redcross.org to find the nearest shelter, reconnect with family members, or donate blood after a disaster. CPR training and other classes available to stay prepared!

SAFE & WELL?

The American Red Cross Safe and Well website is a central location for people in disaster areas in the Los Angeles and the United States to register their current status, and for their loved ones to access that information.

The Safe and Well website: safeandwell.communityos.org
It is easy to use and is available 24 hours a day, 365 days a year and is accessible in both English and Spanish.

SCHOOL SAFETY

BEFORE SCHOOL

If schools cannot open due to unsafe reasons, school staff may declare a school closure.

The school district will notify media to announce necessary closures. Automated phone calls, emails, or text alerts may also be received.

DURING SCHOOL HOURS

Students will be released to adults listed on their emergency card. Keep this contact information updated regularly.

If a disaster occurs during the school day, students will be sheltered and cared for at school. Parent pickup may be delayed.

Notification will be made to school staff if road conditions prevent or delay safe access to or from school.

EMERGENCY SCHOOL EVACUATIONS

Students may be relocated if flooding or fires occur. If destruction of facilities occur, site will be evacuated.

A site evacuation may occur. Students may be relocated to s a safe zone by walking to another site as not all schools have buses.

TIP: Keep your emergency contact information updated with school. Know the school's emergency plans, and emergency relocation sites.

PLACE OF WORSHIP

ENSURE THAT YOUR PLACE OF WORSHIP IS PREPARED FOR A MAJOR DISASTER.

Prepare to help other members of your community as the facility may be used as a shelter.

Plan for building evacuations with clear exits.

Prepare to help your congregation after a disaster.

Train staff in disaster readiness and response.

Prepare for a disaster with emergency supplies.

Identify additional threats including hate crimes, terrorism, and arson fires.

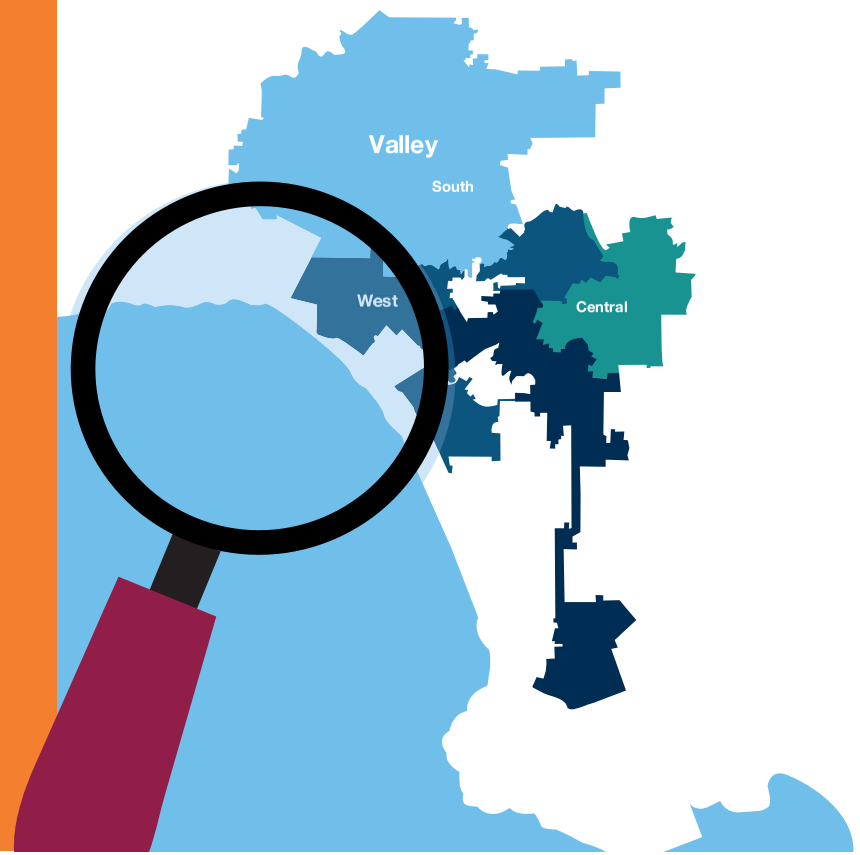
RECOVERY

24/7 Emergency Service

CITY OF LOS ANGELES CONTACTS

Department of Aging		1-800-510-2020
Department of Animal Services	www.laanimalservices.com	1-888-452-7381
Department of Building & Safety	www.ladbs.org/LADBSWeb/services-permit.jsf	(311) (TDD) 1-213-473-3231
Department on Disability	1-213-202-2764	(TDD) 1-213-202-3452
FIRE & POLICE Department: EMERGENCIES ONLY		DIAL (911)
DigAlert	www.digalert.org (811)	Information (411)
General Information	www.lafd.org www.lapdonline.org	1-213-978-3820/ 1-877-275-5273
Emergency Management Department	www.emergency.lacity.org	1-213-484-4800
Department of Water & Power	www.ladwp.com	1-800-342-5397
LA Sanitation Sewer/ Storm Drain Problem		
Storm Damage/ Mud Slide Reports		1-800-773-2489
Trees Down/ Debris Removal		1-800-996-2489
Recs & Parks		1-213-202-2700
Voluntary Organizations Active in Disaster (VOAD)	www.ENLA.org	1-703-778-5088
Street Lights	1-323-913-4744	1-213-485-4184
Traffic Signals		1-818-374-4823
Southern California Gas Company	www.socalgas.com	1-800-427-2200
United Policyholders	www.uphelp.org	1-415-393-9990
California Volunteers (donations/volunteers)	californiavolunteers.ca.gov	1-916-323-7646
American Red Cross	www.redcross.org	1-800-733-2767
The Salvation Army	www.salvationarmy.org	1-800-725-2769

RESOURCES



OFFICE OF THE MAYOR

mayor.lacity.org
213-978-0600

COUNCIL DISTRICTS

To find your Council District go to: www.lacity.org

Council District 1	213 473-7001	Council District 9	213 473-7009
Council District 2	213 473-7002	Council District 10	213 473-7010
Council District 3	213 473-7003	Council District 11	213 473-7011
Council District 4	213 473-7004	Council District 12	213 473-7012
Council District 5	213 473-7005	Council District 13	213 473-7013
Council District 6	213 473-7006	Council District 14	213 473-7014
Council District 7	213 473-7007	Council District 15	213 473-7015
Council District 8	213 473-7008		

EMERGENCY MANAGEMENT DEPARTMENT

CITY of LOS ANGELES
EMERGENCY MANAGEMENT DEPARTMENT
"IN OMNIA PARATUS"

www.emergency.lacity.org
(213) 484-4800
emdcommunications@lacity.org

The Emergency Management Department has five divisions comprised of administrative staff and specialists that work with City departments, municipalities and an array of community-based organizations to ensure that the City and its residents have the resources and information they need to prepare, respond, and recover from emergencies, disasters and significant events.

LOS ANGELES FIRE DEPARTMENT

The Los Angeles City Fire Stations have sandbags available in the event of pending major storms and storm emergencies. A limit of 25 burlap bags are available to each household. Property owners and residents should not solely rely on these sources, as high demand may rapidly strap resources and create spot shortages.

FIRE STATIONS IN LA CITY (ordered by zip code)

ZIP CODE	ADDRESS	PHONE NUMBER	FIRE STATION
90002	1801 E. Century Boulevard, Los Angeles	(213) 485-6265	65
90003	6406 S. Main Street, Los Angeles	(213) 485-6233	33
90004	326 N. Virgil Avenue, Los Angeles	(213) 485-6206	6
90006	2401 W. Pico Boulevard Los Angeles	(213) 485-6213	13
90007	3000 S. Hoover Street, Los Angeles	(213) 485-6215	15
90010	4029 W. Wilshire Boulevard, Los Angeles	(213) 485-6229	29
90011	3401 S. Central Avenue, Los Angeles	(213) 485-6214	14
90011	1192 E. 51st Street, Los Angeles	(213) 485-6221	21
90012	108 N. Fremont Avenue, Los Angeles	(213) 485-6203	3
90012	450 E. Temple Street, Los Angeles	(213) 485-6204	4
90014	430 E. 7th Street, Los Angeles	(213) 485-6209	9
90015	1335 S. Olive Street, Los Angeles	(213) 485-6210	10
90016	4470 Coliseum Street, Los Angeles	(213) 485-6294	94
90018	2009 S. Western Avenue, Los Angeles	(213) 485-6226	26
90018	3661 S. 7th Avenue, Los Angeles	(213) 485-6234	34
90019	5023 W. Washington Boulevard, Los Angeles	(213) 485-6268	68
90021	1601 S. Santa Fe Avenue, Los Angeles	(213) 485-6217	17
90023	2927 E. Whittier Boulevard, Los Angeles	(213) 485-6225	25
90024	107S Beverly Glen Boulevard, Los Angeles	(310) 575-8571	71
90024	1090 S. Veteran Avenue, Los Angeles	(310) 575-8537	37
90026	2144 W. Sunset Boulevard, Los Angeles	(213) 485-6220	20
90027	1601 Hillhurst Avenue, Los Angeles	(213) 485-6235	35
90028	5769 Hollywood Boulevard, Los Angeles	(213) 485-6282	82
90028	1327 N. Cole Avenue, Los Angeles	(213) 485-6227	27
90029	4957 Melrose Avenue, Los Angeles	(213) 485-6252	52
90031	2230 Pasadena Avenue, Los Angeles	(213) 485 6201	1
90032	2011 N. Eastern Avenue, Los Angeles	(213) 485-6216	16
90032	4575 Huntington Dr. South, Los Angeles	(213) 485-6247	47
90033	1962 E. Cesar Chavez Avenue, Los Angeles	(213) 485-6202	2
90034	3690 S. Motor Ave., Los Angeles	(310) 840-2143	43

ZIP CODE	ADDRESS	PHONE NUMBER	FIRE STATION
90035	1556 S. Robertson Boulevard, Los Angeles	(213) 485-6258	58
90036	5821 W. 3rd Street, Los Angeles	(213) 485-6261	61
90037	4370 S. Hoover Street, Los Angeles	(213) 485-6246	46
90039	2759 Rowena Avenue, Los Angeles	(213) 485-6256	56
90041	2021 Colorado Boulevard, Los Angeles	(213) 485-6242	42
90041	4455 E. York Boulevard, Los Angeles	(213) 485-6255	55
90042	5921 N. Figueroa Street, Los Angeles	(213) 485-6212	12
90044	7800 S. Vermont Avenue, Los Angeles	(213) 485-6257	57
90045	6911 World Way West, Los Angeles	(310) 978-2180	80
90045	10010 International Road, Los Angeles	(213) 485-6295	95
90045	10435 Sepulveda Boulevard, Los Angeles	(213) 485-6251	51
90045	8900 S. Emerson Avenue, Los Angeles	(213) 485-6205	5
90046	8021 Mulholland Drive, Los Angeles	(818) 756-8697	97
90046	1439 N. Gardner Street, Los Angeles	(213) 485-6241	41
90047	1909 W. Slauson Avenue, Los Angeles	(213) 485-6266	66
90049	16500 Mulholland Drive, Los Angeles	(818) 756-8609	109
90049	12229 Sunset Boulevard, Los Angeles	(310) 575-8519	19
90057	1819 W. 7th Street, Los Angeles	(213) 485-6211	11
90061	10811 S. Main Street, Los Angeles	(213) 485-6264	64
90064	10556 W. Pico Boulevard, Los Angeles	(310) 840-2192	92
90064	11505 W. Olympic Boulevard, Los Angeles	(310) 575-8559	59
90065	1410 W. Cypress Avenue, Los Angeles	(213) 485-6244	44
90065	3036 Fletcher Drive, Los Angeles	(213) 485-6250	50
90066	11970 W. Venice Boulevard, Los Angeles	(310) 397-2662	62
90068	3111 N. Cahuenga Boulevard, West Los Angeles	(213) 485-6276	76
90094	5451 Playa Vista Drive, Los Angeles	(310) 862-2844	67
90210	14145 Mulholland Drive, Beverly Hills	(818) 756-8699	99
90210	12520 Mulholland Drive, Beverly Hills	(818) 756-8608	108
90247	18030 S. Vermont Avenue, Gardena	(310) 548-7579	79
90272	17281 Sunset Boulevard, Pacific Palisades	(310) 575-8523	23
90272	15045 Sunset Boulevard, Pacific Palisades	(310) 575-8569	69
90291	1930 Shell Avenue, Venice	(310) 575-8563	63
90710	1331 W. 253rd Street, Harbor City	(310) 548-7585	85
90731	2945 S. Miner Street (Berth 44A), San Pedro	(310) 548-7545	110
90731	1444 S. Seaside Ave (Berth 256),Terminal Island	(310) 548-7541	111
90731	444 S. Harbor Boulevard (Berth 86), San Pedro	(310) 548-7542	112
90731	330 Ferry Street, Terminal Island	(310) 548-7540	40
90731	1601 S. Grand Avenue, San Pedro	(310) 548-7548	48
90732	1414 W. 25th Street, San Pedro	(310) 548-7501	101
90732	1005 N.Gaffey Street, San Pedro	(310) 548-2836	36
90744	124 E. "I" Street, Wilmington	(310) 548-7538	38
90744	400 Yacht Street (Berth 194), Wilmington	(310) 548-7549	49
91040	9411 Wentworth Street, Sunland	(818) 756-8624	24
91042	7777 Foothill Boulevard, Tujunga	(818) 756-8674	74
91303	6811 De Soto Avenue, Canoga Park	(818) 756-8672	72
91304	23004 Roscoe Boulevard, West Hills	(818) 756-8606	106
91306	8349 Winnetka Avenue, Winnetka	(818) 756-8604	104
91311	21800 Marilla Street, Chatsworth	(818) 756-8696	96
91311	20225 Devonshire Street, Chatsworth	(818) 756-8607	107
91316	4960 Balboa Boulevard, Encino	(818) 756-8683	83
91324	11351 Tampa Avenue, Northridge	(818) 756-8668	8
91324	9861 Reseda Boulevard, Northridge	(818) 756-7670	70
91325	18143 Parthenia Street, Northridge	(818) 756-8603	103
91326	11641 Corbin Avenue, Northridge	(818) 756-9728	28
91331	13035 Van Nuys Boulevard, Pacoima	(818) 756-8698	98
91335	7419 Reseda Boulevard, Reseda	(818) 756-8673	73
91340	15345 San Fernando Mission, Mission Hills	(818) 756-8675	75
91342	14430 Polk Street, Sylmar	(818) 756-8691	91
91343	10124 Balboa Boulevard, North Hills	(818) 756-8687	87
91344	12050 Balboa Boulevard, Granada Hills	(818) 756-8618	18
91352	9224 N. Sunland Boulevard, Sunland	(818) 756-8677	77
91356	19059 Ventura Boulevard, Tarzana	(818) 756-8693	93
91364	6345 Fallbrook Avenue, Woodland Hills	(818) 756-8605	105
91367	21050 W. Burbank Boulevard, Woodland Hills	(818) 756-8684	84
91401	13200 Burbank Boulevard, Van Nuys	(818) 756-8602	102
91401	14415 Sylvan Street, Van Nuys	(818) 756-8639	39
91402	14355 W. Arminta Street, Panorama City	(818) 756-8681	81
91402	14630 Plummer Street, Panorama City	(818) 892-4807	7
91403	5101 N. Sepulveda Boulevard, Sherman Oaks	(818) 756-8688	88
91406	7921 Woodley Avenue, Van Nuys	(818) 756-8690	90
91406	6751 Louise Avenue, Van Nuys	(818) 756-8600	100
91601	5320 Tujunga Avenue, North Hollywood	(818) 756-8660	60
91602	4305 Vineland Avenue, North Hollywood	(818) 756-8686	86
91604	4041 Whitsett Avenue, Studio City	(818) 756-8678	78
91605	7063 Laurel Canyon Boulevard, North Hollywood	(818) 756-8689	89

My local fire station is... _____

(write in pencil)

"The Los Angeles Fire Department is dedicated to saving lives, fighting fires, safety and prevention, and building communities."

For more fire department information visit www.lafd.org

THE LOS ANGELES POLICE DEPARTMENT

MAKE THE RIGHT CALL

9-1-1

- 911 is for **EMERGENCIES ONLY**
- An emergency is a situation that threatens human life or property and demands immediate attention.

EXAMPLES:
Robberies, violent assaults, significant car collisions, serious medical injuries, or fire emergencies

3-1-1

- 311 is for **NON-EMERGENCIES**
- It is designed to help reduce the number of non-emergency calls to 911 operators.

EXAMPLES:
City services and programs, animal services, child care, permits and licenses, utilities, street repairs, or community disturbances

REPORTING SUSPICIOUS ACTIVITY

To report suspicious activity, contact your local law enforcement agency. Describe specifically what you observed, including:

- Who or what you saw
- When you saw it
- Where it occurred
- Why it's suspicious

1-877-A-THREAT
(1-877-284-7328)
www.iWATCHLA.org
www.JIRC.org

For all other non-emergency calls for service, please telephone:

Non-Emergency Information Line
Toll Free 877-ASK-LAPD
(1-877-275-5273)

Spanish Line (Español)
213-928-8222

COMMUNITY POLICE STATIONS IN LA CITY

For general information or assistance, visit or call your local Community Police Station at any of our 21 geographic areas Citywide:

POLICE STATION	ADDRESS	PHONE NUMBER	ZIP CODE
77th	7600 Broadway, Los Angeles	(213) 485-4164	90003
Olympic	1130 S. Vermont, Los Angeles	(213) 382-9102	90006
Newton	3400 S. Central Avenue, Los Angeles	(323) 846-6547	90011
Central	251 E. Sixth Street, Los Angeles	(213) 833-3707	90014
Rampart	1401 W. Sixth Street, Los Angeles	(213) 484-3400	90017
Wilshire	4861 W. Venice Boulevard, Los Angeles	(213) 473-0476	90019
West Los Angeles	1663 Butler Avenue, Los Angeles	(310) 444-0701	90025
Harbor	2175 John S. Gibson Blvd, San Pedro	(310) 726-7700	90731
Hollywood	1358 N. Wilcox, Hollywood	(213) 972-2971	90028
Hollenbeck	2111 E. First Street, Los Angeles	(323) 342-4100	90033
Southeast	145 W. 108th Street, Los Angeles	(213) 972-7828	90061
Southwest	1546 W. Martin Luther King Blvd, Los Angeles	(213) 485-2582	90062
Northeast	3353 San Fernando Road, Los Angeles	(323) 561-3211	90065
Pacific	12312 Culver Boulevard, Los Angeles	(310) 482-6334	90066
Topanga	21501 Schoenborn Street, Canoga Park	(818) 756-4800	91304
Devonshire	10250 Etiwanda Avenue, Northridge	(818) 832-0633	91325
Foothill	12760 Osborne Street, Pacoima	(818) 756-8861	91331
West Valley	19020 Vanowen Street, Reseda	(818) 374-7611	91335
Mission	11121 Sepulveda Blvd, Mission Hills	(818) 838-9800	91345
Van Nuys	6240 Sylmar Avenue, Van Nuys	(818) 374-9500	91401
North Hollywood	11640 Burbank Boulevard, North Hollywood	(818) 623-4016	91601

TRAFFIC DIVISIONS IN LA CITY

TRAFFIC DIVISONS	ADDRESS	PHONE NUMBER	ZIP CODE
South	4125 S. Crenshaw Boulevard. Los Angeles	(323)-421-2577	90008
Central	251 East 6th Street. Los Angeles	(213)-833-3746	90014
West	4849 W. Venice Boulevard. Los Angeles	(213)-473-0222	90019
Valley	7870 Nollan Place. Panarama City	(818)-644-8000	91402

My local police station is... _____
(write in pencil)

"To Protect and To Serve"

For more police department information visit www.lapdonline.org

GET HELP.

Where can I find information about...

Animal services	LA Department of Animal Services	888-452-7381 www.laanimalservices.com
Buildings and safety	LA Department of Building & Safety	311 www.ladbs.org
Blood donations	American Red Cross	310-445-9900 www.redcross.org
Disaster recovery assistance	U.S. Department of Homeland Security	www.disasterhelp.gov
Disease control	CDC - Centers for Disease Control and Prevention	800-232-4636 www.cdc.gov
Earthquake information	U.S. Geological Survey	www.quake.usgs.gov
Environmental disasters	U.S. Environmental Protection Agency	www.epa.gov/ebtpages/emergencies.html
Exposure to toxic substances	Poison Control Center	800-222-1222 www.aapcc.org/DNN
Health and human services	211 LA County	211 www.211lacounty.org
Loan and grant information	U.S. Small Business Administration	800-659-2955 www.sba.gov
Reports for outages	LADWP - LA Department of Water and Power	800-342-5397 www.ladwp.org
School districts in LA	LAUSD - LA Unified School District	213-241-4500 www.lausd.net
Underground services	Dig Alert	811 www.digalert.org
Weather information	National Oceanic Atmospheric Administration	www.noaa.gov

YOUR EMERGENCY DIRECTORY

Take time to record important contact information for members of your household as well as insurance information. *(write in pencil)*

HOME INFORMATION

Home Address: _____

Home Phone Number: _____

Cell Phone Number: _____

House Color: _____

Landmarks: _____

EMERGENCY INFORMATION

CONTACTS	NAME	LOCATION	PHONE NUMBER
In-State Contacts:			
Primary			
Secondary			
Out-of-State Contacts:			
Primary			
Secondary			
Hospitals Near:			
Home			
Work			
School			
Neighbor			
Family Physician			
Other Doctor			
Dentist			
Employer/Office			
School			
Vet			
Religious Organization			
My Fire Station			
My Police Station			
Poison Control			

INSURANCE INFORMATION

Medical Insurance: _____ Phone: _____

Policy Number: _____

Home Insurance: _____ Phone: _____

Policy Number: _____

Auto Insurance: _____ Phone: _____

Policy Number: _____

EMERGENCY PREPAREDNESS GUIDE

SPECIAL THANKS

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IMPACT DESIGN HUB

CSUN | MIKE CURB COLLEGE OF ARTS, MEDIA, AND COMMUNICATION

Students and faculty from CSUN Impact DesignHub worked collaboratively with the Los Angeles Fire Department using design-thinking strategies to produce the Emergency Preparedness Guide. For more information on Impact DesignHub, visit: csunDesignHub.org

For more fire department information
Visit www.lafd.org

THIS GUIDE

For assistance with this guide, and its content for public use, please contact the Los Angeles Fire Department Homeland Security Division, Disaster Preparedness Officer at 213-202-3136.

LAFD FOUNDATION

For donations to the Los Angeles Fire Department Foundation 501(c)3 visit:

supportLAFD.org
310-552-4139
info@supportlafd.org

FACEBOOK

LosAngelesFireDepartment

TWITTER

@lafd *(incident alerts)*
@lafdtalk *(casual conversation and inquiries)*

INTAGRAM

losangelesfiredepartment

FLICKR

photos/lafd/

www.lafd.org

www.lacity.org

PREPARED NEIGHBORS

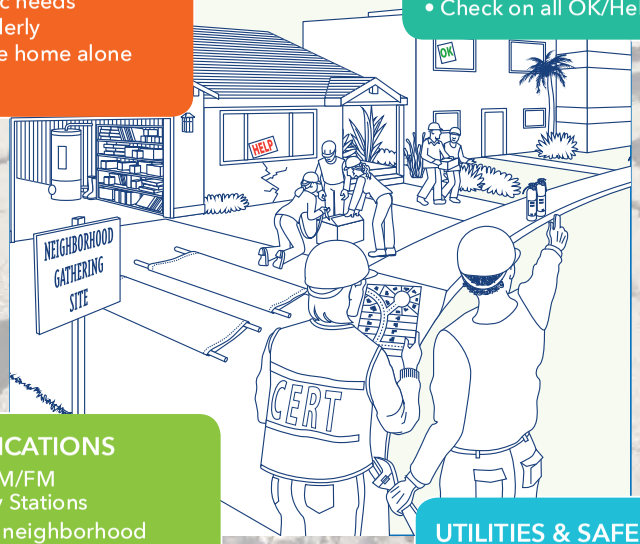
RESPONDING TOGETHER IN THE FIRST HOUR FOLLOWING DISASTER

CARE & SHELTERING

Care for neighbors:
- With specific needs
- Who are elderly
- Who may be home alone
- With pets

SEARCH & AID

- Conduct a door-to-door check
- Provide aid to those in need
- Check on all OK/Help cards



COMMUNICATIONS

- Listen to AM/FM Emergency Stations
- Establish a neighborhood communication system

UTILITIES & SAFETY

- Shut off leaking natural gas
- Reduce the threat of fire
- Rope off hazards (downed power lines, broken glass, etc.)

IT TAKES JUST ONE PERSON TO START, & A SINGLE 90-MINUTE MEETING.

Our proven materials make this easy!

CONTACT US FOR:

- The materials
- A neighborhood map
- A meeting facilitator

CITY of LOS ANGELES
EMERGENCY MANAGEMENT DEPARTMENT
"IN OMNIA PARATUS"

To learn more, contact EMD

Online:
www.emergency.lacity.org

Phone:
(213) 484-4800

Email:
emd.emdweb@lacity.org

NEIGHBORHOOD
DISASTER PREPAREDNESS

READY YOUR LA NEIGHBORHOOD

CITY of LOS ANGELES
EMERGENCY MANAGEMENT DEPARTMENT
"IN OMNIA PARATUS"

featuring
MYN Map Your Neighborhood

To organize your neighborhood for disaster—

BEGIN HERE

WHY NEIGHBORHOODS?

Disasters overwhelm 9-1-1 emergency responders (medics, fire, & police). If you have a crisis—say a loved one is seriously injured—your best source of help will be your neighbors.

PLAN

THE GOLDEN HOUR:

The first 60 minutes following disasters are golden—for saving lives, reducing the severity of injuries, and decreasing property damage.

HOW BIG SHOULD MY NEIGHBORHOOD BE?

The size is determined by the **Golden Hour.**

Experience shows the ideal size for neighborhoods is:

Single-Family: 15–20 houses

Vertical Neighborhood: the entire building

Less-Populated Neighborhood: 5–7 houses

Write your specific neighborhood boundaries here:

(For example: 1400–1498 Palm Blvd., Emergency Management Department [EMD] will need this information to prepare the map for your meeting).

_____

_____

CONNECT

CONTACT EMD

emd.emdweb@lacity.org, (213) 484-4800

- EMD will help you choose a meeting date, and will assign a facilitator to help you.
- Be ready to give EMD your neighborhood boundaries so they can prepare your neighborhood map.
- EMD will provide free materials:
  - Meeting invitations
  - Neighborhood Response Plans
  - OK/Help Cards
  - Maps of your neighborhood

INVITE YOUR NEIGHBORS

KEYS FOR SUCCESS:

- Hold a meeting at a home in your neighborhood.
- *Invite your neighbors in person.* Use the provided written invitation as a meeting reminder. A personal invite makes all the difference in encouraging your neighbors to come.
- Ask a neighbor or two to help you do the inviting.

MEET

HOLD A MYN (Map Your Neighborhood) MEETING

A 90-minute meeting teaches you what to do in the critical first hour following disasters.
You will:

- Learn the Neighborhood Response Plan.
- Complete a Skills & Equipment Inventory.
- Complete a Neighborhood Contact List, including neighbors with disabilities, those who are elderly, and homes with pets.
- Plan to conduct a walk-through in your neighborhood.

All will leave the meeting with:

- A Neighborhood Response Plan
- A neighborhood map
- An OK/Help card

AFTER YOUR MEETING

emd.emdweb@lacity.org, (213) 484-4800

- Schedule your neighborhood exercise as soon as possible by contacting EMD.

PREPARE

HOLD YOUR NEIGHBORHOOD EXERCISE

- Practice the Neighborhood Response Plan.
- Complete the Neighborhood Map by plotting the exact locations of all the natural gas meters.
- Discuss the neighborhood response to different disaster scenarios.

Already using MYN in your neighborhood?

Excellent!
Contact EMD to schedule your neighborhood exercise and to learn about other elements of preparedness in the RYLAN program.

www.emergency.lacity.org
(213) 484-4800

READY YOUR LA NEIGHBORHOOD

Welcome to the City of Los Angeles
Emergency Management Department (EMD)
Ready Your LA Neighborhood (RYLAN) Program. RYLAN is designed to help you, your family, and your neighborhood prepare for disaster. There are a variety of things you can do to increase your readiness.
For more information, visit us at emergency.lacity.org

PREPARE

Preparing yourself, your loved ones, and your home reduces the serious impacts of disaster. Many activities are free of cost and take only minutes. Contact EMD to learn how simple actions can save a life and reduce damage.

ORGANIZE

Hold a Map Your Neighborhood (MYN) meeting. You and your neighbors will create a Response Plan. You will learn what to do in the first hour of a disaster response. Contact EMD for program materials and a meeting facilitator.

PRACTICE

Disasters can overwhelm the capacity of 9-1-1. Neighbors become your best source of help. Your confidence as responders will increase as you practice using your Response Plan. Contact EMD to schedule your practice exercise.

CONNECT

Sign up for the City's emergency notification program, **Notify LA.** When disasters occur, the City will alert you with specific instructions on what to do.
Text READY to 888-777 to sign up.

COMMUNICATE

You and your neighbors will want to communicate with each other, other neighborhoods, and the City responders during a disaster. Contact EMD to learn how.

TRAIN

Enroll in preparedness training classes, such as Level 1 CERT, First Aid, CPR, Amateur Radio, Active Shooter, Stop the Bleed, etc. to enhance your readiness skills. Contact EMD to learn of the training opportunities available in your area.

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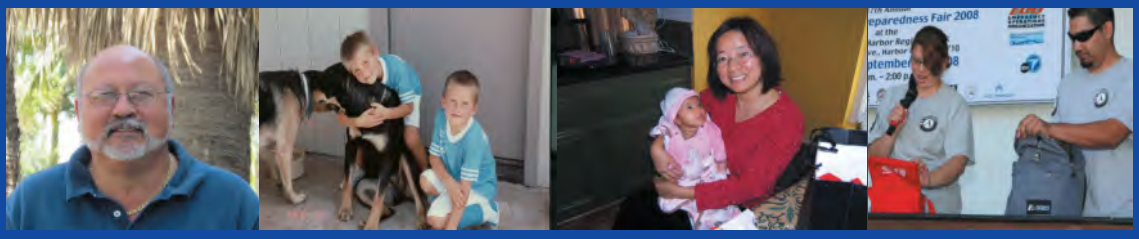
September 2017

WHO WILL YOU HELP?
ONCE IT HAPPENS…
IT'S TOO LATE!



A COMPREHENSIVE GUIDE TO FAMILY and HOME PREPAREDNESS

CITY OF LOS ANGELES
EMERGENCY MANAGEMENT DEPARTMENT
200 NORTH SPRING STREET, ROOM 1533
LOS ANGELES, CALIFORNIA 90012
(213) 978-2222 TTY (213) 978-0463
www.readyla.org

WHO WILL YOU HELP? ONCE IT HAPPENS...IT'S TOO LATE !

TABLE OF CONTENTS

An emergency can happen quickly and often without warning. In a major disaster (emergency) it may take several days for vital services to be restored.

Are you and your family prepared to survive for at least 72 hours without the comforts of home?

In Los Angeles, you are most likely to experience an earthquake. If you can prepare your family for a major earthquake, you will be prepared for most disasters.

WHO WILL YOU HELP? ONCE IT HAPPENS...IT'S TOO LATE !

Having a plan is one of the most important steps you can take in disaster preparedness. Knowing what to do and how to do it can help you and your family manage disasters with less worry, fear, and uncertainty.

Who Will You Help? Once It Happens…It's Too Late!

Commit a weekend to updating telephone numbers, buying, finding and collecting survival supplies, especially any personal items needed to sustain life. Always review your emergency plan with everyone.

The purpose of this City of Los Angeles Family Preparedness Guide is to show you and your family how to prepare and recover for disasters.

This guide has been prepared by the City of Los Angeles, Emergency Management Department, (EMD). EMD coordinates the emergency preparedness and planning of all City departments, over four million residents, and over 400,000 businesses residing within our 475 square miles. During major emergencies and disasters, we coordinate the response, mitigation and recovery efforts.

MAKE A FAMILY PLAN

Family Meeting
Who Will You Help? Once It Happens…It's Too Late!

The purpose of a family meeting is to inform and educate family members, including children, seniors and family members with disabilities. Having a plan is one of the most important steps you can take in disaster preparedness. Knowing what to do and how to do it can help you and your family manage disasters with less worry, fear, and uncertainty.

All Family Members need to know the following:

- The location of your Survival Supplies (page 5).
- The location of the "GO BAGS" (page 10).
- Draw a map of the house. Locate doors and windows that can be used as evacuation routes.
- Identify two evacuation routes from each room.
- Practice your evacuation routes.
- Determine a meeting place outside of your residence, in case it is unsafe to remain indoors.
- Do not meet on the roof.
- Determine one location outside your neighborhood in case of evacuation.
- Keep gas tank half full at all times. Gas might not be available after a disaster.
- Determine the out of state contacts. Family members should be instructed to call them in event of emergency. Local calls may be difficult to place.

MAKE A FAMILY PLAN

- Practice your Drop, Cover & Hold-On (Earthquake) and Stop, Drop & Roll (Fire).
- Teach each member of your family how to use a fire extinguisher.
- Create emergency cards for each of your family members (page 15).
- Locate utilities: Determine how to turn them off and with what tools? Do not turn the gas back on by yourself.

Gas On /Off valve

Water Shut-Off

Electric Breaker Panel

PREPARE AND PLAN WITH CHILDREN

A child that is knowledgeable of the information below will feel more in control during a crisis situation. Check off the boxes after you have talked with your children about this information.

	Include children in discussions and planning for emergency safety.
	Know two escape routes from your residence and from each room.
	Designate primary meeting areas and alternate meeting areas in case of an evacuation.
	Be alert for unusual or strange smells. Alert an adult.
	Never touch fallen poles or wires.
	In case of separation, children should know their family's personal information such as: How to spell their full name, their parents' names, their phone numbers, address, and other appropriate information.
	Every family member should have an "emergency card" which includes information above plus out-of-state contact.
	Know how to contact out of state contact?

PREPARE AND PLAN WITH CHILDREN	
	Know how and when to dial 911.
	Practice Role-playing what to tell the 911 dispatcher.
	Practice Role-playing what to do when a parent or caregiver becomes suddenly ill or injured.
	Rehearse Drop, Cover, and Hold-On (Earthquake)
	Rehearse Stop, Drop and Roll (Fire)
	Notify your children's school of address changes, phone numbers, and authorized persons to pick up children.
	Find out the emergency procedures of your child's school

SURVIVAL SUPPLIES

Survival Supplies are different from a First Aid Kit.
A First Aid Kit is *part* of Survival Supplies.

Survival Supplies can be stored in a large watertight container that is easily moveable, like a trash can with wheels. Food and water should be replenished after expiration dates.

There are many items on the list below. Think about situations unique to your family. It is important to recognize the significance of each item.

<u>You may know where these items are throughout the house</u>, but in the event of an emergency, there is no time to gather all the items. Family members should know the location of the Survival Supplies.

SURVIVAL SUPPLIES		
	Item	**How much and why?**
	Water	1 gallon/person/day for seven days. People can become dehydrated quickly, even in cold weather.
	Food and Utensils	3 days supply of non-perishables: canned meat, fruit and vegetables, cereal, peanut butter, manual can opener, sharp knife utensils, plates, paper towels.
	Battery operated or Hand-Crank Radio	Use AM Radio. Listen to KNX 1070 AM, KFWB 980 AM, and KFI 640 AM radio stations for regional emergency alert information for Los Angeles County.
	Flashlight(s)	Batteries should be inserted at time of emergency. Flashlight in rooms could have batteries already inserted.
	First Aid Kit	Can be purchased at local pharmacy. You can attend to the immediate first aid needs of your family, including bleeding and burn relief. Look for instructions inside the First Aid Kit.
	Whistle	1 whistle to signal for help.
	Duct-Tape; Plastic Sheeting; Dust Mask	Duct tape is versatile. Plastic sheeting and duct tape can be used as a shelter-in-place barrier. Mask is for blocking contaminants

SURVIVAL SUPPLIES		
	Sanitation/ Toiletries	Toothbrush, toothpaste, toilet paper, moist wipes, large garbage bags and shovel for waste disposal.
	Shut-off wrench, pliers	Know where the gas shut-off is. Turn off only in an emergency.
	Local Maps	You should be familiar with evacuation routes.
	Clothes	2 sets of clothes, undergarments, socks, comfortable, but sturdy shoes. Babies may need more.
	Blankets/ Sleeping Bags	Enough to cover family member for warmth and comfort.
	Medication	1 week supply. Instant cold packs for refrigerated medications since you may not have access to refrigeration.
	Consumable Medical Supplies	Enough to cover family members needs for up to 7 days.
	Durable Medical Equipment	Be sure to have an additional DME if possible, i.e., extra cane, manual wheelchair, etc.
	Matches	Stored in a water-proof container. Water-proof matches can be purchased at camping supply stores.

SPECIAL FAMILY SITUATIONS

Things to consider: These may not apply to your family situation.

BABY NEEDS

- Formula
- Diapers
- Bottles
- Powdered milk
- Medications
- Baby wipes
- Diaper rash ointment

MEDICAL NEEDS

Ask your doctor about storing prescription medications such as:

- Heart and high blood pressure medication
- Insulin and other prescription drugs
- Denture needs
- Contact lenses and supplies
- Extra eye glasses
- Durable medical equipment

People with Disabilities and Other Access with Functional Needs

- Do you know where the meeting place is? Does anyone need mobility assistance?
- Think about what modes of transportation you use and what alternative modes could serve as back-ups.
- If you require accessible transportation be sure your alternatives are also accessible.
- Make a communications plan: Who is the out-of-state contact to be notified?
- A week's supply of any medications, discuss with doctor about an emergency situation.

SPECIAL FAMILY SITUATIONS

People with Disabilities and Other Access with Functional Needs

- If routine medical treatments are administered at a clinic or at home, develop a plan with the health practitioner for emergency events.
- If you have tools or aids specific to your disability, plan how you would cope without them. For example, if you use a communication device, mobility aid, or rely on a service animal, what will you do if these are not available?
- If you are dependent on life-sustaining equipment or treatment such as oxygen or dialysis, find out from the provider how these can be administered in times of emergency.
- For every aspect of your daily routine, plan an alternative procedure. Make a plan and write it down. Put the plan in an envelope and place it with your Survival Supplies.

PLANNING FOR YOUR PET AND SERVICE ANIMAL

Part of your Family Plan should include your family pet and service animal. Having a plan for them will reduce stress that often occurs following an emergency.

Decide in advance how you will take care of your pet if you are not home and cannot get to them after an emergency. Can you make plans with the neighbors?

Service animals are permitted at all City of Los Angeles facilities providing assistance to people affected by a disaster/emergency. City staff will assist pet owners with sheltering their pets, if necessary.

Water	7 days supply; 1-2 ounces of water per pound of body weight of dog/cat. Water intake can be higher/lower depending on the age of the animal, exercise level. This is separate from the human supply of water.
Food	7 days supply in an airtight and waterproof container

PLANNING FOR YOUR PET AND SERVICE ANIMAL

Medicines, medical records and other essential documents	An extra supply of medicine that the animal regularly takes. Also adoption papers, medical and vaccination records should be included. Consider getting a permanent ID, like microchip ID.
Collar with ID, harness or leash	Your pet should be wearing an ID tag at all times. You should keep an extra leash/ harness and ID tag in Emergency Kit.
Crate or pet carrier	A sturdy crate or carrier will aid a safe evacuation for your pet. It should be big enough for the pet to sit, turn around, and lie down.
Sanitation	Plastic bags; litter box; household bleach for disinfecting
Picture of you and pet/service animal	In the event of separation, a picture can ease the reunion process.
Familiar Items	Toys, treats, or familiar bedding to reduce stress.

PET and SERVICE ANIMAL SURVIVAL SUPPLIES

For additional information please visit these sites:

- http://www.laanimalservices.com
- http://www.ready.gov/animals

HOME HAZARD HUNT

According to a study from the University of California in Los Angeles (UCLA), **55% of the injuries** during the 1994 Northridge earthquake were **caused by falling furniture or objects**.

Many of these injuries could have been prevented through actions taken before the earthquake.

As a family, go around your residence and identify areas that need to be secured or repaired. Here is a suggested checklist.

Not all items will apply to your household.

	Securely fasten or RELOCATE heavy pictures or mirrors away from beds.
	Fasten shelves securely: bookshelves, wall units, and entertainment centers. Nylon/ Velcro straps can be found at home improvement stores.
	Place large, heavy objects on lower shelves.
	Brace overhead light and fan fixtures.
	Secure cabinets to wall studs. Use latches designed for child-proofing, earthquakes or boat safety to keep cabinet doors from flying open and contents falling.

HOME HAZARD HUNT	
	Secure electronics with nylon/ Velcro straps found at home improvement stores: Computers, microwaves, televisions.
	Secure refrigerator so that it will not fall or move.
	Secure water heater. Strap to wall studs. Gas and water lines should be flexible.
	Store weed killers, pesticides, painting and cleaning liquids away from heat sources.
	Place oily polishing rags and waste in covered metal cans.
	Secure chimney with sheet metal straps and steel angle bracing to roof rafters. Clean and repair chimneys, flue pipes, vent connectors and gas vents.
	Repair defective electrical wiring and leaky gas connections.
	Know **how**, **when** and **where** to turn off utilities. Do not practice this on the gas meter since the gas utility professional must restore service after being turned off.

STAY OR GO?

Depending on the emergency you may decide to go (evacuate) or shelter-in-place.

During some emergencies, it is not safe to go outside.

You may not receive information immediately. You should use your battery or crank operated radio to learn about updated information. Television and the Internet are good resources if they are available. **Use AM Radio**: Listen to KNX 1070 AM, KFWB 980 AM, and KFI 640 AM radio stations for regional emergency alert information for the Los Angeles County area. To access or share emergency information, it is recommended that people with disabilities and others with access and functional needs develop multiple communication strategies with family, friends, and neighbors, which include, but are not limited to, the internet, TV with closed captioning, social media, smartphones, and texting.

Stay or Go?: Assess the situation

- Does the building appear to be unsafe to remain inside?
- Can you return to the building or must you stay somewhere else?
- Administer First Aid and get help for any seriously injured person(s).
- If you are at home, check for damages using a flashlight. DO NOT USE MATCHES OR CANDLES, OR TURN ON ELECTRICAL SWITCHES.

STAY OR GO?

- Check for any fire, electrical, or other household hazards. Check for spilled bleach, gasoline, or other liquids that may produce deadly fumes when mixed, or be a fire hazard.
- Sniff for any gas leaks, starting at the water heater**. In the event that you smell gas, shut off gas at gas meter, open windows, and evacuate the premises immediately.**

Shelter-In-Place:

Authorities may mandate this strategy

In a biological or chemical emergency, it might be necessary to shelter-in-place and seal the room. This is considered a short term strategy. Choose a room with few or no windows. Key points to remember:

- Make sure all family members and pets are inside together.
- Make sure your basic Emergency Supplies Kit is with you.
- You will need battery operated radio for updates.
- Turn off any type of ventilation or heating systems.
- Seal off any openings, windows, doors, and vents with duct tape and plastic sheeting. Plastic sheeting should be cut ahead of time. (10'x10')

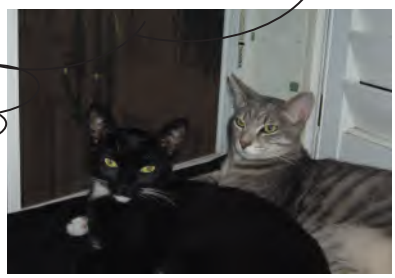
Evacuate:

You also may be asked to evacuate by authorities. If you cannot take your basic emergency supply kit, at least take the **emergency envelope with your important documents and a "GO BAG".**

STAY OR GO: A "GO BAG"

A "**GO BAG**" is an individual emergency kit for each family member. These items can be placed in a backpack or other easy to carry bag.

Have a GO BAG for your pet and service animal too!



Place a "**GO BAG**"*:*
1. Near your bed
2. In your car
3. At your workplace

Essential Items include but are not limited to:

Individual Emergency Card	(Page 15 & 16)
Water	A couple of 1/2 liter bottles
Non-perishable food	Granola bars, crackers
Medication & First Aid Supplies	A few days supply
A family photo	Identification purposes
A pocket-knife	To cut food, duct tape, first aid
A dust mask	A contamination protection
A change of clothes, underwear, sturdy shoes	A warm top for cold weather / a hat for the sun

STAY OR GO: A “GO BAG”	
Toothbrush/ toothpaste	Travel size is sufficient
Small Amount of Cash	Small denominations, and coins
Flashlight with batteries	To aid in evacuation or searches
Whistle	So other people can find you
Small battery operated radio	To keep updated on disaster information
Local Map	Know local evacuation routes
Pencil, Permanent Markers, Paper	To record information
An Extra Set of Keys	Auto/Home
Feminine Hygiene Products	Depends on individual
Small Toys, playing cards, books	Depends on individual
Consumable Medical Supplies	3 to 5 day supply

LOCAL DISASTERS

Earthquakes: Earthquakes damage can extend for miles from the epicenter. Damages can include collapsed building, bridges, and overpasses; cracked roadways; downed power lines; broken gas lines; fires; explosions; and landslides.

Earthquake responses: Duck, Cover, and Hold on. Evaluate damages to structure and humans. Evacuate structure if necessary. Take GO BAG.

Tsunami: A large wave, or series of large waves created by an undersea disturbance, such as an earthquake or volcanic eruption.

Tsunami responses: Evacuation is necessary. Gas tank should be at least half-full. A GO BAG should be in the car.

Chemical or Biological Release: A chemical emergency can occur as an accident or maliciously resulting with a release of chemical agents. A biological emergency can be a natural outbreak of disease or a deliberate release of germs or other biological substances.

Chemical or Biological Release Response: Get to a safe area by evacuating or shelter-in-place (use duct tape and plastic sheeting to create barrier).

LOCAL DISASTERS

Mudslide: Mudslides are moving rivers of rock, soil, and water. Most often they are triggered by rain, but also can occur after volcanic activity, earthquakes, fires, and manmade stress on the land.

Mudslide Response: If there is a threat of a mudslide in your area, you must evacuate immediately. Take GO BAG.

Fires: Fires can spread quickly. In five minutes an entire house can be engulfed in flames. Often, the heat and smoke can be even more dangerous than the flames.

Fire Response: If you are on fire: STOP, DROP, and ROLL. Evacuate immediately when you see, hear, feel, smell smoke and/ or fire.
Take GO BAG.

BE INFORMED

For additional ways to be informed *before* an emergency, visit:

- http://readyla.org
- http://emergency.lacity.org
- http://www.facebook.com/readyla
- http://twitter.com/ReadyLA
- http://5steps.la
- http://www.laanimalservices.com/general-information/emergency-preparedness/
- http://www.ready.gov
- http://www.listo.gov
- http://www.shakeout.org
- http://www.earthquakecountry.org/
- http://www.terremotos.org

It's up to you to GET INVOLVED!

CERT LA is a **FREE** training offered to adults (18+). Participants will learn how to:

- manage utilities and put out small fires
- provide basic medical aid
- search for and rescue victims safely
- organize themselves and spontaneous volunteers to be effective, and collect disaster intelligence to support first responder efforts

BE INFORMED

It is a 17.5 hour course offered over 7 weeks (once a week) plus bi-annual refresher courses. Classes are offered throughout City of Los Angeles; all year; various times of the day. If you have a group of 20 or more, CERT LA can arrange a course for your business, school, or neighborhood.

213-893-9840
www.cert-la.com
lafdcert@lacity.org

AMERICAN RED CROSS

The ARC offers classes in Basic First Aid, CPR (Cardio-pulmonary Resuscitation), Disaster Preparedness, etc. American Red Cross of Greater Los Angeles can be reached at:

1-800-627-7000
www.redcross.org/ca/losangeles

PREPARELA+

EMERGENCY ENVELOPE

Copies of these documents, photos, USB drives, and or CD/DVD's should be stored in a waterproof bag and placed in your Go-Kit along with this checklist.

Family members should know the location of these documents. It is also suggested that originals be placed in safety deposit box.

Check off the items after you have placed them in the emergency envelope

Yes	Item	Current
	Birth Certificates of all household Members	
	Marriage Certificates	
	Death Certificates	
	Driver's licenses or ID cards	
	Health Insurance & Immunization Records	
	Social Security Cards	
	Passports	
	Current Photos of all household members	
	Will, Deeds, Trusts, Medical Directives	

EMERGENCY ENVELOPE		
Yes	**Item**	**Current**
	Insurance papers	
	Bank and Credit Card Account Numbers	
	Stocks and Bonds	
	Inventory of household goods	
	Photos/ or video/ digital media of household goods	
	Receipts for valuables	
	Current photos of pets with family member, in case of separation	
	Digital copies of computer files	
	Local maps	
	Contact information for doctors, RXs, list of CMS	

EMERGENCY CONTACT INFORMATION	
Complete this information and place in your GO-KIT!	
FAMILY MEMBER'S LEGAL NAME	
RELATIONSHIP (MOM, DAD, DAUGHTER…)	
DATE OF BIRTH	
GOVERNMENT ISSUE ID # (DRIVER'S LICENSE/ PASSPORT/SOCIAL SECURITY)	
MEDICATIONS / ALLERGIES/ IMPORTANT HEALTH INFO	
FAMILY MEMBER'S LEGAL NAME	
RELATIONSHIP (MOM, DAD, DAUGHTER…)	
DATE OF BIRTH	
GOVERNMENT ISSUE ID # (DRIVER'S LICENSE/ PASSPORT/SOCIAL SECURITY)	
MEDICATIONS / ALLERGIES/ IMPORTANT HEALTH INFO	
Download this form at http://www.readyla.org	

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MEDICATIONS / ALLERGIES/ IMPORTANT HEALTH INFO	
Download this form at http://www.readyla.org	

Fill out the front and the back. Each Family Member should have one to carry with them at all times.

Download this form at http://www.readyla.org.
It is designed to be printed as a
double-sided document.

EMERGENCY CARD

NAME……..
DATE OF BIRTH……
PHONE #……....
MEDICAL NEEDS……
NEIGHBORHOOD MEETING PLACE……...
OUT OF NEIGHBORHOOD MEETING PLACE……...
……..
OUT OF TOWN CONTACT NAME……
OUT OF TOWN CONTACT #.....

EMERGENCY CARD

NAME……..
DATE OF BIRTH……
PHONE #……....
MEDICAL NEEDS……
NEIGHBORHOOD MEETING PLACE……...
OUT OF NEIGHBORHOOD MEETING PLACE……...
……..
OUT OF TOWN CONTACT NAME……
OUT OF TOWN CONTACT #.....

CITY of LOS ANGELES
EMERGENCY MANAGEMENT DEPARTMENT
"IN OMNIA PARATUS"

WHO WILL YOU HELP?
ONCE IT HAPPENS…
IT'S TOO LATE!

BACK OF EMERGENCY CARD

SCHOOL OR WORK NAME……
ADDRESS……
SCHOOL OR WORK PHONE #……
PARENT OR CAREGIVER……
PET NAME……
VETERINARIAN……
PET MEDICATIONS……
OTHER IMPORTANT PHONE NUMBERS……
……

BACK OF EMERGENCY CARD

SCHOOL OR WORK NAME……
ADDRESS……
SCHOOL OR WORK PHONE #……
PARENT OR CAREGIVER……
PET NAME……
VETERINARIAN……
PET MEDICATIONS……
OTHER IMPORTANT PHONE NUMBERS……
……

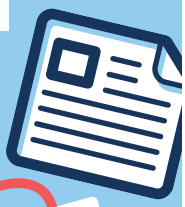
EMERGENCY SUPPLY CHECKLIST

CITY OF LOS ANGELES
Ready Your Los Angeles Neighborhood (RYLAN)

READY YOUR LA NEIGHBORHOOD

☐ IMPORTANT FAMILY DOCUMENTS

Have a copy of identification cards, driver licenses, social security cards, emergency contact lists, and medical information in your kit.



☐ FIRST AID KIT

Familiarize yourself with your kit and know how to use the items in an emergency.

☐ CASH

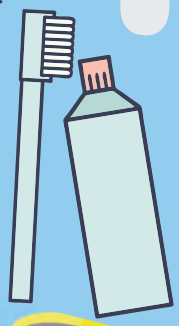
Have small quantities in both bills and coins. At least $100-$200 per person.

☐ MEDICATIONS

Know the doses and have the emergency prescription handy. Include your pets' medications, if any.

☐ TOILETRIES

Pack feminine products, deodorant, hand sanitizer, toothbrush, toothpaste, soap, etc.



☐ CLOTHING + SHOES

Pack extra clothing and sturdy shoes.

☐ FLASHLIGHT

Pack a crank or battery-operated flashlight!

☐ RADIO

Pack a battery, solar powered or hand crank AM/FM radio to tune into AM 1070 for emergency alerts.

☐ TOOLS

A wrench to turn off utilities, a crowbar for opening doors, etc.

☐ WATER AND FOOD

- Add non-perishable foods *(enough for 7 days)*, which require no refrigeration or cooking/preparation.
- Consider any allergies when packing food. Include food for your pets!
- You should have *1 gallon of water per person, per day, for up to 7 days.* Apply the same rule for children and pets!

☐ OTHER ITEMS

- Phone charger.
- Personal comfort item (toys for children or a favorite book).
- Adaptive or supportive equipment (extra batteries) and instructions on how to operate any special equipment.
- Pet supplies including identification tags, carrier, etc.
- Can-opener for canned foods.

FOR A LISTING OF ADDITIONAL ITEMS, VISIT:
EMERGENCY.LACITY.ORG

2019

PET EMERGENCY SUPPLY CHECKLIST

☐ IMPORTANT PET DOCUMENTS

Have a copy of important medical records, an emergency contact list, commands being used and record of any behavioral indicators or problems.

- *It is highly recommended that your pet is micro-chipped.*
- *All pets(including equine)should have a current City of Los Angeles License anionlinelicense.lacity.org*

☐ FIRST AID KIT

- Cotton Bandage Rolls
- Scissors
- Antibiotic Ointments
- Extra Supply of Medication
- Latex Gloves
- Isopropyl Alcohol
- Flea and Tick Prevention

Include a pet first aid reference book

☐ FOOD & WATER

- Have enough food for 7 days. If it is canned, do not forget a manual can opener!
- You should have 1 gallon of water, per pet, per day, for up to 7 days.

☐ COLLAR, HARNESS & LEASH

Your pet should wear a collar with their identification and rabies tag at all times. Include a backup leash, collar and ID tag.

☐ CRATE OR PET CARRIER

Pack a sturdy, safe, comfortable crate or carrier near your bag so that it is ready for transporting your pet.Remember that all animals need to be trained to get use to the carrier.

☐ SANITATION

Include pet litter, a litter box, or potty pads. If possible, also include newspapers, paper towels, and plastic trash bags in your emergency kit.

☐ MEDICATIONS

Know the doses and have an emergency prescription handy.

☐ FAMILIAR ITEMS

- Include toys, bedding and treats.
- Any extra items you can think that your pet needs!

☐ PICTURES

Include a picture of you and your pet. If your pet gets lost, you have a picture to find them!

PET DISASTER PLAN

It is important to make informal arrangements just in case you are unable to care for your pet.

- Identify a primary and secondary pet caregiver that you are comfortable with handling your pet in the event of an emergency.
- Provide your pet caregiver with the veterinarian's contact information, your contact information and the location of your pet's "go bag."
- Identify boarding facilities. Make arrangements ahead of time, check out the facility and know the requirements needed for boarding.
- Carry a wallet card with information about the number of pets you have, their names and their breed. Do not forget to include your emergency caregiver's information on this card.

LISTA DE SUMINISTROS DE EMERGENCIA PARA MASCOTAS

☐ IMPORTANTE DOCUMENTOS DE TU MASCOTA

Tén a la mano copias de registros médicos, lista de contactos de emergencia, las ordenes que tu mascota entiende y cualquier registro e indicador de problemas de conducta (en su caso).

- *Se recomienda que coloques un micro-chip a su mascota.*
- *Toda mascotas (incluyendo caballos) deben tener su licencia vigente de la Cuidad de Los Angeles anionlinelicense.lacity.org*

☐ BOTIQUIN DE PRIMEROS AUXILIOS

- Vendas
- Tijeras
- Ungüento antibiotico
- Dosis extra de medicamentos
- Guantes de Latex
- Alcohol Isopropilico
- Productos anti pulgas y garrapatas

- *Incluye un libro de referencia de primeros auxilios para mascotas*

☐ AGUA Y COMIDA

- Tén comida suficiente para 7 días. Si es comida enlatada, no olvide el abrelata.
- Debe tener 1 galón de agua diario por mascota para 7 días.

☐ COLLAR, ARNES Y CORREA

Su mascota debe llevar un collar con etiqueta de identificación y constancia de vacuna contra la rabia en todo momento. Incluye un collar, correa y etiqueta de identificacion de contacto.

☐ PORTADORA PARA MASCOTAS

Incluir una jaula transportadora cómoda, segura, y resistente para transportar tu mascota. Recuerda que es necesario que tu mascota esté acostumbreada a su jaula tranportadora

☐ HIGIENE

Incluye arena y arenero para mascotas, o tapete. Si es posible, incluye un periódico, toallas de papel y bolsas para basura.

☐ MEDICAMENTOS

Conocer las dosis exactas y tener la receta médica en mano.

☐ ARTÍCULOS FAMILIARES

Incluir juguetes, mantas, premios o cualquier otro artículo que pueda necesitar tu mascota.

☐ FOTOS

Incluye una foto de ti con tu mascota(si se pierde tu mascota, tendrás una foto para encontrarla)

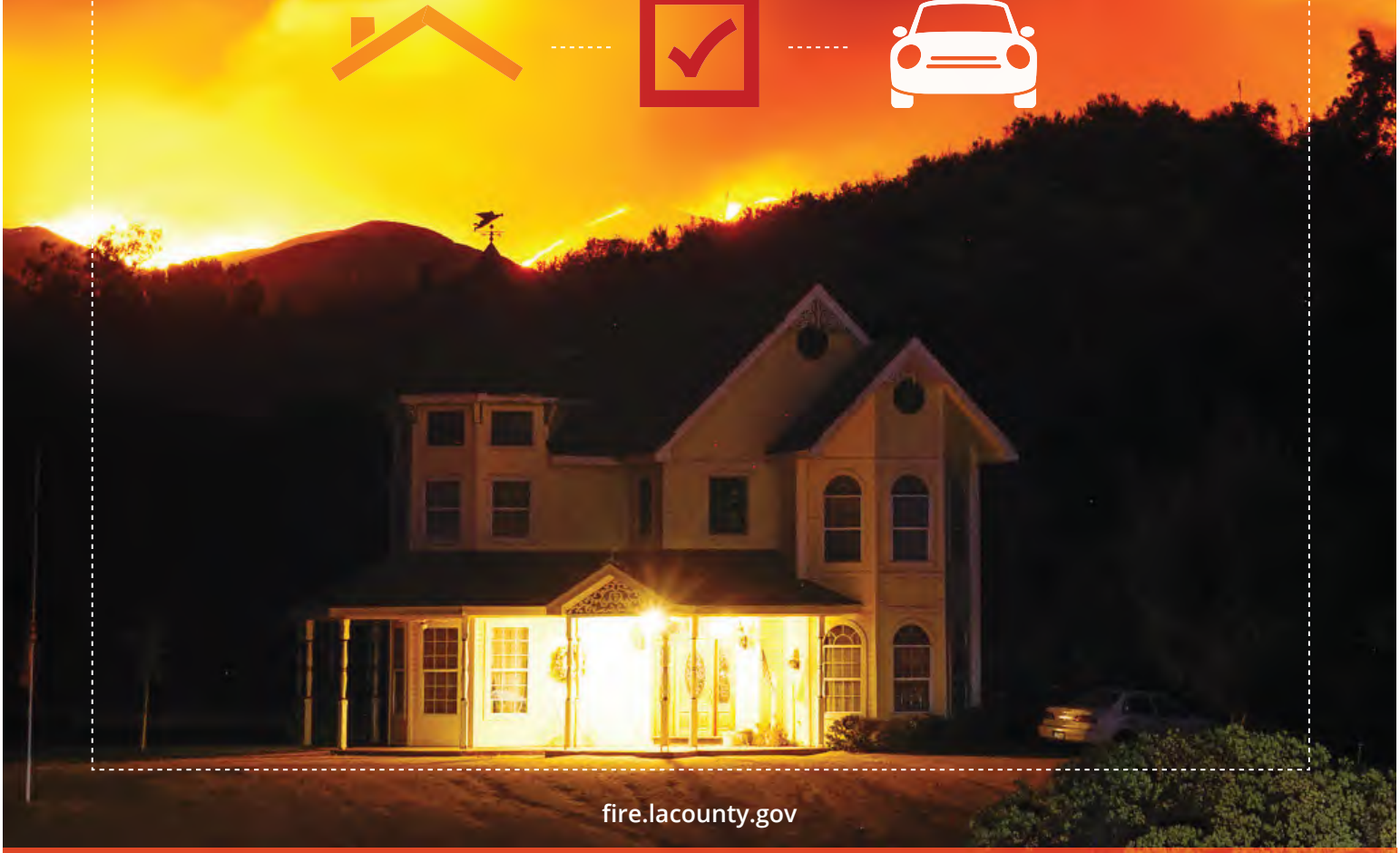
PREPARAR UN PLAN DE DESASTRES PARA MASCOTAS

En caso de una emergencia, es importante hacer arreglos informales en caso de que no puedas cuidar a tu mascota.

- Identifica dos personas de confianza, una primaria y otra secundaria, que puedan cuidar a tu mascota en caso de emergencia.
- Proporciona a las personas de cofianza tus datos de contacto y los del veterinario, e infórmale del lugar en el que guardas la jaula transportadora y el kit de emergencia de tu mascota.
- Identifica el abordaje de mascota . Localiza el lugar y enterate de los requisitios para poder tener a tu mascota ahi. Haz los los arreglos antes del abordaje.
- En su cartera, lleve una tarjeta que indique el número de mascotas queusted tiene, sus nombres, y sus razas. No se olvide incluir datos de personas de confianza que pueden cuidar a las mascotas.

READY! SET! GO!

YOUR PERSONAL WILDFIRE ACTION PLAN



fire.lacounty.gov

MESSAGE FROM FIRE CHIEF DARYL L. OSBY

Dear Residents,

Los Angeles County is one of the most beautiful places to live, but for those living in "wildland urban interface areas," it does not come without risks. Climate change has made fire season year-round and increased our ever-growing number of wildfires. Firefighters and residents alike are now constantly on heightened alert for the threat of wildfires.

The Los Angeles County Fire Department, along with our partnering agencies, stand ready to quickly respond to contain wildfires, utilizing our firefighting resources from the air and ground to help protect you and your property from wildfire.

But, we can't do this without your cooperation. Preparation and prevention go hand-in-hand. This *Ready! Set! Go!* brochure was designed to provide you with critical information on creating defensible space around your home, retrofitting your home with fire-resistant materials, and preparing you to safely evacuate well ahead of a wildfire. Please protect yourself, your family, and your property from a devastating wildfire by taking the time to learn about *Ready! Set! Go!*

In Los Angeles County, wildfires will continue to be fueled by a build-up of seasonal dry vegetation and driven by dry conditions and locally strong winds, making them extremely dangerous and challenging for firefighters to control. Yet, many homeowners don't consider how a wildfire could affect them, and very few residents have properly prepared for evacuation until it is too late.

You play the most important role in protecting yourself, family, and property. Through planning and preparation, we can all be ready for the next wildfire. I hope you find the information in this brochure helpful as you prepare your home and family for a wildfire.

As always, if you need additional information about preparing for a wildfire or any other natural disaster, please contact your nearest fire station or visit us at fire.lacounty.gov.

Daryl L. Osby
Los Angeles County Fire Chief

INSIDE

READY!

SET!

GO!

The *Ready!Set!Go!* program is supported by the following partner agencies:

READY!

Living in the Wildland Urban Interface

Ready! Set! Go! begins with a house that firefighters can defend.

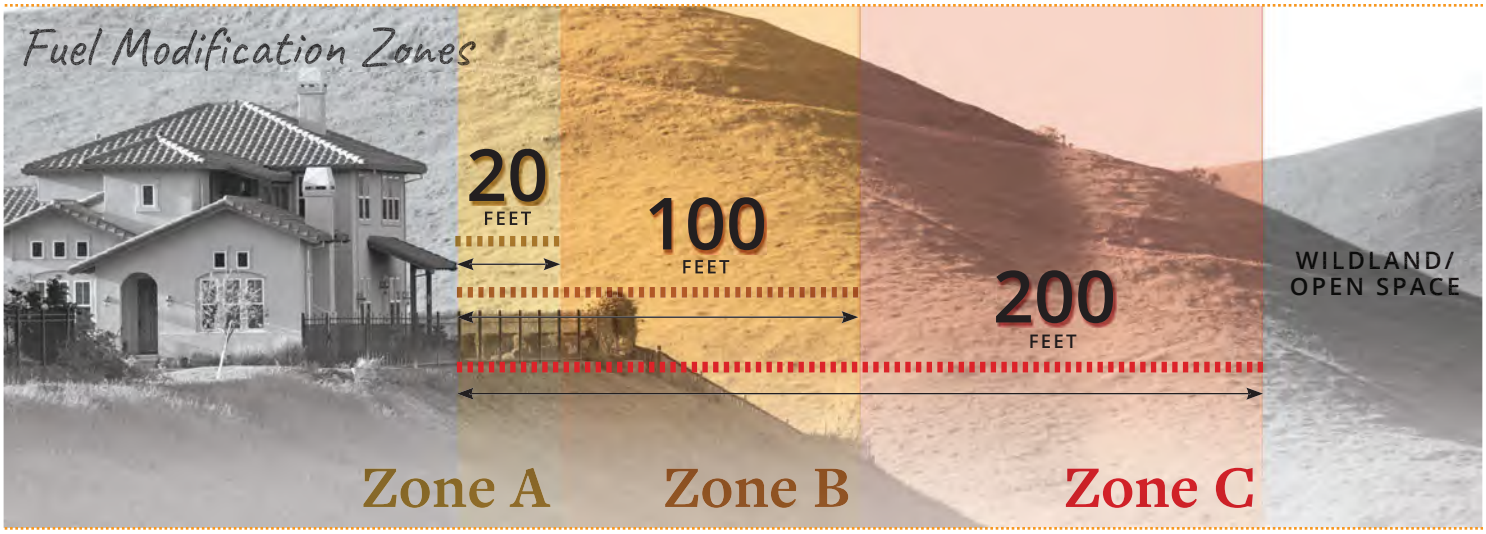
Create a Defensible Home

A defensible home is a home that has the greatest potential for surviving a wildfire. Defensible homes are those that are in compliance with the Los Angeles County Fire Department's Defensible Space requirements or have been through the Fire Department's Fuel Modification Plan Review Program, and have been constructed in accordance with the latest building standards for the fire zones.

What Is Fuel Modification?

The Fuel Modification Plan Review Program affects new structures and developments built in the fire hazard severity zones. A Fuel Modification Plan, submitted by applicants, reviews landscaping plans and identifies areas of defensible space within all fuel modification zones around structures.

For further information please visit: bit.ly/fuelmod



Zone A — EXTENDS 20 FEET FROM STRUCTURE

- Vines and climbing plants shall not be allowed on any combustible structure.
- Irrigated area consisting of low-growing, small herbaceous plants with high-moisture content immediately around structures.
- Occasional accents of woody shrubs or an occasional small patio tree ten feet from structure, if widely spaced and zone appropriate as well as eliminating annual grasses and leaf litter help prevent direct-flame impingement on the structure.

Zone B — EXTENDS UP TO 100 FEET FROM STRUCTURE

- Also irrigated with an approved slightly dense planting avoiding woody plant species larger than 3 feet at maturity beneath any tree canopy.
- Introducing shade trees that are zone appropriate with adequate spacing by eliminating continuous canopy coverage and continuous fuels to minimize fire transmission.
- Screen plantings can be used; however, continuous hedging is discouraged as it promotes the accumulation of dead litter inside the live hedge.

Zone C — EXTENDS FROM ZONE B OUTER EDGE UP TO 200 FEET FROM STRUCTURE

- Thinned to remove dead vegetation and prevent overgrowth.
- Designed to slow the fire's progress and reduce its intensity by decreasing the availability of continuous fuels.
- Native vegetation thinned 30 to 50 percent in Zone C.

Ideal Fuel Modification Landscape:

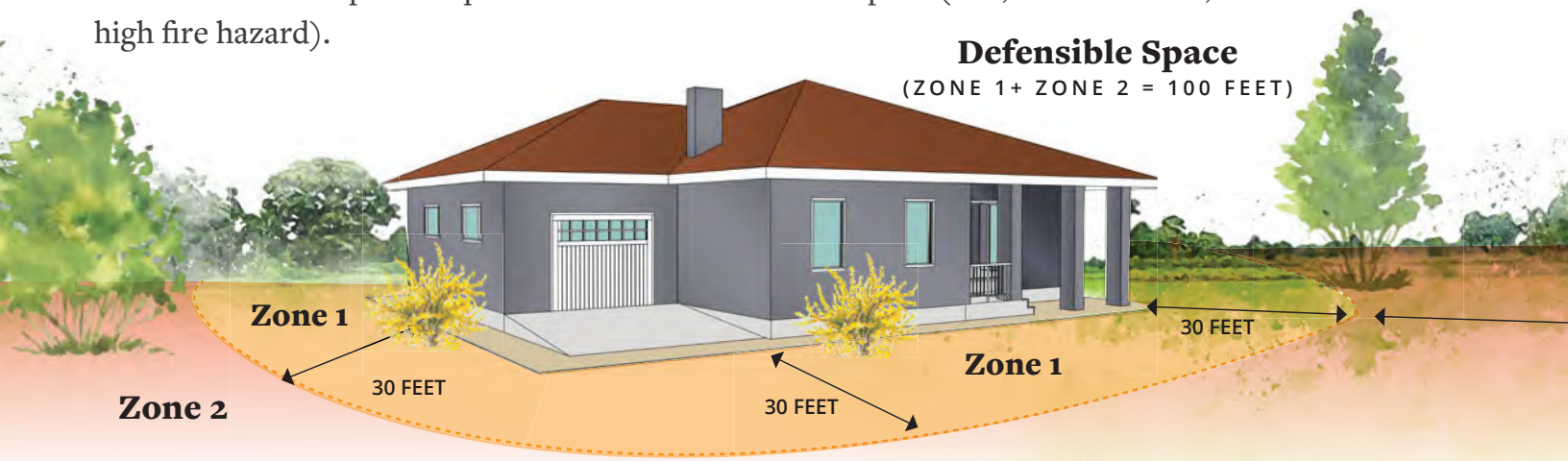
Limited woody plant material, high moisture content, adequate spacing and inorganic mulch thoughout Zone A.

READY!

Defensible Space

Creating and maintaining defensible space are essential for increasing your home's chance of surviving a wildfire. It's the buffer that homeowners are required to create on their property between a structure and the plants, brush, and trees or other items surrounding the structure that could catch fire. This space is needed to slow the spread of wildfire and improves the safety of firefighters defending your home. The defensible space for each structure varies, depending on the type of vegetation and topography.

Two zones make up the required 100 feet of defensible space (and, in some cases, 200 feet due to high fire hazard).



Zone 1

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

- Remove all dead or dying vegetation.
- Remove dead or dry leaves and pine needles from your yard, roof, and rain gutters.
- Trim trees regularly to keep branches a minimum of 10 feet from other trees.
- Remove dead branches that hang over your roof. And, keep branches 10 feet away from your chimney.
- Relocate exposed woodpiles outside of Zone 1 unless they are completely covered in a fire-resistant material.
- Remove vines and climbing plants from combustible structures (e.g. bougainvillea, wisteria)
- Remove or prune vegetation near windows.
- Remove vegetation and items that could catch fire from around and under decks.
- Create a separation between trees, shrubs, and items that could catch fire, such as patio furniture, swing sets, etc.

Zone 2

Extends 30 to 100 feet from buildings and other structures.

(Note: The inspecting officer may require an additional 100 feet of thinning or removal, for a total of 200 feet due to high-fire hazard.)

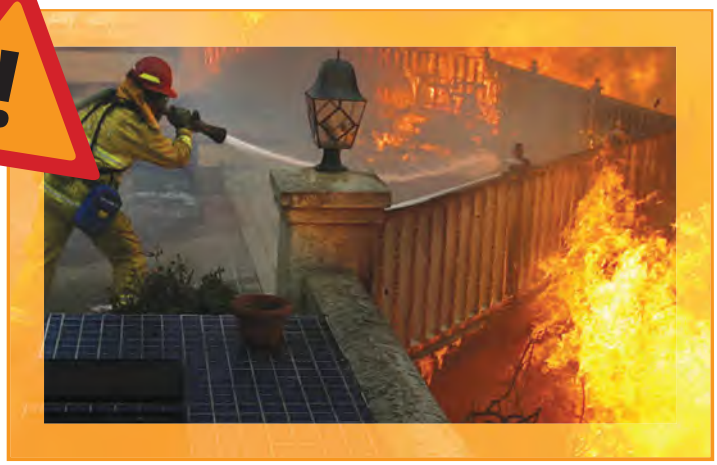
- Cut or move annual grass down to a maximum height of four inches.
- Create horizontal spacing between shrubs and trees.
- Create vertical spacing between grass, shrubs, and trees.
- Remove fallen leaves, needles, twigs, bark, cones, and small branches. However, they may be permitted to a depth of 4 inches if erosion control is an issue.

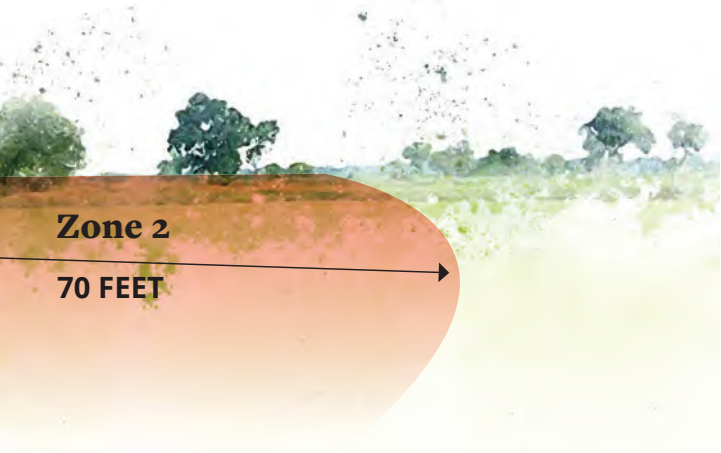
  Note: Special attention should be given to the use and maintenance of ornamental plants known or thought to be high-hazard plants when used in close proximity to structures. Examples include Acacia, Cedar, Cypress, Eucalyptus, Italian Cypress, Juniper, Palms (remove all dead fronds), Pine (removal within 20' of structures) and, pampas grass. These plantings should be properly maintained and not allowed to be in mass plantings that could transmit fire from the native growth to any structure.

READY!

HAZARDOUS
ORNAMENTAL LANDSCAPE

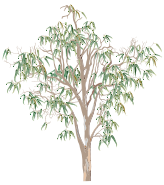
Preventing conditions where fire can travel from adjacent fuels, through an ornamental landscape to your structure, is the key to creating defensible space. Fire spreads through convection, conduction, radiation, or embers. Proper maintenance of ornamental vegetation reduces ember production, fire propagation, intensity, and duration of the approaching flames.





HIGH-HAZARD PLANTS


Acacia (Shrub)


Eucalyptus


Juniper


Palm


Pine


Pampas Grass


This home provides a good example of defensible space.


Firefighters in defensible space during a wildfire.

READY!

Safeguard or "Harden" Your Home

The ability of your home to survive a wildfire depends on its construction materials and the quality of the "defensible space" surrounding it. Windblown embers from a wildfire will find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. However, there are measures you can take to safeguard your home from wildfire. While you may not be able to accomplish all of the measures listed below, each will increase your home's - and possibly your family's - safety and survival.

Tour a Wildfire-Ready Home

Address 1

- Make sure your address is clearly visible from the road.

Chimney 2

- Cover your chimney and stovepipe outlets with a non-flammable screen of ¼-inch wire mesh or smaller to prevent embers from escaping and igniting a fire.
- Make sure that your chimney is at least 10 feet away from any tree branches.

Deck/Patio Cover 3

- Use heavy timber or non-flammable construction material for decks and patio covers.
- Enclose the underside of balconies and decks with fire-resistant materials to prevent embers from blowing underneath.
- Keep your deck clear of combustible items, such as baskets, dried flower arrangements, and other debris.
- The decking surface must be ignition-resistant if it's within 10 feet of the home.

Driveways and Access Roads 4

- Driveways should be designed to allow fire and emergency vehicles and equipment to reach your home.
- Access roads should have a minimum 10-foot clearance on either side of the traveled section of the roadway and should allow for two-way traffic.
- Ensure that all gates open inward and are wide enough to accommodate emergency equipment.
- Trim trees and shrubs overhanging the road to a minimum of 13-½ (or 13.5) feet to allow emergency vehicles to pass.

Garage 5

- Have a fire extinguisher and tools, such as a shovel, rake, bucket, and hoe, available for fire emergencies.
- Install a solid door with self-closing hinges between living areas and the garage. Install weather stripping around and under the doors to prevent ember intrusion.
- Store all combustibles and flammable liquids away from ignition sources.

Home Site and Yard 6

- Ensure you have at least a 100-foot radius of defensible space (cleared vegetation) around your home. This means looking past what you own to determine the impact a common slope or neighbor's yard will have on your property during a wildfire.
- Cut dry weeds and grass before noon when temperatures are cooler to reduce the chance of sparking a fire.
- Landscape with fire-resistant plants that are low-growing with high-moisture content.
- Keep woodpiles, propane tanks, and combustible materials away from your home and other structures, such as garages, barns, and sheds.
- Ensure trees are far away from power lines.

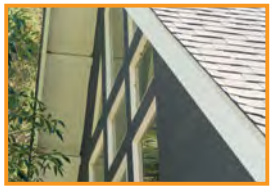
READY!

Inside

- Keep working fire extinguishers on hand and train your family how to use them (check expiration dates regularly).

- Install smoke alarms on each level of your home and near bedrooms. Test them monthly and change the batteries twice a year.

Non-Combustible Boxed-In (Soffit) Eaves



- Box-in eaves with non-combustible materials to prevent accumulation of embers.

Non-Combustible Fencing 7

- Make sure to use non-combustible fencing to protect your home during a wildfire.

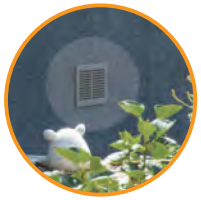
Rain Gutters

- Screen or enclose rain gutters to prevent accumulation of plant debris.

Roof 8

- Your roof is the most vulnerable part of your home because it can easily catch fire from windblown embers.
- Homes with wood shake or shingle roofs are at a higher risk of being destroyed during a wildfire.
- Build your roof or re-roof with fire-resistant materials that include composition, metal, or tile.
- Block any spaces between roof decking and covering to prevent ember intrusion.
- Clear pine needles, leaves, and other debris from your roof and gutters.
- Cut any tree branches within 10 feet of your roof.

Vents



- Vents on homes are particularly vulnerable to flying embers.
- All vent openings should be covered with ⅛-inch or smaller metal mesh. Do not use fiberglass or plastic mesh because they can melt and burn.
- Attic vents in eaves or cornices should be baffled or otherwise prevent ember intrusion (mesh is not enough).

Walls 9

- Wood products, such as boards, panels, or shingles, are common siding materials. However, they are combustible and not good choices for fire-prone areas.
- Build or remodel with fire-resistant building materials, such as brick, cement, masonry, or stucco.
- Be sure to extend materials from foundation to roof.

Water Supply 10

- Have multiple garden hoses that are long enough to reach any area of your home and other structures on your property.
- If you have a pool or well, consider a pump.

Windows 11

- Heat from a wildfire can cause windows to break even before the home ignites. This allows burning embers to enter and start internal fires. Single-paned and large windows are particularly vulnerable.
- Install dual-paned windows with an exterior pane of tempered glass to reduce the chance of breakage in a fire.
- Limit the size and number of windows in your home that face large areas of vegetation.

Utilities

- Ensure that your family knows where your gas, electric, and water main shut-off controls are and how to safely shut them down in an emergency.

☑ SET!

Create Your Own Wildfire Action Plan

Now that you have done everything you can to protect your home, it's time to prepare your family. **Your Wildfire Action Plan must be prepared with all members of your household well in advance of a wildfire.** Each family's plan will be different, depending on their situation. Once you finish your plan, practice it regularly with your family, and post in a safe and accessible place for quick implementation.

1 Important Phone Numbers

- ☐ A family communication plan that designates an out-of-area friend or relative as a point-of-contact to act as a single source of communication among family members in case of separation.
- ☐ Maintain a list of emergency contact numbers posted near your phone and in your Emergency Supply Kit.

2 What to Take

- ☐ Assemble an Emergency Supply Kit (see page 10 in this guide).
- ☐ Keep an extra Emergency Supply Kit in your car in case you can't get to your home because of fire.
- ☐ Have a portable radio or scanner, so that you can stay updated on the fire.

3 Prepare to Evacuate

- ☐ Designate an emergency meeting location, outside the fire or hazard area. It is critical to determine who has safely evacuated from the affected area.
- ☐ Several different escape routes from your home and community. Practice these often so everyone in your family is familiar in case of emergency.
- ☐ Necessities and boarding options for your pets and large animals, such as horse and other livestock.

Your Personal
WILDFIRE ACTION PLAN

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

1 IMPORTANT PHONE NUMBERS

EMERGENCY CONTACTS

Name

( ) Phone

Name

( ) Phone

SCHOOLS

Name

( ) Phone

Name

( ) Phone

FAMILY & FRIENDS

Name

( ) Phone

Name

( ) Phone

2 WHAT TO TAKE

- ○ Insurance Papers
- ○ Photos
- ○ Emergency Supply Kit
- ○ Prescriptions
- ○ Important Documents
- ○ _____

3 EVACUATION

WHEN TO GO

WHERE TO GO

HOW TO GET THERE

DESTINATION

WHO TO TELL (BEFORE AND AFTER)

ANIMAL SHELTER

Name

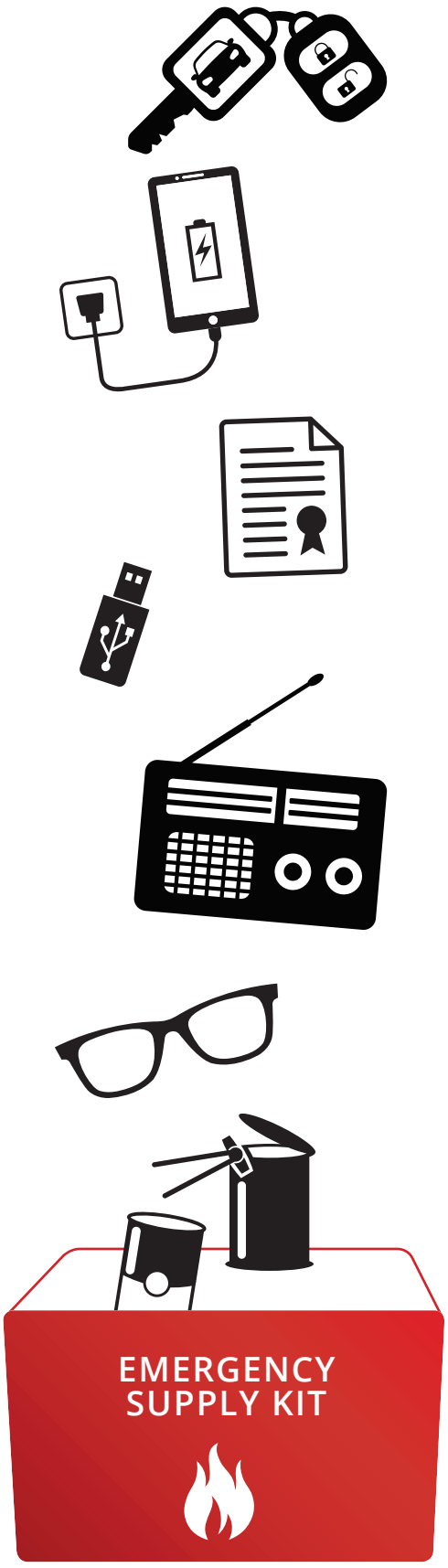
( ) Phone

LOS ANGELES COUNTY FIRE DEPARTMENT

IF YOU HAVE AN EMERGENCY, CALL 9-1-1

Public Information Office: (323) 881-2411
fire.lacounty.gov

☑ SET!



Assemble Your Emergency Supply Kit

Put together your emergency supply kit long before a wildfire or other disaster occurs, and keep it easily accessible, so you can take it with you when you have to evacuate. Plan to be away from your home for an extended period of time. Each person should have a readily accessible emergency supply kit.

Backpacks work great for storing these items (except for food and water) and are easy to grab. Storing food and water in a tub or chest on wheels will make it easier to transport. Keep it light to be able to easily lift it into your car.

Essential Supplies

- ☐ Three-day supply of non-perishable food and three gallons of water per person.
- ☐ Map marked with at least two evacuation routes
- ☐ Prescriptions or special medications
- ☐ Change of clothing
- ☐ Closed-toe shoes
- ☐ Extra eyeglasses or contact lenses
- ☐ An extra set of car keys, credit cards, cash, or travelers checks
- ☐ First aid kit
- ☐ Flashlight
- ☐ Battery-powered radio and extra batteries
- ☐ Sanitation supplies
- ☐ Copies of important documents (e.g., birth certificates, passports, etc.)
- ☐ Don't forget pet food and water!

If Time Allows

- ☐ Easy-to-carry valuables
- ☐ Family photos and other irreplaceable items
- ☐ Personal computer information on hard drives and flash drives
- ☐ Chargers for cell phones, laptops, etc.

SET!

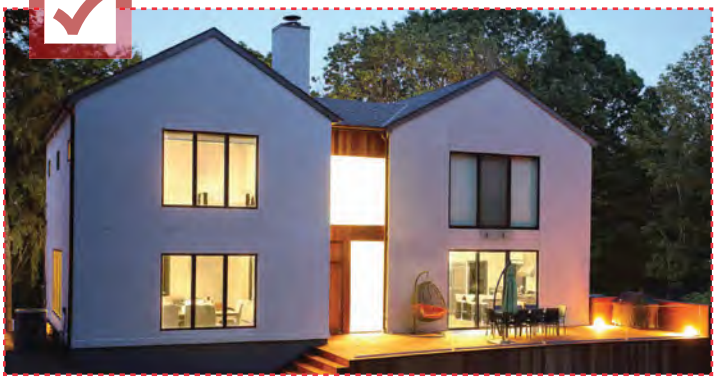
Pre-Evacuation Preparation Steps

When an evacuation is anticipated and if time permits, follow these checklists to give your home the best chance of surviving a wildfire:

Animals

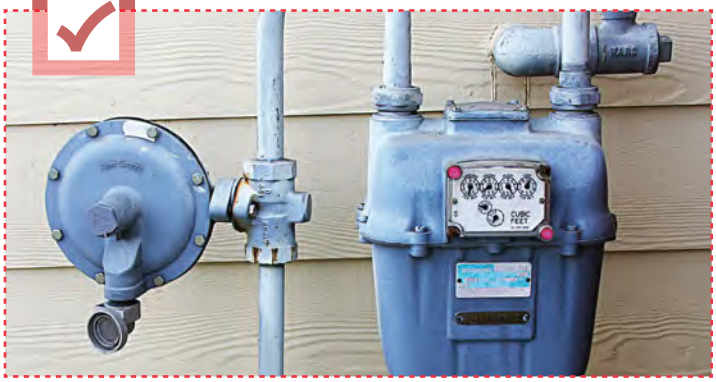
- ☐ Locate your pets and keep them nearby.
- ☐ Prepare farm animals for transport and think about moving them to a safe location early.

Inside



- ☐ Shut all windows and doors, leaving them unlocked.
- ☐ Remove flammable window shades, lightweight curtains, and close metal shutters.
- ☐ Move flammable furniture to the center of the room, away from windows and doors.
- ☐ Leave your lights on so firefighters can see your home under smoky conditions.
- ☐ Shut off the air conditioning.
- ☐ Shut off the gas meter. Turn off pilot lights.

Outside



- ☐ Gather up flammable items from the exterior of the house and bring them inside (e.g., patio furniture, children's toys, doormats, etc.) or place them in your pool.
- ☐ Turn off propane tanks. Move propane BBQ appliances away from structures.
- ☐ Connect garden hoses to outside water valves or spigots for use by firefighters. Fill water buckets and place them around the house.
- ☐ Don't leave sprinklers on or water running. They can affect critical water pressure.
- ☐ Leave exterior lights on.
- ☐ Put your emergency supply kit in your vehicle.
- ☐ Back your loaded vehicle into the driveway with all doors and windows closed. Carry your car keys with you.
- ☐ Have a ladder available.
- ☐ Seal attic and ground vents with pre-cut plywood or commercial seals, if time permits.
- ☐ Monitor your property and the wildfire situation. **Don't wait for an evacuation order, if you feel threatened and need to leave.**
- ☐ Check on neighbors and make sure they are preparing to leave.

Remember the Six P's

P

People and pets

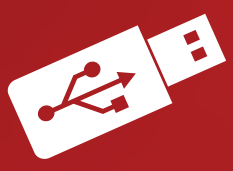
Papers, phone numbers, and important documents

Prescriptions, vitamins, and eyeglasses

Pictures and irreplaceable memorabilia

Plastic
(e.g., credit cards, ATM cards)
and cash

Personal computer hard drives and flash drives



GO!

TAKE ACTION IMMEDIATELY WHEN WILDFIRE STRIKES

Go Early

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

When to Evacuate

Leave as soon as evacuation is recommended by emergency personnel to avoid being caught in fire, smoke, or road congestion. Don't wait to be ordered by authorities to leave. In an intense wildfire, they may not have time to knock on every door. If you are advised to leave, don't hesitate! Go!

- Emergency personnel will determine the areas to be evacuated and escape routes to use, depending upon the fire's location, behavior, winds, terrain, etc.
- Emergency personnel make every effort to advise you of potential evacuations as early as possible. You must take the initiative to stay informed and aware. Monitor social media and listen to your local radio/TV for announcements from law enforcement and other emergency personnel.
- You may be directed to temporary assembly areas to await transfer to a safe location.

The terms "Voluntary" and "Mandatory" are used to describe evacuation orders. However, local jurisdictions may use other terminology such as "Precautionary" and "Immediate Threat." These terms are used to alert you to the significance of the danger. All evacuation instructions provided by emergency personnel should be followed immediately for your safety.

Where to Go

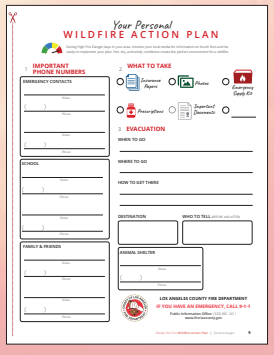
Leave for a pre-determined location. It should be a low-risk area, such as a well-prepared neighbor or relative's house, a Red Cross shelter or evacuation center, Motel, etc.

How to Get There

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

Follow these steps as soon as possible to get ready to GO!

- **Review your Wildfire Action Plan evacuation checklist.**



- Ensure your Emergency Supply Kit is in your vehicle.

- Cover up to protect against heat and flying embers. Wear long pants, a long-sleeve shirt, heavy shoes/boots, a cap, dry bandanna (for face cover), goggles, or glasses. 100% cotton is preferable.

- Locate your pets and take them with you.

GO!

Survival Tips if You Become Trapped

In Your Home

- ☐ Stay calm and keep your family together.
- ☐ Call 9-1-1 and inform authorities of your location.
- ☐ Fill sinks and tubs with cold water.
- ☐ Keep doors and windows closed, but unlocked.
- ☐ Stay inside your home.
- ☐ Stay away from outside walls.

In Your Vehicle

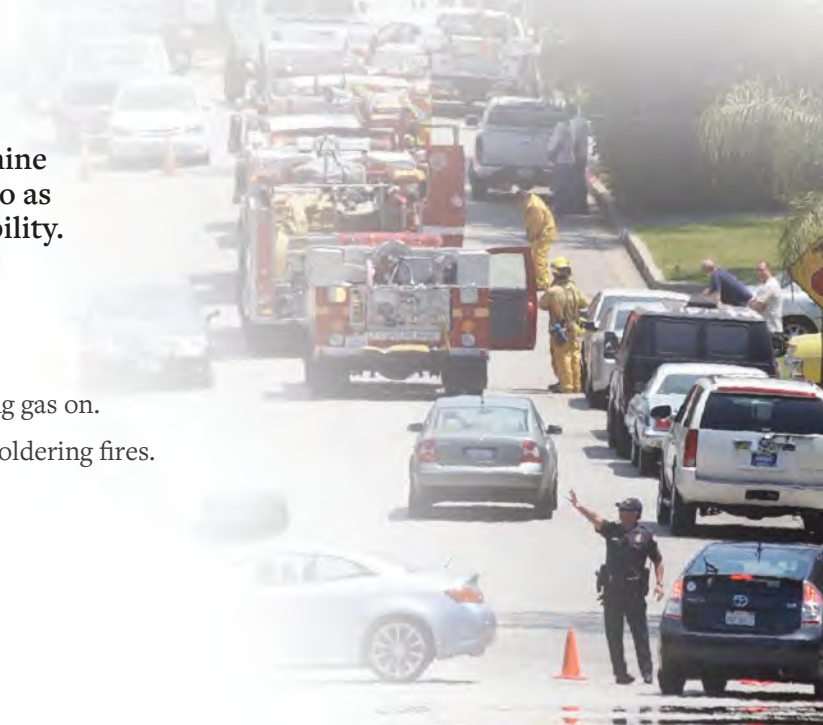
- ☐ Stay calm.
- ☐ Park your vehicle in an area clear of vegetation.
- ☐ Close all vehicle windows and vents.
- ☐ Cover yourself with a wool or cotton blanket or jacket.
- ☐ Lie on the vehicle floor.
- ☐ Use your cell phone and call 9-1-1 to inform authorities of your location.

On Foot

- ☐ Stay calm.
- ☐ Go to an area clear of vegetation, a ditch or depression on level ground if possible.
- ☐ Lie face down and cover up your body.
- ☐ Use your cell phone and call 9-1-1 to inform authorities of your location.

Returning Home After a Wildfire

Do not return home until emergency officials determine it is safe. You will receive proper notification to do so as soon as it is possible, considering safety and accessibility.



When You Return Home

- ☐ Be alert for downed power lines and other hazards.
- ☐ Check propane tanks, regulators, and lines before turning gas on.
- ☐ Check your residence carefully for hidden embers or smoldering fires.

Preparing for a wildfire starts with three simple steps:

READY! SET! GO!

Please keep this plan on hand as a quick reference for helping your family and property be safe in the event of a wildfire.

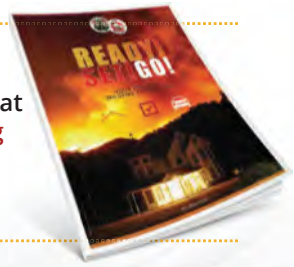
OFFICIAL

- facebook.com/LACoFD
- twitter.com/LACoFD
- instagram.com/lacountyfd
- youtube.com/user/LosAngelesCountyFD
- vimeo.com/user4029934

PUBLIC INFORMATION OFFICE

- twitter.com/lacofdpio
- twitter.com/lacofdespanol

Download the *Ready! Set! Go!* Wildfire Action Plan at fire.lacounty.gov/rsg or by scanning this QR code with your smart phone.



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LOS ANGELES COUNTY FIRE DEPARTMENT
Public Information Office
1320 N. Eastern Avenue
Los Angeles, California 90063

Produced by the Communications Section of the Executive Support Division. Revised September 25, 2018.

Appendix B1 through B4

Family Disaster Plan and Personal Survival Guide

Additional Items to Consider Adding to an Emergency Supply Kit:

- ❑ **Prescription medications and glasses**
- ❑ **Infant formula and diapers**
- ❑ **Pet food and extra water for your pet**
- ❑ **Important family documents such as copies of insurance policies, identification and bank account records in a waterproof, portable container**
- ❑ **Cash or traveler's checks and change**
- ❑ **Emergency reference material such as a first aid book or information from www.ready.gov**
- ❑ **Sleeping bag or warm blanket for each person. Consider additional bedding if you live in a cold-weather climate.**
- ❑ **Complete change of clothing including a long sleeved shirt, long pants and sturdy shoes. Consider additional clothing if you live in a cold-weather climate.**
- ❑ **Household chlorine bleach and medicine dropper** – When diluted nine parts water to one part bleach, bleach can be used as a disinfectant. Or in an emergency, you can use it to treat water by using 16 drops of regular household liquid bleach per gallon of water. Do not use scented, color safe or bleaches with added cleaners.
- ❑ **Fire Extinguisher**
- ❑ **Matches in a waterproof container**
- ❑ **Feminine supplies and personal hygiene items**
- ❑ **Mess kits, paper cups, plates and plastic utensils, paper towels**
- ❑ **Paper and pencil**
- ❑ **Books, games, puzzles or other activities for children**

Ready

Prepare. Plan. Stay Informed.®

Emergency Supply List

FEMA

www.ready.gov

Recommended Items to Include in a Basic Emergency Supply Kit:

- **Water, one gallon of water per person per day for at least three days, for drinking and sanitation**
- **Food, at least a three-day supply of non-perishable food**
- **Battery-powered or hand crank radio and a NOAA Weather Radio with tone alert and extra batteries for both**
- **Flashlight and extra batteries**
- **First aid kit**
- **Whistle to signal for help**
- **Dust mask, to help filter contaminated air and plastic sheeting and duct tape to shelter-in-place**
- **Moist towelettes, garbage bags and plastic ties for personal sanitation**
- **Wrench or pliers to turn off utilities**
- **Can opener for food (if kit contains canned food)**
- **Local maps**

Through its *Ready* Campaign, the Federal Emergency Management Agency educates and empowers Americans to take some simple steps to prepare for and respond to potential emergencies, including natural disasters and terrorist attacks. *Ready* asks individuals to do three key things: get an emergency supply kit, make a family emergency plan, and be informed about the different types of emergencies that could occur and their appropriate responses.

All Americans should have some basic supplies on hand in order to survive for at least three days if an emergency occurs. Following is a listing of some basic items that every emergency supply kit should include. However, it is important that individuals review this list and consider where they live and the unique needs of their family in order to create an emergency supply kit that will meet these needs. Individuals should also consider having at least two emergency supply kits, one full kit at home and smaller portable kits in their workplace, vehicle or other places they spend time.

Ready FEMA

Federal Emergency Management Agency
Washington, DC 20472

BE SMART. TAKE PART. CREATE YOUR FAMILY EMERGENCY COMMUNICATION PLAN

Join with others to prepare for emergencies and participate in America's PrepareAthon! | ready.gov/prepare

Creating your *Family Emergency Communication Plan* starts with one simple question: "What if?"

"What if something happens and I'm not with my family?" "Will I be able to reach them?" "How will I know they are safe?" "How can I let them know I'm OK?" During a disaster, you will need to send and receive information from your family.

Communication networks, such as mobile phones and computers, could be unreliable during disasters, and electricity could be disrupted. Planning in advance will help ensure that all the members of your household—including children and people with disabilities and others with access and functional needs, as well as outside caregivers—know how to reach each other and where to meet up in an emergency. Planning starts with three easy steps:

1. COLLECT.

Create a paper copy of the contact information for your family and other important people/offices, such as medical facilities, doctors, schools, or service providers.

2. SHARE.

Make sure everyone carries a copy in his or her backpack, purse, or wallet. If you complete your *Family Emergency Communication Plan* online at ready.gov/make-a-plan, you can print it onto a wallet-sized card. You should also post a copy in a central location in your home, such as your refrigerator or family bulletin board.

3. PRACTICE.

Have regular household meetings to review and practice your plan.

TEXT IS BEST!

If you are using a mobile phone, a text message may get through when a phone call will not. This is because a text message requires far less bandwidth than a phone call. Text messages may also save and then send automatically as soon as capacity becomes available.

The following sections will guide you through the process to create and practice your *Family Emergency Communication Plan*.

HOUSEHOLD INFORMATION

Write down phone numbers and email addresses for everyone in your household. Having this important information written down will help you reconnect with others in case you don't have your mobile device or computer with you or if the battery runs down. If you have a household member(s) who is Deaf or hard of hearing, or who has a speech disability and uses traditional or video relay service (VRS), include information on how to connect through relay services on a landline phone, mobile device, or computer.

SCHOOL, CHILDCARE, CAREGIVER, AND WORKPLACE EMERGENCY PLANS

Because a disaster can strike during school or work hours, you need to know their emergency response plans and how to stay informed. Discuss these plans with children, and let them know who could pick them up in an emergency. Make sure your household members with phones are signed up for alerts and warnings from their school, workplace, and/or local government. To find out more about how to sign up, see *Be Smart. Know Your Alerts and Warnings* at http://1.usa.gov/1BDloze. For children without mobile phones, make sure they know to follow instructions from a responsible adult, such as a teacher or principal.

OUT-OF-TOWN CONTACT

It is also important to identify someone outside of your community or State who can act as a central point of contact to help your household reconnect. In a disaster, it may be easier to make a long-distance phone call than to call across town because local phone lines can be jammed.

EMERGENCY MEETING PLACES

Decide on safe, familiar places where your family can go for protection or to reunite. Make sure these locations are accessible for household members with disabilities or access and functional needs. If you have pets or service animals, think about animal-friendly locations. Identify the following places:

- ☐ *Indoor*: If you live in an area where tornadoes, hurricanes, or other high-wind storms can happen, make sure everyone knows where to go for protection. This could be a small, interior, windowless room, such as a closet or bathroom, on the lowest level of a sturdy building, or a tornado safe room or storm shelter.
- ☐ *In your neighborhood*: This is a place in your neighborhood where your household members will meet if there is a fire or other emergency and you need to leave your home. The meeting place could be a big tree, a mailbox at the end of the driveway, or a neighbor's house.
- ☐ *Outside of your neighborhood*: This is a place where your family will meet if a disaster happens when you're not at home and you can't get back to your home. This could be a library, community center, house of worship, or family friend's home.

- [ ] *Outside of your town or city*: Having an out-of-town meeting place can help you reunite if a disaster happens and:

  - You cannot get home or to your out-of-neighborhood meeting place; or
  - Your family is not together and your community is instructed to evacuate the area.

  This meeting place could be the home of a relative or family friend. Make sure everyone knows the address of the meeting place and discuss ways you would get there.

OTHER IMPORTANT NUMBERS AND INFORMATION

You should also write down phone numbers for emergency services, utilities, service providers, medical providers, veterinarians, insurance companies, and other services.

- [ ] Make copies of your *Family Emergency Communication Plan* for each member of the household to carry in his or her wallet, backpack, or purse. Post a copy in a central place at home. Regularly check to make sure your household members are carrying their plan with them.
- [ ] Enter household and emergency contact information into all household members' mobile phones or devices.
- [ ] Store at least one emergency contact under the name "In Case of Emergency" or "ICE" for all mobile phones and devices. This will help someone identify your emergency contact if needed. Inform your emergency contact of any medical issues or other requirements you may have.
- [ ] Create a group list on all mobile phones and devices of the people you would need to communicate with if there was an emergency or disaster.
- [ ] Make sure all household members and your out-of-town contact know how to text if they have a mobile phone or device, or know alternative ways to communicate if they are unable to text.
- [ ] Read *Be Smart. Know Your Alerts and Warnings* at http://1.usa.gov/1BDloze and sign up to receive emergency information.

Once you have completed your *Family Emergency Communication Plan*, made copies for all the members of your household, and discussed it, it's time to practice!

Here are some ideas for practicing your plan:

- [ ] Practice texting and calling. Have each person practice sending a text message or calling your out-of-town contact and sending a group text to your mobile phone group list.
- [ ] Discuss what information you should send by text. You will want to let others know you are safe and where you are. Short messages like "I'm OK. At library" are good.

- [ ] Talk about who will be the lead person to send out information about the designated meeting place for the household.
- [ ] Practice gathering all household members at your indoor and neighborhood emergency meeting places. Talk about how each person would get to the identified out-of-neighborhood and out-of-town meeting places. Discuss all modes of transportation, such as public transportation, rail, and para-transit for all family members, including people with disabilities and others with access and functional needs.
- [ ] Regularly have conversations with household members and friends about the plan, such as whom and how to text or call, and where to go.
- [ ] To show why it's important to keep phone numbers written down, challenge your household members to recite important phone numbers from memory—now ask them to think about doing this in the event of an emergency.
- [ ] Make sure everyone, including children, knows how and when to call 911 for help. You should only call 911 when there is a life-threatening emergency.
- [ ] Review, update, and practice your *Family Emergency Communication Plan* at least once a year, or whenever any of your information changes.

To help start the conversation or remind your family why you are taking steps to prepare and practice, you may want to watch the 4-minute video, *It Started Like Any Other Day*, about families who have experienced disaster, at www.youtube.com/watch?v=w_omgt3MEBs. Click on the closed captioning (CC) icon on the lower right to turn on the captioning.

After you practice, talk about how it went. What worked well? What can be improved? What information, if any, needs to be updated? If you make updates, remember to print new copies of the plan for everyone.

OTHER IMPORTANT TIPS FOR COMMUNICATING IN DISASTERS[1]

- [ ] Text is best when using a mobile phone, but if you make a phone call, keep it brief and convey only vital information to emergency personnel and/or family or household members. This will minimize network congestion, free up space on the network for emergency communications, and conserve battery power. Wait 10 seconds before redialing a number. If you redial too quickly, the data from the handset to the cell sites do not have enough time to clear before you've re-sent the same data. This contributes to a clogged network.
- [ ] Conserve your mobile phone battery by reducing the brightness of your screen, placing your phone in airplane mode, and closing apps you do not need. Limit watching videos and playing video games to help reduce network congestion.
- [ ] Keep charged batteries, a car phone charger, and a solar charger available for backup power for your mobile phone, teletypewriters (TTYs), amplified phones, and caption phones. If you charge your phone in your car, be sure the car is in a well-ventilated area (e.g., not in a closed garage) to avoid life-threatening carbon monoxide poisoning.

[1] Federal Communications Commission, Public Safety and Homeland Security Bureau. (n.d.) *Tips for communicating in an emergency.* Retrieved from http://transition.fcc.gov/pshs/emergency-information/tips.html

- [ ] If driving, do not text, read texts, or make a call without a hands-free device.
- [ ] Maintain a household landline and analog phone (with battery backup if it has a cordless receiver) that can be used when mobile phone service is unavailable. Those who are Deaf or hard of hearing, or who have speech disabilities and use devices and services that depend on digital technology (e.g., VRS, Internet Protocol [IP] Relay, or captioning) should have an analog phone (e.g., TTY, amplified phone, or caption phone) with battery backup in case Internet or mobile service is down.
- [ ] If you evacuate and have a call-forwarding feature on your home phone, forward your home phone number to your mobile phone number.
- [ ] Use the Internet to communicate by email, Twitter, Facebook, and other social media networks. These communication channels allow you to share information quickly with a widespread audience or to find out if loved ones are OK. The Internet can also be used for telephone calls through Voice over Internet Protocol. For those who are Deaf or hard of hearing, or who have speech disabilities, you can make calls through your IP Relay provider.
- [ ] If you do not have a mobile phone, keep a prepaid phone card to use if needed during or after a disaster.
- [ ] Use a pay phone if available. It may have less congestion because these phones don't rely on electricity or mobile networks. In some public places, you may be able to find a TTY that can be used by those who are Deaf or hard of hearing, or who have speech disabilities.

America's PrepareAthon! is a grassroots campaign for action to get more people prepared for emergencies. Make your actions count at ready.gov/prepare.

The reader recognizes that the Federal Government provides links and informational data on various disaster preparedness resources and events and does not endorse any non-Federal events, entities, organizations, services, or products.

10 WAYS TO PARTICIPATE IN AMERICA'S PrepareAthon!℠

Access Alerts and Warnings

Test Communication Plans

Assemble or Update Supplies

Drill or Practice Emergency Response

Participate in a Class, Training, or Discussion

Plan with Neighbors

Conduct an Exercise

Make Property Safer

Document and Insure Property

Safeguard Documents

FAMILY EMERGENCY COMMUNICATION PLAN

HOUSEHOLD INFORMATION

Home #: .....
Address:.....

Name: ..... Mobile #: .....
Other # or social media: .....
Email: .....
Important medical or other information: .....
.....

Name: ..... Mobile #: .....
Other # or social media: .....
Email: .....
Important medical or other information: .....
.....

Name: ..... Mobile #: .....
Other # or social media: .....
Email: .....
Important medical or other information: .....
.....

Name: ..... Mobile #: .....
Other # or social media: .....
Email: .....
Important medical or other information: .....
.....

SCHOOL, CHILDCARE, CAREGIVER, AND WORKPLACE EMERGENCY PLANS

Name: .....
Address:.....
Emergency/Hotline #: .....
Website: .....
Emergency Plan/Pick-Up: .....

SCHOOL, CHILDCARE, CAREGIVER, AND WORKPLACE EMERGENCY PLANS

Name: .....
Address: .....
Emergency/Hotline #: .....
Website: .....
Emergency Plan/Pick-Up: .....

Name: .....
Address: .....
Emergency/Hotline #: .....
Website: .....
Emergency Plan/Pick-Up: .....

Name: .....
Address: .....
Emergency/Hotline #: .....
Website: .....
Emergency Plan/Pick-Up: .....

IN CASE OF EMERGENCY (ICE) CONTACT

Name: ..... Mobile #: .....
Home #: ..... Email: .....
Address: .....

OUT-OF-TOWN CONTACT

Name: ..... Mobile #: .....
Home #: ..... Email: .....
Address: .....

EMERGENCY MEETING PLACES

Indoor: .....
Instructions: .....
Neighborhood: .....
Instructions: .....

Out-of-Neighborhood: .....
Address: .....
Instructions: .....

Out-of-Town: .....
Address: .....
Instructions: .....

IMPORTANT NUMBERS OR INFORMATION

Police: ..... Dial 911 or #: .....
Fire: ..... Dial 911 or #: .....
Poison Control: .....#: .....
Doctor: .....#: .....
Doctor: .....#: .....
Pediatrician: .....#: .....
Dentist: .....#: .....
Hospital/Clinic: .....#: .....
Pharmacy: .....#: .....
Medical Insurance: .....#: .....
Policy #: .....
Medical Insurance: .....#: .....
Policy #: .....
Homeowner/Rental Insurance: .....
#: .....
Policy #: .....
Flood Insurance: .....#: .....
Policy #: .....
Veterinarian: .....#: .....
Kennel: .....#: .....
Electric Company: .....#: .....
Gas Company: .....#: .....
Water Company: .....#: .....
Alternate/Accessible Transportation: .....
#: .....
Other: .....#: .....
Other: .....#: .....
Other: .....#: .....

AMERICA'S PrepareAthon!™
BE SMART. TAKE PART. PREPARE.

Ready

Write your family's name above

Family Emergency Communication Plan

IN CASE OF EMERGENCY (ICE) CONTACT

Name: ..... Mobile #: .....
Home #: ..... Email: .....
Address: .....

OUT-OF-TOWN CONTACT

Name: ..... Mobile #: .....
Home #: ..... Email: .....
Address: .....

FOLD HERE

HOUSEHOLD INFORMATION

Home #: .....
Address: .....

Name: ..... Mobile #: .....
Other # or social media: ..... Email: .....
Important medical or other information: .....

Name: ..... Mobile #: .....
Other # or social media: ..... Email: .....
Important medical or other information .....

FOLD HERE

Name: ..... Mobile #: .....
Other # or social media: ..... Email: .....
Important medical or other information: .....

Name: ..... Mobile #: .....
Other # or social media: ..... Email: .....
Important medical or other information: .....

FOLD HERE

SCHOOL, CHILDCARE , CAREGIVER, AND WORKPLACE EMERGENCY PLANS

Name: .....
Address: .....
Emergency/Hotline #: ..... Website: .....
Emergency Plan/Pick-Up: .....

Name: .....
Address: .....
Emergency/Hotline #: ..... Website: .....
Emergency Plan/Pick-Up: .....

FOLD HERE

Name: .....
Address: .....
Emergency/Hotline #: ..... Website: .....
Emergency Plan/Pick-Up: .....

Name: .....
Address: .....
Emergency/Hotline #: ..... Website: .....
Emergency Plan/Pick-Up: .....

EMERGENCY MEETING PLACES

Indoor: .....
Instructions: .....
.....

Neighborhood: .....
Instructions: .....
.....

Out-of-Neighborhood: .....
Address: .....
Instructions: .....
.....

Out-of-Town: .....
Address: .....
Instructions: .....
.....

IMPORTANT NUMBERS OR INFORMATION

Police: ..... Dial 911 or #: .....
Fire: ..... Dial 911 or #: .....
Poison Control: ..... #: .....
Doctor: ..... #: .....
Doctor: ..... #: .....
Pediatrician: ..... #: .....
Dentist: ..... #: .....
Medical Insurance: ..... #: .....
Policy #: .....
Medical Insurance: ..... #: .....
Policy #: .....
Hospital/Clinic: ..... #: .....

Pharmacy: ..... #: .....
Homeowner/Rental Insurance: ..... #: .....
Policy #: .....
Flood Insurance: ..... #: .....
Policy #: .....
Veterinarian: ..... #: .....
Kennel: ..... #: .....
Electric Company: ..... #: .....
Gas Company: ..... #: .....
Water Company: ..... #: .....
Alternate/Accessible Transportation: ..... #: .....
Other: .....
Other: .....

American Red Cross

Family Disaster Plan

Family Last Name(s) or Household Address: **Date:**

Family Member/Household Contact Info (If needed, additional space is provided in #10 below):

Name	Home Phone	Cell Phone	Email:

Pet(s) Info:

Name:	Type:	Color:	Registration #:

Plan of Action

1. The disasters most likely to affect our household are:

2. What are the escape routes from our home?

3. If separated during an emergency, what is our meeting place near our home?

4. If we cannot return home or are asked to evacuate, what is our meeting place outside of our neighborhood?

_____

What is our route to get there and an alternate route, if the first route is impassible?

_____

_____

5. In the event our household is separated or unable to communicate with each other, our emergency contact outside of our immediate area is:

Name	Home Phone	Cell Phone	Email:
_____	_____	_____	_____

After a disaster, let your friends and family know you are okay by registering at "Safe and Well" at https://safeandwell.communityos.org/cms// or by calling 1-800-733-2767. You can also give them a call, send a quick text or update your status on social networking sites.

6. If at school/daycare, our child(ren) will be evacuated to:

Child's Name:	Evacuation Site (address and contact info):
_____	_____
_____	_____
_____	_____
_____	_____

7. Our plan for people in our household with a disability or special need is:

Person's Name:	Plan:
_____	_____
_____	_____

8. During certain emergencies local authorities may direct us to "shelter in place" in our home. An accessible, safe room where we can go, seal windows, vents and doors and listen to emergency broadcasts for instructions, is:

_____

9. Family Member Responsibilities in the Event of a Disaster

Task	Description	Family Member Responsible
Disaster Kit*	Stock the disaster kit and take it if evacuation is necessary. Include items you might want to take to an evacuation shelter. Remember to include medications and eye glasses.	
Be informed	Maintain access to NOAA or local radio, TV, email or text alerts for important and current information about disasters.	
Family Medical Information	Make sure the household medical information is taken with us if evacuation is necessary.	
Financial Information	Obtain copies of bank statements and cash in the event ATMs and credit cards do not work due to power outages. Bring copies of utility bills as proof of residence in applying for assistance.	
Pet Information	Evacuate our pet(s), keep a phone list of pet-friendly motels and animal shelters, and assemble and take the pet disaster kit.	
Sharing and Maintaining the Plan	Share the completed plan with those who need to know. Meet with household members every 6 months or as needs change to update household plan.	

**What supplies and records should go in your disaster kit? Visit www.redcross.org*

10. Other information, if not able to be included above.

Congratulations on completing your family disaster plan! Please tell others: "We've made a family disaster plan and you can, too, with help from the American Red Cross."

Get the facts about what you should do if an emergency or disaster occurs at www.redcross.org

Appendix C

Evacuation Travel Time Technical Analysis

TO:	Nathan Keith, Sr. Vice President, Tejon Ranch Company
FROM:	Phuong Nguyen, PE; CR Associates (CRA)
DATE:	August 19, 2024
RE:	Tejon Ranch Centennial Fire Evacuation Analysis – Technical Memorandum

The purpose of this technical memorandum is to assess the time required for emergency evacuation under several scenarios, assuming a wind-driven fire that results in an evacuation affecting the Tejon Ranch Centennial Project ("Project") and surrounding communities.[1] The following discussion of evacuation traffic simulations is not intended to be an Evacuation Plan, nor include elements typically found in an Evacuation Plan. The sole purpose of the traffic simulations is to focus on the vehicle travel times in simulated evacuation events.

Background and Purpose

This memorandum provides a summary of the traffic simulations conducted for evacuation of the Project and surrounding community due to a wildfire. The simulations have been conducted for a variety of evacuation scenarios described below. Modeling potential evacuation traffic impacts requires that numerous assumptions be made to address many variables that will impact a real-life evacuation scenario, including the number of existing vehicles in the community, the number of Project vehicles that will need to evacuate, the roadway capacities and whether enhancements are provided (e.g., extra lanes, lane widening, signaling intersections), the total number of intersections and how they will be operating, the final destination, the targeted evacuation area, the total mobilization time, vegetation communities, weather and wind, fire spread rates, humidity, topography, risk to homes, locations of ignitions and new fire starts, and lead time needed, etc. There are many hundreds or thousands of potential model scenarios, and every fire scenario poses variations that regularly change and are reassessed "real-time" during a wildfire. Agencies involved in implementing an evacuation order would not rely on a project-specific evacuation plan, but on situational awareness and agency created wildfire pre-plans, which act as operational tools to provide high-level fire assessments, identify critical infrastructure and assets, identify preferred evacuation approaches, and provide key safety information to inform evacuation decision-making.

The following analysis is intended to present representative evacuation scenarios using available information, conservative assumptions, and an industry-based modeling technology. In an actual emergency, Unified Command[2] will take into account numerous factors including fire location and spread rates, wind speeds and direction, humidity, topography, fuel loading, emergency access routes, evacuation routes, shelter-in-place options, time needed to evacuate, and other variables, and, after taking into account such factors and variables, will issue specific evacuation or shelter-in-place directives consistent with the process and protocols outlined in the Los Angeles County Emergency Operations Plans. During a wildfire,

[1] This memorandum was prepared with technical fire behavior input from Dudek's Urban Forestry + Fire Protection team.
[2] As defined in the FEMA Glossary, for incidents involving multiple jurisdictions, a single jurisdiction with multiagency involvement, or multiple jurisdictions with multiagency involvement, unified command allows agencies with different legal, geographic, and functional authorities and responsibilities to work together effectively without affecting individual agency authority, responsibility, or accountability.

nearby residents and the Project's residents should comply with those directives from authorities and first responders conducting the evacuation or emergency response. The evacuation traffic model used herein is appropriate for planning and comparison purposes but will likely not be relied on by first responders and should not be relied on by Incident Commander in time of an emergency. However, it provides useful information that will be provided to agencies and emergency managers and may inform strategic response plans in terms of evacuation timeframes and contingency options.

The roadway network and vehicle input assumptions have been selected to simulate targeted evacuations scenarios, based on potential fire location and direction as well as at different stages of Project implementation, as detailed in Table 2. Additionally, each of these scenarios assumes evacuation scenario that would occur during a weekend day (Saturday) when the Project's residents are home, and nearby homes are likely to be fully occupied. As it is most likely that phased evacuation orders would be given to provide for a more orderly evacuation. It is also likely that fewer residents would be present nearby if the evacuation happened during a time that the Project was not at full occupancy (e.g., a weekday afternoon); and, therefore less potential for evacuation traffic, a Saturday afternoon evacuation represents a reasonably conservative assumption for evacuation traffic conditions from the Project and surrounding areas.

The wildfire evacuation scenarios selected for this analysis were based on a comprehensive approach that included review of fire history, review of recent fires (e.g., 2014 Pine Fire, 2020 Ridge Fire, 2024 Max Fire[3], 2024 Post Fire[4]), fire behavior science, area topography, fuel types and the evolved approach to evacuations which have become increasingly more surgical instead of large, area-wide evacuations. Accordingly, given the highest probability wildfire scenarios that would result in evacuation, it is anticipated that specific neighborhoods and communities would be evacuated in a phased approach. The construction of the Project will adhere to the most recent building and fire code standards, which includes a number of fire safety precautions for properties situated within a Fire Hazard Severity Zone. Once the Project has been fully implemented and the Project site has become increasingly hardened with a singular WUI interface, the structures in the internal neighborhoods would no longer be considered part of the WUI; however, these structures will have been constructed to CBC and CFC standards for development in Very High Fire Hazard Severity Zones (e.g., Chapter 7A).

During a wildfire, a targeted portion of the Project site's population would likely be evacuated as a precautionary measure. This may be combined with targeted evacuations within the existing community of Neenach and surrounding residence. This type of evacuation is consistent with management of recent wildfires throughout southern California and Los Angeles County, where the phased evacuation practice has been implemented with great success and continues to be refined through real-time application. The phased evacuation approach was utilized in the recent fires including the 2024 Apache Fire in Ventura, CA, 2024 Post Fire in Gorman, California, 2023 Rabbit Fire in Riverside, CA, all of which included early evacuation warnings issued for vulnerable areas.

[3] https://ktla.com/news/local-news/max-fire-fire-raging-in-lancaster-threatening-hundreds-of-homes/
[4] https://twitter.com/search?q=(%23PostFire)%20(from%3ALACoFDPIO)&src=typed_query&f=top

Project Description

Centennial Specific Plan is a planned new town located east of the I-5 Freeway and adjacent to SR-138 in northwest unincorporated Los Angeles County. Comprising approximately 12,323 acres, the Specific Plan proposes development of both residential and nonresidential uses. Proposed are a maximum of 19,333 dwelling units, ranging from multi-family attached homes to low-density, single family detached units. The nonresidential component includes 10,097,208 total square feet of nonresidential commercial and business park development. By design, it includes a wide range of transportation demand management (TDM) features as an integral part of the Project. The northern boundary of the project area extends to the Los Angeles/Kern county line and the southern boundary extends to just south of SR-138. The western boundary begins approximately one mile east of I-5 and the eastern boundary is just east of 300th Street West.

Analysis Methodology

The analysis conducted for the Project was based on review of best practices research as well as the State of California Attorney General "Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act (AG Guideline)" report. Section IV.C. of the AG Guidance report provides recommendations on Analyzing and Mitigating Wildfire Risk Impacts Under CEQA – including recommendations on analyzing a project's impact on evacuation and emergency access.

Per the AG Guidance, the addition of new developments in high wildfire risk areas can impact the evacuation of both new residents and the existing population, as well as hinder emergency responders' firefighting access. The report suggests that this impact could increase the risk and extent of large-scale fire spread and affect community safety. The report also suggests that Environmental Impact Reports (EIRs) should evaluate these impacts during construction and over the project's lifetime, with a higher level of analysis for low-density developments in wildland-urban interfaces compared to higher density infill projects in developed areas. Further, the report recommends that Projects in high wildfire risk areas should include evacuation modeling and planning at the review and approval stage, taking into account roadway capacity, evacuation timing, alternative plans, impacts on existing evacuation plans, emergency access adequacy, and traffic modeling. This would ensure that proposed developments facilitate emergency access and ease evacuation constraints and allow for design modifications that address wildfire risk.

Consistent with the AG Guidelines, the analysis presented herein accounts for roadway capacity and congestion that may occur during an evacuation, existing emergency response plan, potential evacuation scenarios, and evaluated modeled travel times for occupants (e.g., residents, employees, visitors, etc.) of the Project and the occupants surrounding communities to evacuate to nearby urban areas/freeway access in case of a fire emergency.

Existing Evacuation Plan and Practices

Current evacuation practice typically targets the scope of the evacuation only to the area in immediate danger (evacuation order area) and placing a larger area on standby for evacuation (evacuation warning or alert area). This practice allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. The practice of

evacuating areas most at risk first has become standard during evacuations. The most recent Office of the State Fire Marshal (OSFM) Incident Update for the 2024 Post Fire, referenced above, lists evacuation orders for at-risk areas that are the priority, as well as listing areas that have restricted access to the public, in the event they would need to be evacuated. Further, the evacuation warning platform Genasys Protect, assigns each designated evacuation zone with a level of evacuation anticipation. If an evacuation zone has received an evacuation order, the status will state 'EVACUATION ORDER' and the zone will be shaded red on the map. The zones that are anticipated to evacuate soon will have an 'EVACUATION WARNING' status, and the zone will be shaded yellow.

Methodical Approach

The County of Los Angeles Emergency Operation Plan describes an organized and systematic process of relocating people from an area or location that is at risk or threatened by an imminent hazard or disaster. Los Angeles County utilizes two levels of evacuation terminology:

1. Evacuation Warning: Potential threat to life and/or property. Those who require additional time to evacuate, and those with pets and livestock should leave now.
2. Evacuation Order: Immediate threat to life. This is a lawful order to leave now. The area is lawfully closed to public access.

Evacuations in Los Angeles County are managed in a consistent manner as evacuations in most other California jurisdictions (see wildfire evacuation summaries on following page). As evacuation methods, approaches, and technologies have been developed, tested, and adopted, they tend to be implemented widely throughout California emergency management agencies. Based on the review of the County of Los Angeles Operational Area Emergency Operation Plan (November 2023), the County of Los Angeles All-Hazards Mitigation Plan (2020), recent wildfire evacuation efforts, daily briefings[5], and other relevant information, the current evacuation practices are led by the local incident commander. These practices involve collaboration between fire departments and various law enforcement agencies. Depending on the nature of the emergency, multiple departments may work together during the evacuation process. The responsibilities of these departments are detailed in the County of Los Angeles Operational Area Emergency Operation Plan and summarized below:

Fire Department Responsibilities

The Fire Department is responsible for establishing command of the incident, conducting situation assessments to evaluate the need for evacuations, setting up an Incident Command Post (ICP) with sufficient space for representatives from assisting agencies, and announcing its location. Additionally, the Fire Department must request a law enforcement agency representative to respond to the ICP to ensure coordinated efforts during the evacuation process.

Law Enforcement Responsibilities

Law enforcement's responsibilities include sending a supervisor of the rank of Sergeant or above to the ICP and requesting a Deputy to work with the Operations Section Chief. They mobilize field resources to maintain ingress and egress routes for emergency vehicles, establish perimeter control to keep unauthorized vehicles and

[5] https://twitter.com/search?q=(%23PostFire)%20(from%3ALACoFDPIO)&src=typed_query&f=top

pedestrians out of the involved area, conduct evaluations as directed by the Incident Commander, establish anti-looting security patrols when safe to do so, and maintain a Unit log to document their activities during the incident.

Joint Fire and Law Enforcement Responsibilities

Fire and law enforcement agencies collaborate to evaluate and determine whether the law enforcement role will be as an Agency Representative or Unified Incident Commander, depending on the scope of the incident. They assign a law enforcement supervisor to work closely with the Operations Section Chief or Incident Commander to determine evacuation areas. Together, they assess and validate the need for an Evacuation Warning, Evacuation Order, and/or Shelter in Place, determine the location, potential size, and direction of the incident's travel or spread. Unified Commanders also assess the potential for incident spread and request appropriate resources to complete the evacuation and concurrently mitigate the incident.

On-the-ground conditions combined with ICP staff experience determine which areas need to be evacuated and which roadways may be closed to prioritize evacuating traffic. The ICP may issue evacuation orders out of an abundance of caution. For example, during the Post Fire, the ICP issued an evacuation order to all campers in the vicinity of the fire due to prevailing wind conditions[6]. Some of these evacuation orders were downgraded to evacuation warnings over the next few days as weather conditions changed. Once the ICP determines the need to issue an evacuation order or warning, the order/warning is communicated to the public in the affected area via various communication mediums. Given the diverse needs of the community, the County employs a variety of alert and warning tools to ensure effective communication during emergencies, including the National Emergency Alert System, Wireless Emergency Alerts, Non-Weather Emergency Messages, Alert LA County, websites, social media, traditional media, and field notifications.

The approach summarized above is similar to most other California jurisdictions, including the San Diego County Operational Area Evacuation and Repopulation Policy #8-B[7] which provides the following procedures when an evacuation is needed:

Fire Department Responsibilities

- Establish command of the Incident
- Conduct a situation assessment and evaluate the need for evacuations
- Establish an Incident Command Post (ICP) with sufficient room for representatives from other assisting agencies and announce its location
- Request Agency Representative from Law Enforcement to respond to the ICP.

Law Enforcement Responsibilities

- Assign supervisor of the rank of Sergeant or above to the Incident Command Post and request a Deputy to locate with Operations Section Chief
- Maintain ingress and egress routes for emergency vehicles

[6] https://www.youtube.com/watch?v=_sdQ7NCtff4
[7] https://sdoparea.org/wp-content/uploads/documents/8B%20Evacuation%20and%20Repopulation.pdf

- Establish perimeter control, keeping unauthorized vehicles and pedestrians out of the involved area. Conduct evaluations, if required, at the direction of the Incident Commander
- Establish anti-looting security patrols, when safe to do so, for evacuated areas within the perimeter
- Maintain a Unit log

Joint Fire and Law Enforcement Responsibilities

- Evaluate and determine whether Law Enforcement role will be as an Agency Representative or Unified Incident Commander, depending on the scope of the Incident
- Assign a Law Enforcement supervisor to work closely with the Operations Section Chief or Incident Commander, whomever is determining the areas to be evacuated
- Assess and validate the need for an Evacuation Warning, Evacuation Order, and/or Shelter in Place — Determine the location, potential size, and direction of Incident travel or spread
- Unified Commanders determine potential for Incident spread and request the appropriate resources to complete the evacuation and mitigate the Incident concurrently

Based on the San Diego County Operational Area Evacuation and Repopulation procedure, an evacuation order requires the movement of community members out of a defined area due to an immediate threat to life and property from an emergency incident. An evacuation order issued when there is a potential for or an actual threat to civilian life, within 1 to 2 hours of such determination or when the IC deems it necessary to protect civilians. The purpose of an evacuation warning, in comparison, is to alert community members in a defined area of a potential threat to life and property from an emergency incident. An evacuation warning may be issued when the potential or actual threat to civilian life is more than 2 hours away. The timing of an evacuation order can vary widely between different fires, depending on factors such as fire conditions, fuel availability, wind speed, and other variables. The IC, composed of firefighting experts, will determine the evacuation area and timeline.

Examples of Strategic Evacuation

Methodical and strategic evacuation orders ensure that resources are deployed where needed and support a manageable traffic flow out of the area under threat. This approach is demonstrated through several recent wildfires where evacuation orders were issued to target populations, several examples of recent evacuations are provided below:

Border Fire 32, San Diego County

During the Border Fire 32 in August 2022[8] for example, on August 31st, the San Diego County Sheriff's Department shut down SR-94 at 2:57 p.m. before issuing an evacuation order at 3:28 p.m.[9]. Such road closures are typically implemented to ensure that evacuating traffic has priority and to maintain clear pathways for law enforcement, first responders, and firefighting equipment.

[8] https://x.com/SDSheriff/status/1565096377494818817
[9] https://x.com/SDSheriff/status/1565104232688074752

Lilac Fire December 2017, San Diego County[10]

Early in the fire, Sheriff's deputies and firefighters focused on evacuating and rescuing residents in immediate danger. County and local agencies implemented a phased evacuation of potentially affected areas with 14 separate evacuation campaigns (notifications sent to affected areas) – sequencing of evacuation areas occurring between 12/7/2017 at 1:52 pm to 12/7/2017 10:17 pm. The Oceanside Police Department utilized 3 separate notification campaigns as the fire moved toward and into their jurisdiction between 5:49 pm and 9:19 pm 12/7/2017.

The Sheriff's Department deployed a platoon of 50 deputies, including four sergeants and a lieutenant, 24 hours a day for the first several days of the incident. Sheriff's deputies prepare for wildfires with mandatory annual training, which includes fire behavior, evacuations, and emergency operations

Thomas Fire 2017, Ventura County

During the Thomas Fire, a targeted evacuation order was issued only to areas in immediate danger. Law enforcement first targeted communities in the Carpinteria area with specific emphasis that the evacuation order is only for the identified communities in order to reduce the number of evacuees on roadways being utilized for evacuation. Evacuation orders continued to change throughout the duration of the fire, focused only on the highest risk populations. This approach has been confirmed by numerous fire and law enforcement agencies at project meetings, public hearings, and interviews with Dudek personnel.

Given that the Project's Specific Plan is a comprehensive plan for the long-term development of a new master planned community and all residential and commercial structures within the Project site would be required to adhere to the latest Building Code and Fire Code, paired with the nature of the current phased evacuation approach, it is unlikely that all of the Project would need to evacuate simultaneously during a wildfire scenario. The Otay Ranch General Development Plan (GDP) within the City of Chula Vista, located in San Diego County, exemplifies this scenario. Historical incidents such as the 2007 Harris Fire[11], and the 2023 Border Fire[12] predominantly affected the open spaces, but their progression was largely halted at the fringes of urbanized areas. Notably, during these fire events, evacuation orders were confined to the peripheral areas of the Otay Ranch GDP. Similarly, during the 2024 Max Fire, firefighters concentrated on protecting existing structures, which resulted in the fire being contained at the outskirts of the City of Lancaster[13].

Furthermore, as a Specific Plan, the Project presents enhanced defensibility relative to smaller-scale developments and could potentially serve as a strategic evacuation hub and safety zone for adjacent areas more susceptible to wildfire, such as the Neenach community to the east of the Project site. For instance, in a scenario where a wildfire endangers the Neenach community, Neenach residents could reach the Project site in approximately 10 minutes. Evacuating to the Project site would provide for a significantly shorter evacuation

[10] Lilac Fire After Action Report. County of San Diego 107 pp.
[11] https://www.sandiegocounty.gov/oes/docs/2007_SanDiego_Fire_AAR_Main_Document_FINAL.pdf
[12] https://www.sandiegouniontribune.com/news/public-safety/story/2023-07-28/forward-progress-stopped-on-border-fire-in-east-county-evacuation-warning-lifted
[13] https://ktla.com/news/local-news/max-fire-fire-raging-in-lancaster-threatening-hundreds-of-homes/

compared to the 30 minutes required to reach developed areas to the east such as Antelope Acres or the City of Lancaster.

Evacuation Model Methods and Assumptions

The methodology for fire evacuation analysis is evolving as new data and best practices become available. Before conducting the evacuation analysis, a thorough historical review of fire evacuation behavior and practices was undertaken to ensure the analysis accurately reflects local conditions. The analysis conducted was based on extensive review of best practice research at the time of the analysis. These foundational best practices informed the evacuation analysis, and a selection of the most relevant and recent research is included in **Attachment A**.

According to the research, wildfire evacuation analysis is not a one-size-fits-all approach; certain tools and practices are better suited for jurisdiction-wide analysis, including transportation modeling, roadway capacity-based analysis, GIS analysis, and custom tools. Notably, "A Review of Traffic Models for Wildland-Urban Interface Wildfire Evacuation" (Bergstedt, 2017) identified 12 tools for evacuation analysis, a number that continues to grow as more data and computing power become available.

Vissim, although not the sole tool available for fire evacuation analysis, was chosen for its capability to simulate driver behaviors, particularly undesirable behaviors such as competing for the right-of-way during evacuations. This capability is endorsed by the Bergstedt research paper and is utilized by various agencies, including the Utah Department of Transportation and the Florida Department of Transportation for hurricane evacuation analysis (Bergstedt 2017). Vissim's popularity and widespread use in evacuation analysis are evidenced by its citation in over 700 research papers, reflecting its effectiveness in mirroring human behavior. Despite the availability of other tools, Vissim was deemed the most suitable for this project's evacuation analysis.

In Vissim simulations, roadway capacity is accounted for through multiple model inputs. The model incorporates roadway features and driver behaviors that impact the actual flow of traffic on a road segment. For instance, it includes elements like posted speed limits and reduced speed zones, which are typically found on curvy road sections and at all points where turns are made. These features cause vehicles to slow down or maintain an appropriate speed in these areas. Reduced speed zones simulate the need for vehicles to decelerate to navigate turns, and when combined with driver behavior, they effectively replicate real-world conditions. For example, when a driver slows down while navigating a curve, the following vehicles must also brake, creating a domino effect typical of evacuation traffic characterized by frequent stop-and-go patterns. A comparison between the theoretical roadway capacity obtained from the Centennial Specific Plan Traffic Study conducted by Stantec in May 2017, and the actual roadway processing capacity during an evacuation measured from Vissim is provided in **Attachment B.**

Primary Evacuation Routes

It is assumed that traffic evacuating from both the Project and nearby communities/land uses would use the closest available evacuation routes for leaving the area. Evacuation routes were selected based upon review of the Project site, available evacuation routes, and the quickest way to leave the at-risk areas. The number of evacuation roadways accessible to each village depends on the development phase of the specific plan. **Attachment C** outlines the evacuation

roadways by development phases, while Figure 3 in Attachment C shows available backbone roadways at the full buildout of the specific plan.

No contraflow lanes[14] were assumed, and access for first responders and law enforcement would be via inbound roadways. Two-way travel was assumed, with evacuating vehicles traveling outbound to the designated Safe Zone. It is assumed that first responders, law enforcement or other coordinating agency personnel will conduct traffic control (e.g., direct traffic at identified intersections and on/off ramps) during the evacuation process, as detailed in the County of Los Angeles Operational Area Emergency Operation Plan[15]. Should evacuation managers determine whether contraflow is preferred or necessary, evacuation capacity would increase while evacuation times would decrease.

The Centennial Specific Plan Traffic Study conducted by Stantec in May 2017 and the Centennial Specific Plan Supplemental Traffic Study, both collectively referred to as 2017 Traffic Studies, assumed that the Project would improve SR-138 to a four-lane expressway from I-5 to 240th Street West and to a limited access conventional four-lane highway from 240th Street West to 190th Street West, with right-of-way reserved for a six-lane expressway between Gorman Post Road and 300th Street West, or comparable improvements consistent with the Northwest 138 Corridor. However, to be conservative, it is assumed that SR-138 would remain as a two-lane highway for all analysis scenarios.

Evacuation Time

Fire evacuation orders, like most evacuation events, can be issued at any time, day or night, depending on a wildfire's location and movement, making it unpredictable when an evacuation order might actually occur. According to the "Review of California Wildfire Evacuations from 2017 to 2019[16]" report, the timing of evacuations for the Thomas Fire varied, with a significant portion occurring at night (between 9PM and 4 AM), followed by the morning, 10 AM to noon. **Figure 1** below, Hourly Percent of Evacuees – Thomas Fire, summarizes the evacuation timings for the Thomas Fire.

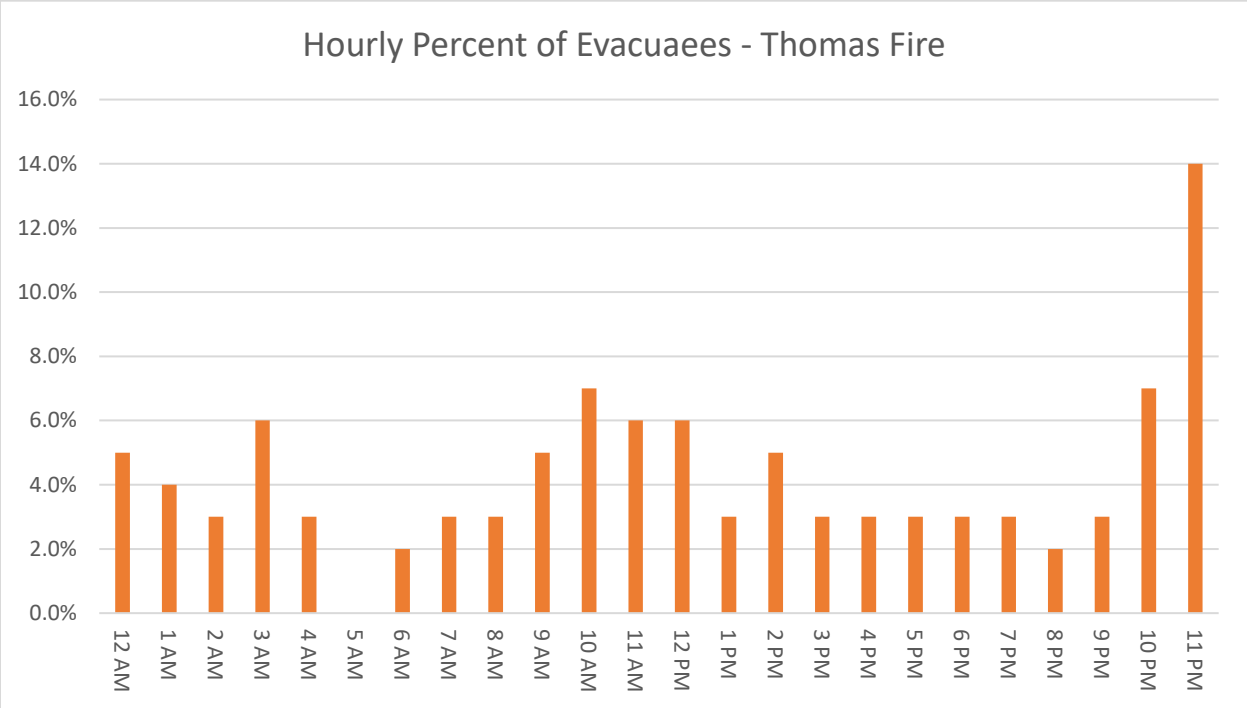
Considering that the Project is a Specific Plan, a conservative analysis assumes the evacuation order would be issued during a weekend noontime period when residents are home and commercial centers are operational. It is assumed that schools are not in session, and that supporting land uses such as parks and recreation areas are primarily utilized by the Project's residents, therefore not generating additional vehicles. In a real evacuation, it is unlikely that all land uses would be at full capacity. This is an extremely conservative approach but is consistent with best practices to understand expected worst-case evacuation scenario timelines.

[14] Contraflow or lane reversal involves directing traffic to use lanes coming from the source of a hazard to move people away from the hazard. Such a strategy can be used to eliminate bottlenecks in communities with road geometries that prevent efficient evacuations or to facilitate traffic flow out of a major urban area. Among the considerations in planning emergency contraflow are whether sufficient traffic control officers are available, potential negative impact on responding fire apparatus, access management, merging, exiting, safety concerns, and labor requirements. Contraflow configurations must be carefully planned based on on-site factors and should not be implemented in an *ad-hoc* fashion. Dudek July 2014. "Wildland Fire Evacuation Procedures Analysis" for City of Santa Barbara, California, page 65.

[15] County of Los Angeles Emergency Operation Plan page 97 stated that the sheriff department responsibilities broad range of tasks, including search and rescue operations, evacuation coordination, traffic control, and ensuring order in affected areas. Deputies are deployed to disaster sites to provide immediate assistance, assess the situation, and support relief efforts. Additionally, they establish a law enforcement command and collaborate with emergency management to establish vital communication channels for disseminating critical information to the public.

[16] https://escholarship.org/uc/item/5w85z07g

Figure 1 – Thomas Fire Evacuation Percentage by Time of Day



Study Area

The selection of the study area was guided by several factors, including each community's or area's access to the evacuation roadway network, proximity to the Wildland Urban Interface (WUI), and distance to SR-138. The study area was divided into 11 evacuation zones, all of which are within the Project's footprint (each representing individual villages within the project), while one zone encompasses the existing land uses to the east of the Project's site.

The use of these evacuation zones aligns with the County of Los Angeles' Genasys Protect Evacuation[17] notification system, an evacuation software that segments the county into different evacuation areas based on development patterns, roadway networks, land uses, and other factors. **Table 1** displays the proposed land use by village, **Figure 2** displays the conceptual phasing plan, and **Figure 3** displays the proposed villages. The zones established for this evaluation are the consultant team's collective professional opinion and are meant to mimic or be similar to how the County may create zones using Genasys. Regardless of the final zone delineations and differences between this study and the final zones, the evacuation scenarios are anticipated to be managed in a similar method.

As shown, the Project consists of 9 villages, institutional/civic land use, business park that will be develop over 10 phases, which consist of the following assumptions:

[17] https://finance.yahoo.com/news/los-angeles-county-awards-5-130000497.html?

- **Phase 1 -** Includes Village 1: 1,825 residential dwelling units, 141,570 SF of commercial, 15 acres school, 38 acres of park, and 87,120 SF of recreation.
- **Phase 2 -** Includes Village 3: 1,872 residential dwelling units, 294,030 SF of commercial, 15 acres school, and a 3 acre park.
- **Phase 3 -** Western portion of Village 7 (Village 7 West), western portion of the Business Park (Business Park West), and buildout of the Institutional and Civic land use: Approximately 723 residential dwelling units, approximately 2,881,000 SF of business park, and approximately 1,568,160 SF of institutional land use.
- **Phase 4 -** Eastern portion of Village 7 (Village 7 East): Approximately 723 residential dwelling units.
- **Phase 5 -** Western portion of Village 9 (Village 9 West): Approximately 787 residential dwelling units.
- **Phase 6 -** Village 6 and central portion of the Business Park (Business Park Central): 1,645 residential dwelling units and approximately 1,920,000 SF of business park.
- **Phase 7A -** Eastern portion of Village 9 (Village 9 East): Approximately 787 residential dwelling units, 10 acres school, and 13 acres of park.
- **Phase 7 -** Western portion of Village 8 (Village 8 West): Approximately 1,421 residential dwelling units
- **Phase 8A –** Eastern portion of the Business Park (Business Park East): approximately 1,822,000 SF of business park.
- **Phase 8 -** Village 2 & southern portion of Village 4 (Village 4 South): Approximately 2,768 residential dwelling units, 98,010 SF of commercial, and 12 acres of park.
- **Phase 9 -** Village 5 and northern portion of Village 4 (Village 4 North): Approximately 5,360 residential dwelling units, 87,120 SF of commercial, 15 acres school, and 31 acres of park.
- **Phase 10 -** Eastern portion of Village 8 (Village 8 East): Approximately 1,422 residential dwelling units, 108,900 SF of commercial, 15 acres school, and 19 acres of park.

Table 1 – Land Use by Village

Village	Land Use	Residential (DU)	Commercial (SF)	Business Park (SF)	Institutional (SF)	School (Acres)	Park (Acres)	Recreation/ Entertainment (SF)
1	VLDR	126						
	LDR	1,210						
	MDR	234						
	HDR	255						
	Total	**1,825**	**141,570**		-	**15**	**38**	**87,120**
2	LDR	930						
	MDR	873						
	HDR	480						
	Total	**2,283**	**98,010**		-	-	**12**	**6,970**
3	MDR	972						
	HDR	600						
	VHDR	300						
	Total	**1,872**	**294,030**		-	**15**	**3**	**0**
4	VLDR	410						
	LDR	560						
	Total	**970**	-		-	-	**9**	**17,424**
5	VLDR	116						
	LDR	1495						
	MDR	2,709						
	HDR	555						
	Total	**4,875**	**87,120**		-	**15**	**22**	-
6	VLDR	286						
	LDR	1,080						
	MDR	279						
	Total	**1,645**	**54,450**		-	**60**	**34**	-
7	VLDR	112						
	LDR	845						
	MDR	324						

Village	Land Use	Residential (DU)	Commercial (SF)	Business Park (SF)	Institutional (SF)	School (Acres)	Park (Acres)	Recreation/ Entertainment (SF)
	HDR	165						
	Total	**1,446**	**163,350**		**-**	**15**	**13**	**8,712**
8	VLDR	96						
	LDR	2,450						
	MDR	297						
	Total	**2,843**	**108,900**		**-**	**15**	**19**	**-**
9	VLDR	124						
	LDR	1,090						
	MDR	360						
	Total	**1,574**	**-**		**-**	**10**	**13**	**10,454**
No Village				**7,363,818**	**1,568,160**			

Figure 2 – Conceptual Phasing Plan

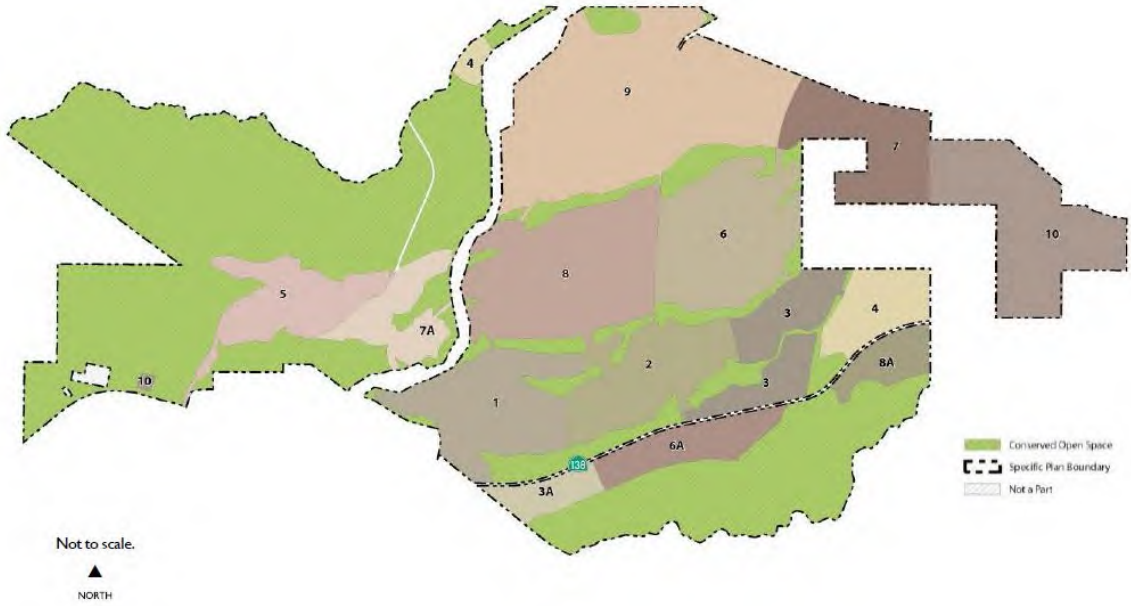
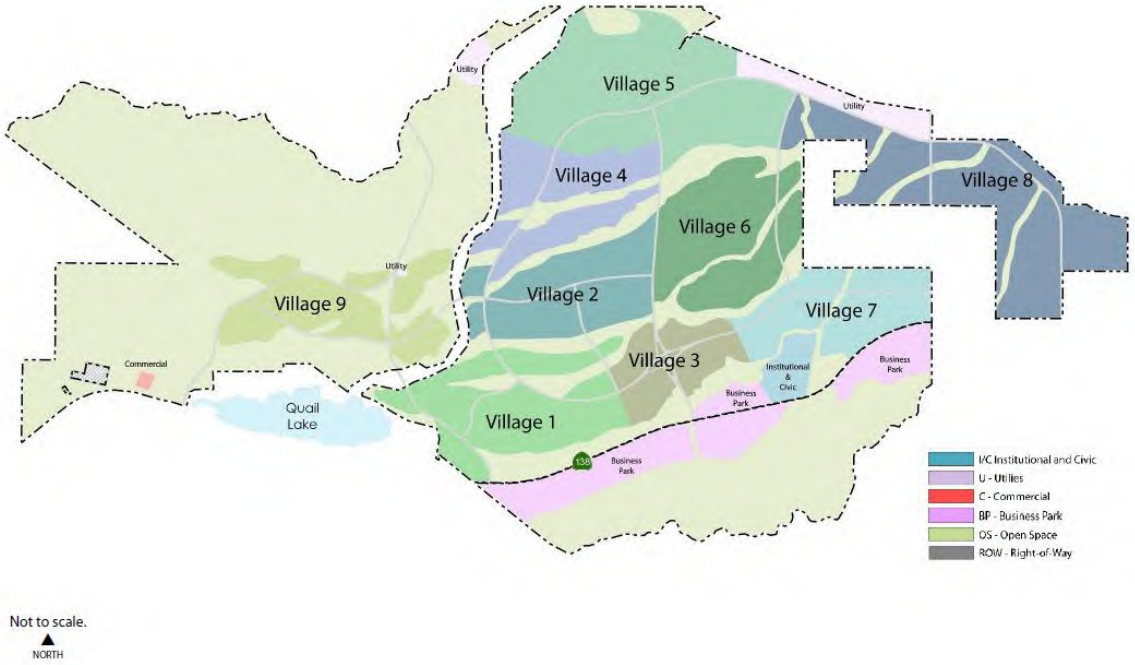


Figure 3 – Proposed Villages



Study Scenarios

As previously discussed, fire evacuation is not a one size fit all approach, and even though mass evacuation provides a conservative analysis, current evacuation practice indicates that this approach is not desirable due to the potential of creating high level of congestion and prevent those in at risk area from evacuating safety. Thus, the analysis presented in this report follow current fire evacuation approaches, which assume that ICP staff and law enforcement would issue targeted evacuation warnings and orders to areas that are at risk instead of a full evacuation of the specific plan.

As the Project would be constructed over multiple years, the development phases were grouped together in order to analyze the different potential evacuation scenarios that may occur as the project is developed over time. The phases are grouped together in set of every two phases, resulting in a total of five different land use scenarios.

Based on a review of historical fire conditions and fire modeling conducted by Dudek, landscapes around the Project site could potentially support wildfire that, in the most likely scenarios, would approach the Project site from the south/southeast, north/northeast, or west/northwest, depending on the fire's point of origination. Therefore, for each of the land use scenarios, an analysis was conducted for each potential direction of fire approach, resulting in a total of 15 different scenarios. These scenarios are summarized in Table 2 below.

Safe Zone

Based on Dudek's review of the area's fire history, fires have halted along developed areas adjacent to wildland fuels and have not historically progressed into the more densely urbanized, irrigated, and hardscaped areas. Specifically, none of the historical fires encroached beyond the periphery areas within the wildland urban interface area of the Los Angeles County. Recent fires such as the Max Fire (2024), Post Fire (2024), Jerry Fire (2019), Merwin Fire (2015), and Lago Fire (2011) were all stopped at or prior to reaching the urbanized area or I-5. Thus, it is assumed that during the earlier phases of the specific plan, evacuees are considered "safe" once their vehicles reach an area outside the evacuation order zone. For scenarios 1 through 3, which would occur early in the project's buildout process, evacuees are considered "safe" when their vehicles arrive at either the I-5/SR-138 interchange to the west, or the community of Neenach to the east. In the later scenarios,which would occur later in the project's buildout process, it is assumed that some evacuees will be directed to other villages or developed areas (e.g., Institutional & Civic) within the project site that are not at risk of fire and/or to offsite locations, In such later scenarios, evacuees are considered "safe" once they arrive at the respective receiving villages or at the onsite or offsite evacuation point otherwise indicated in Table 2.

Evacuating Vehicles

The projected number of vehicles evacuating from or within the study area is based on a combination of various data sources: Parcel Quest's parcel map data for land use, vehicle ownership averages from the US Census Bureau, aerial imagery from Nearmap, and relevant environmental documents. Breakdown of the calculations for evacuating vehicles is as follows:

Existing Residential: This is obtained by multiplying the total number of households (from Parcel Quest parcel map data) with the average vehicle ownership, which stands at 2.07 vehicles per household as per the US Census Bureau.

For this analysis, it is assumed that during the earlier phases of the Project, existing land use to the east of the Project site will evacuate in the same direction as the Project's traffic. Once the Project is developed, the Project site can serve as an evacuation zone for existing land uses that need to evacuate westward toward the Project site. Therefore, the evacuation times for existing land uses are only included in scenarios where the Project's traffic would potentially share the same evacuation roadway as the existing land uses.

Proposed Project: This is calculated by multiplying the quantities of land use by the following sources:

Residential Land Use: Total number of dwelling units x average vehicle ownership.

Nonresidential Land Uses: Total square footage x parking rate derived from the Institute of Transportation Engineer (ITE) Parking Generation Manual.

Land use quantities were obtained from Stantec and Appendix E of the Centennial Specific Plan Traffic Study (November 2017).

Shadow Evacuees: These are individuals who choose to evacuate out of an abundance of caution, even without an official evacuation order. The "Review of California Wildfire Evacuations from 2017 to 2019" report found that approximately 30% of evacuees fall into this category.

For a reasonable analysis, these scenarios assumed that two percent (2%)[18] of the evacuating vehicles are heavy vehicles (trucks with trailers). Two percent is the nationally acceptable ratio of heavy vehicles to all vehicles.

Average vehicle ownership, residential units, and evacuating vehicles calculations are provided in **Attachment D**. **Table 2** displays the number of vehicles evacuating under each scenario.

[18] https://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_599.pdf (p.5).

Table 2 – Study Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
1	Phase 1-2	Village 1 & Village 3	South/Southeast	75% via SR-138 westbound toward I-5 25% via internal road toward I-5	Village 1 Village 3 Existing	4,026 4,330 200
2	Phase 1-2	Village 1 & Village 3	North/Northeast	25% via SR-138 westbound toward I-5 25% via internal road toward I-5 25% via internal road toward Lancaster 25% via SR-138 eastbound toward Lancaster	Village 1 Village 3 Existing	4,026 4,330 200
3	Phase 1-2	Village 1 & Village 3	West/Northwest	75% via SR-138 eastbound toward Lancaster 25% via internal road toward Lancaster	Village 1 Village 3 Existing	4,026 4,330 200
4	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	South/Southeast	50% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1	50% of Village 7 Business Park West Institutional & Civic	1,578 981 1,796
5	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1 25% via SR-138 eastbound toward Lancaster	50% of Village 3 Village 7 Existing	2,165 3,156 200
6	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional/Civic land use 50% via SR-138 eastbound toward Lancaster	Village 1 30% of Village 3 Business Park West Existing	4,026 1,299 981 200
7	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	South/Southeast	25% via SR-138 westbound toward I-5 25% via internal roadway toward Village 1 25% via internal roadway toward Village 3 25% via internal roadway toward Village 6	50% of Village 7 Business Park West Business Park Central Institutional & Civic	1,578 981 654 1,796

Table 2 – Study Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
8	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1 and Village 3 25% via SR-138 eastbound toward Lancaster	Village 6 Village 7	3,556 3,156
9	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional & Civic 50% via SR-138 eastbound toward Lancaster	Village 1 Village 9 West Existing	4,026 2,321 200
10	Phase 1-8	Village 1, 3, 7 E & West, Village 9 West, Village 6, Village 9 East, Village 8 West, Village 2, Village 4 South	South/Southeast	25% via SR-138 westbound toward I-5 25% via internal roadway toward Village 1 25% via internal roadway toward Village 3 25% via internal roadway toward Village 6	50% of Village 7 Business Park West Business Park Central Business Park East 30% of the Institutional z& Civic	1,578 981 654 621 539
11	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	North/Northeast	25% via internal roadway toward Village 1 25% via internal roadway toward Village 3 25% via internal roadway toward Village 7 25% via internal roadway toward Institutional & Civic	30% of Village 2 Village 4 South 50% of Village 6 Village 8 West 30% of Village 9	740 2,380 1,778 2,035 1,025
12	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	West/Northwest	25% via internal roadway toward Village 3 25% via internal roadway toward Village 7 25% via internal roadway toward Business Park 25% via internal roadway toward Institutional & Civic	30% of Village 1 30% of Village 2 Village 4 South Village 9	1,208 740 2,380 3,415

Table 2 – Study Scenarios and Evacuating Vehicles Calculation

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles
13	Phase 1-10	Buildout	South/Southeast	25% via SR-138 westbound toward I-5	Business Park West	981
				25% via internal roadway toward Village 1	Business Park Central	654
				25% via internal roadway toward Village 3	Business Park East	621
				25% via internal roadway toward Village 6/Village 5	30% of the Institutional & Civic	539
					50% of Village 7	1,578
					Village 8 East	3,843
14	Phase 1-10	Buildout	North/Northeast	25% via internal roadway toward Village 1/Village 2	30% of Village 4	1,318
				25% via internal roadway toward Village 3	Village 5	10,451
				25% via internal roadway toward Village 7/Institutional & Civic	30% of Village 6	1,067
				25% via SR-138 Westbound toward Business Park	Village 8 West	2,035
					Village 8 East	3,843
15	Phase 1-10	Buildout	West/Northwest	25% via internal roadway toward Village 3	30% of Village 2	740
				25% via internal roadway toward Village 7	50% of Village 4	2,197
				25% via internal roadway toward Business Park	50% of Village 5	5,226
				25% via internal roadway toward Institutional & Civic	Village 9	3,415

Source: CR Associates (2024), US Census Bureau (2023), Google Maps (2023).

Extreme Wildfire Event

The evacuation analysis set forth below assumes wildfire scenarios where a fire is approaching the Centennial site from the north, northwest, southeast, and west. Fire is not anticipated to the east due to landscape disturbance and lack of a continuous fuel bed. This fire condition is the one most likely to require a large-scale evacuation, and the one that creates the most risk to property and humans.

In California, wildfire-related large-scale evacuations are almost exclusively associated with wildfires that occur on extreme fire weather days, also known as "Red Flag Warning" days. These days occur when relative humidity drops to low levels and strong winds from the north/northeast are sustained. With climate change, periods in which such wildfires occur may increase. During Red Flag Warning days, vegetation is more likely to ignite and fire spread is more difficult to control. In the greater Los Angeles region, these extreme weather days typically occur during limited periods in the late summer, fall and, occasionally, in the spring, but may occur at other times on a less frequent basis. Currently, it is not common to experience more than 10 to 15 Red Flag Warning days in a typical year. Wildfires that occur during these periods of extreme weather are driven by winds – referred to as "Santa Ana" winds – that come from the north or east and blow toward the south or west. Fires driven by these winds move very quickly, making them difficult to control. In response to such fires, emergency managers typically activate pre-planned evacuation triggers that provide warnings for down-wind communities to sequentially be notified of potential evacuation and movement to nearby urbanized areas prior to the fire's encroachment.

Wildfires that occur on non-extreme weather days typically behave in a much less aggressive manner and pose fewer dangers to life and property because they include less aggressive fire behavior and are easier to control. Terrain and fuel are typically the wildfire drivers during these conditions. During these non-extreme weather days, vegetation is much more difficult to ignite and does not spread fire as rapidly. In these situations, firefighters have a very high success rate of controlling fires and keeping them under 10 acres. CALFIRE estimates that 90% of all vegetation fires occur during normal, onshore weather conditions and that such fires account for only 10% of the land area burned. Conversely, the 10% of wildfires that occur during extreme fire weather account for 90% of the land area burned. This data highlights that the most dangerous fire conditions are those related to a fire that moves rapidly due to high winds and low humidity, whereas under normal conditions fires are likely to be controlled with no evacuation or possibly limited extent, focused evacuations.

While it is possible that a fire driven by onshore wind (i.e., from the west) could require evacuation of the Project, such an event would be unusual. Moreover, due to the reduced fire behavior during normal weather periods, the evacuation would not be expected to be a large-scale evacuation of large areas.

Approach

To analyze the evacuation events, CRA conducted simulations using *Vissim*, a microscopic, multimodal traffic flow modeling software used to simulate different traffic conditions. In *Vissim* simulations, roadway capacity is accounted for and each vehicle in the traffic system is individually tracked through the model and comprehensive measures of effectiveness, such as average vehicle speed and queueing, are collected on every vehicle during each 0.1-second

of the simulation. This software enables drivers' behaviors during an evacuation to be replicated. A total of 20 simulations were conducted to yield a reasonable sample size to determine the performance of the study area roadways and impacts during evacuation scenarios. To be conservative, CRA assumed a worst-case traffic condition, in which all vehicles belonging to study area households ordered to evacuate would be used in the evacuation, instead of the necessary number of vehicles needed to evacuate the impacted population. Detailed evacuation analysis information is provided in **Attachment E**.

Evacuation Analysis & Results

Based on the analysis methodology described above, **Table 3** reflects evacuation times for each scenario. A summary of the evacuation time for each scenario is provided below:

Table 3 – Evacuation Time

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hours: Minutes)
1	Phase 1-2	Village 1 & Village 3	South/Southeast	75% via SR-138 westbound toward I-5 25% via internal road toward I-5	Village 1 Village 3 Existing	4,026 4,330 200	2:04 3:37 0:42
2	Phase 1-2	Village 1 & Village 3	North/Northeast	25% via SR-138 westbound toward I-5 25% via internal road toward I-5 25% via internal road toward Lancaster 25% via SR-138 eastbound toward Lancaster	Village 1 Village 3 Existing	4,026 4,330 200	1:33 1:34 0:17
3	Phase 1-2	Village 1 & Village 3	West/Northwest	75% via SR-138 eastbound toward Lancaster 25% via internal road toward Lancaster	Village 1 Village 3 Existing	4,026 4,330 200	2:03 1:36 0:17
4	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	South/Southeast	50% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1	50% of Village 7 Business Park West Institutional & Civic	1,578 981 1,796	1:00 1:54 1:46
5	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1 25% via SR-138 eastbound toward Lancaster	50% of Village 3 Village 7 Existing	2,165 3,156 200	1:07 1:23 0:17
6	Phase 1-4	Village 1, Village 3, Village 7, Business Park West, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional/Civic land use 50% via SR-138 eastbound toward Lancaster	Village 1 30% of Village 3 Business Park West Existing	4,026 1,299 981 200	2:26 0:41 2:21 0:17
7	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	South/Southeast	25% via SR-138 westbound toward I-5 25% via internal roadway toward Village 1 25% via internal roadway toward Village 3 25% via internal roadway toward Village 6	50% of Village 7 Business Park West Business Park Central Institutional & Civic	1,578 981 654 1,796	0:39 0:50 1:07 1:20
8	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	North/Northeast	25% via SR-138 westbound toward I-5 50% via internal roadway toward Village 1 and Village 3 25% via SR-138 eastbound toward Lancaster	Village 6 Village 7	3,556 3,156	3:27 1:49
9	Phase 1-6	Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic	West/Northwest	50% via internal roadway toward Village 7 and the Institutional & Civic 50% via SR-138 eastbound toward Lancaster	Village 1 Village 9 West Existing	4,026 2,321 200	1:22 1:11 0:17
10	Phase 1-8	Village 1, 3, 7 E & West, Village 9 West, Village 6, Village 9 East, Village 8 West, Village 2, Village 4 South	South/Southeast	25% via SR-138 westbound toward I-5 25% via internal roadway toward Village 1 25% via internal roadway toward Village 3 25% via internal roadway toward Village 6	50% of Village 7 Business Park West Business Park Central Business Park East 30% of the Institutional & Civic	1,578 981 654 621 539	1:21 1:07 0:47 1:19 0:26

Table 3 – Evacuation Time

Scenario	Phases	Build Land Use	Fire Approach Direction	Evacuation Direction/Routes	Area Under Evacuation	Evacuating Vehicles	Evacuating Time (Hours: Minutes)
11	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	North/Northeast	25% via internal roadway toward Village 1	30% of Village 2	740	0:53
				25% via internal roadway toward Village 3	Village 4 South	2,380	0:53
				25% via internal roadway toward Village 7	50% of Village 6	1,778	0:53
				25% via internal roadway toward Institutional & Civic	Village 8 West	2,035	1:02
					30% of Village 9	1,025	0:49
12	Phase 1-8	Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic	West/Northwest	25% via internal roadway toward Village 3	30% of Village 1	1,208	0:52
				25% via internal roadway toward Village 7	30% of Village 2	740	0:57
				25% via internal roadway toward Business Park	Village 4 South	2,380	0:48
				25% via internal roadway toward Institutional & Civic	Village 9	3,415	2:58
13	Phase 1-10	Buildout	South/Southeast	25% via SR-138 westbound toward I-5	Business Park West	981	1:07
				25% via internal roadway toward Village 1	Business Park Central	654	0:55
				25% via internal roadway toward Village 3	Business Park East	621	1:32
				25% via internal roadway toward Village 6/Village 5	30% of the Institutional & Civic	539	0:26
					50% of Village 7	1,578	1:32
					Village 8 East	3,843	2:20
14	Phase 1-10	Buildout	North/Northeast	25% via internal roadway toward Village 1/Village 2	30% of Village 4	1,318	0:51
				25% via internal roadway toward Village 3	Village 5	10,451	6:41
				25% via internal roadway toward Village 7/Institutional & Civic	30% of Village 6	1,067	0:34
				25% via SR-138 Westbound toward Business Park	Village 8 West	2,035	4:32
					Village 8 East	3,843	3:06
15	Phase 1-10	Buildout	West/Northwest	25% via internal roadway toward Village 3	30% of Village 2	740	1:11
				25% via internal roadway toward Village 7	50% of Village 4	2,197	1:08
				25% via internal roadway toward Business Park	50% of Village 5	5,226	2:37
				25% via internal roadway toward Institutional & Civic	Village 9	3,415	1:53

Analysis and Conclusion

Study of evacuation timeframes and potential increases in evacuation time with a proposed project are relatively new CEQA focus areas. Public safety, not time, is generally the guiding consideration for evaluating impacts related to emergency evacuation. Consistent with CEQA Guidelines Appendix G, a Project's impact on evacuation is significant if the Project will significantly impair or physically interfere with implementation of an adopted emergency response or evacuation plan.

In any populated area, safely undertaking large-scale evacuations may take several hours or more and require moving people long distances to designated safety areas. Further, evacuations are fluid and timeframes may vary widely depending on numerous factors, including, among other things, the number of vehicles evacuating, the road capacity to accommodate those vehicles, residents' awareness and preparedness, evacuation messaging and direction, and on-site law enforcement control.

A recent study titled "Review of California Wildfire Evacuation from 2017 to 2019[19]" provides more insights on the topic. This research involved interviews with 553 individuals (297 evacuees affected by various fires) including the Creek Fire, Rye Fire, Skirball Fire, and Thomas Fire. The study aimed to understand the decision-making processes of these individuals during the fires, such as whether to evacuate or stay, when to leave, the paths taken, chosen shelters, destinations, and modes of transportation. According to this research, the time it took for evacuations ranged from under 30 minutes to over 10 hours. From this dataset[20], the average evacuation time for the Creek Fire was found to be 3 hours and 40 minutes, involving 115,000 people[21]. For the Thomas Fire, the average time was 4 hours and 25 minutes, impacting 104,607 individuals. Per the FEIR, the estimated population for the proposed Project would be 55,000 people, significantly less than the population that was evacuated during the Creek Fire.

California fire and law enforcement agencies have integrated training, experience, and technology to assist in successful evacuations, which focus on moving persons at risk to safer areas before a wildfire encroaches on a populated area. Timeframes for moving people vary by site specifics, population, road capacities and other factors and there is no one threshold that would be appropriate to all locations. There are no established thresholds for evacuation times for this Project or at the time of this plan's preparation, for any California community, to the knowledge of the authors. This is primarily because every location and fire scenario are unique. While it may take one community 20 minutes to evacuate safely, it is not a valid assumption to consider a 3-hour evacuation for another community as unsafe. The 3-hour evacuation can be very safe while the 20-minute evacuation may be unsafe due to the conditions and exposures along the evacuation routes.

Notwithstanding evacuation challenges and variables, both the City of Los Angeles and Los Angeles County have had great success in safely managing both mass evacuations and targeted evacuations. For example, the 2020 Lake Fire resulted in evacuation of several

[19] https://escholarship.org/uc/item/5w85z07g
[20] https://zenodo.org/record/4408243
[21] https://abc7.com/sylmar-brush-fire-creek-kagel-canyon/2740550/

neighborhood[22] with zero fatalities[23]. It should be noted that other variables can impact the number of fatalities during an evacuation. For Instance, some individuals may choose to stay behind to defend their property or adopt a wait-and-see approach[24]. Such individual decisions could delay evacuation to a point where it becomes too late for that individual to leave safely[25].

Best practices learned from previous wildfire events have resulted in a system that is many times more capable of managing evacuations. With the best practices in use today, evacuations are more strategic and surgical than in the past, evacuating smaller areas at highest risk and phasing evacuation traffic so that it flows more evenly and minimizes the surges that may slow an evacuation. Mass evacuation scenarios where large populations are all directed to leave simultaneously, resulting in traffic delays, are thereby avoided, and those populations most at risk are able to safely evacuate.

Due to its location, the Project would also provide the responding emergency managers (e.g., incident commander, Los Angeles County Sheriff) the alternative option of recommending that all or a portion of the onsite population shelter in place. This on-site sheltering option is a contingency plan, but an important option in the scenario when evacuation is considered infeasible or the less safe option. This would provide emergency managers with a safer alternative to risking a late evacuation.

This information will be provided to law enforcement and fire agencies for use in pre-planning scenarios to better inform in the field decisions made pursuant to adopted Emergency Response Plans. Emergency personnel who issue an evacuation order may consider these time estimates in determining when and where to issue evacuation orders. In a real evacuation scenario, emergency managers may use alternative actions/options to further expedite evacuation. Such actions may include providing additional lead time in issuing evacuation orders, prioritizing area at higher risks, providing alternative signal control at downstream intersections, utilizing additional off-site routes or directing traffic to roadways with additional capacity, implementing contra-flow lanes, issuing "shelter-in-place" orders when determined to be safer than evacuation, or considering the possibility of a delayed evacuation where parts of the population could be directed to remain on-site until the fire burns through the fuels around the evacuation route. These options require "in the field" determinations of when evacuations are needed and how they are phased to maximize efficiency. Overall, safe evacuation of the Project and surrounding community is possible in all modeled scenarios.

Limitations

In coordination with fire professionals at Dudek, CRA has presented a conservative analysis simulating evacuation during an extreme wildfire event. However, as discussed above, wildfires are variable events. The underlying planning principle for fire preparedness, given the dynamic nature of a fire, is to demonstrate the availability of multiple route alternatives

[22] https://www.latimes.com/california/story/2020-08-14/additional-evacuations-ordered-in-explosive-lake-fire
[23] https://web.archive.org/web/20200922095200/https://inciweb.nwcg.gov/incident/6953/
[24] Preparing for wildfire evacuation and alternatives: Exploring influences on residents' intended evacuation behaviors and mitigations (https://doi.org/10.1016/j.ijdrr.2021.102177) Table 2 indicates that the majority of the surveyed individuals strongly agree with the stay and defend statements.
[25] National Institute of Standards and Technology – Department of Commerce – WUI Fire Evacuation and Sheltering Consideration Assessment, Planning, and Execution (August 2023) – Evacuation Alternatives

and response strategies to permit emergency professionals to manage their response according to the specific circumstances. The Project area provides ample route and response alternatives that were not considered in this model. Emergency responders will coordinate the safest possible evacuation based on the dynamic circumstances of the actual event, including the appropriate phasing of the evacuation, and utilization of the most appropriate ingress and egress routes for area residents and emergency responders.

The breadth of route alternatives and response strategies available to emergency professionals to manage a potential fire in the City/County cannot and should not be evaluated using this evacuation analysis alone. A comprehensive view of Project fire safety is gained by understanding this memorandum, the Project's Wildfire Evacuation Study (Dudek 2023), along with the standard protocols and "in-the-field" decision making of emergency responders as detailed in the County[26] and nearby cities Emergency Response Plans documents.

This travel time analysis presents a reasonable vehicle travel time estimate based on professional judgment made by CRA, Dudek, and fire operations experts with experience participating in evacuations in Southern California. Changing any number of these assumptions can lengthen or shorten the average vehicle travel time.

For Instance, a situation could arise in which professionals *may* choose to utilize additional roadways for evacuation not utilized in the analyses and *may also* choose to guide vehicle trips to more or different route permutations relative to what has been modeled in this analysis. A phased evacuation is also likely to be implemented, which improves the orderly flow of traffic in an evacuation scenario.

The net result of changing the variables selected could yield an average evacuation travel time shorter or longer than the results detailed in the analysis. Many factors can shorten or lengthen the vehicle time from the results shown herein. For example:

1. Changing the evacuation area affected by the evacuation order would affect the results. For Instance, emergency managers could order an early evacuation of land uses located in higher risks area, such as the Southern Oaks community. Thus, by the time an evacuation order is established for the proposed Project, there would be less vehicles on the road.
2. Increasing or decreasing the number of path permutations and percentage of the population utilizing each route that leads out of the immediate area could shorten or lengthen vehicle travel time relative to the results shown herein.
3. Emergency professionals electing to reserve certain travel lanes for emergency vehicle ingress for periods of time could affect the travel time relative to the results shown herein.
4. Assuming evacuees utilize fewer or more vehicles to evacuate from their homes relative to the vehicle utilization rate selected in the analysis would shorten or lengthen vehicle travel time relative to the results shown herein.

[26] County of Los Angeles Emergency Operation Plan: http://LosAngelescountyca.iqm2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=2048&MediaPosition=3715.315&ID=10490&CssClass= County of Los Angeles Emergency Management Plan: chrome- https://rivcoready.org/sites/g/files/aldnop181/files/EMD%202022-2025%20Strategic%20Plan.pdf

5. Changing the mix of vehicle trips allocated to each evacuation route could shorten or lengthen vehicle travel time relative to the results shown herein.
6. Assuming different road condition adjustment factors could shorten or lengthen the vehicle travel time relative to the results shown herein.
7. Assuming fewer people are at home when the evacuation notice is given would reduce the number of vehicle trips and shorten vehicle travel time relative to the results shown herein. For instance, an evacuation during daytime hours could result in fewer outbound trips than assumed in this analysis
8. Assuming some portion of vehicle trips are made in advance of the evacuation notice would reduce the number of vehicle trips relative to the results shown herein.
9. Assuming emergency professionals elect to implement contraflow on certain roadways to open up additional lanes for emergency evacuation egress could reduce the travel time results shown herein.

This evacuation time analysis is necessarily limited in scope given the numerous and unpredictable variables inherent in a wildfire and evacuation event. Because of this unpredictability, modeling evacuation behaviors and times is inherently speculative, though this report represents a reasonable forecast of multiple evacuation scenarios based on fire modeling results. However, as discussed above, it is not anticipated that the Project will significantly impact the safe evacuation of the proposed or existing surrounding communities based on evacuation times and other qualitative considerations.

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Attachment A
Best Practices Research

Reference & Analysis Tool Selection

CRA has compiled an extensive list of research and findings on best practices for both wildfire and standard evacuation analyses. These foundational best practices informed our evacuation analysis assumption and approaches. A list of the relevant and recent research is included at the end this section.

Local Guidelines References

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Attachment B
Roadway Capacity Calculation

This section offers a comparison between the normal roadway capacity, as utilized in the Centennial Specific Plan Traffic Study by Stantec (2017), and the roadway evacuation capacity measured using the Vissim microsimulation model. The roadway capacity utilized for the traffic study is based on a stable traffic flow under non-evacuation conditions. According to Tables 1-3 and 2-1 of the Traffic Study, the service flow rate for SR-138, between Gorman Post Road and 300th Street West, is 1,904 vehicles per hour per lane or 476 vehicles every 15 minutes. An excerpt from the traffic study is provided below:

SR-138									
60	Btw. Jct I-5 & Gorman Post Rd	2M	2,100	n/a	21%	1.5	0.91	1.00	1,904
61	Btw. Gorman Post Rd & Old Ridge Route Rd	1M	2,100	n/a	21%	1.5	0.91	1.00	1,904
62	Btw. Old Ridge Route Rd & 300th St W	1M	2,100	n/a	21%	1.5	0.91	1.00	1,904
63	Btw. 300th St W & Three Pts Rd	1M	2,100	n/a	21%	1.5	0.91	1.00	1,904
64	Btw. Three Pts Rd & 245th St (Ave F)	1M	2,100	n/a	21%	1.5	0.91	1.00	1,904
65	Btw. 245th St W & 170th St W	1M	2,100	n/a	21%	1.5	0.91	1.00	1,904
66	Btw. 170th St W & 110th St W	1M	2,100	n/a	14%	1.5	0.93	1.00	1,962
67	Btw. 110th St W & 60th W	1M	2,100	n/a	14%	1.5	0.93	1.00	1,962
68	Btw. 60th W & Jct Rte 14 North	1M	2,100	n/a	14%	1.5	0.93	1.00	1,962

(Continued)

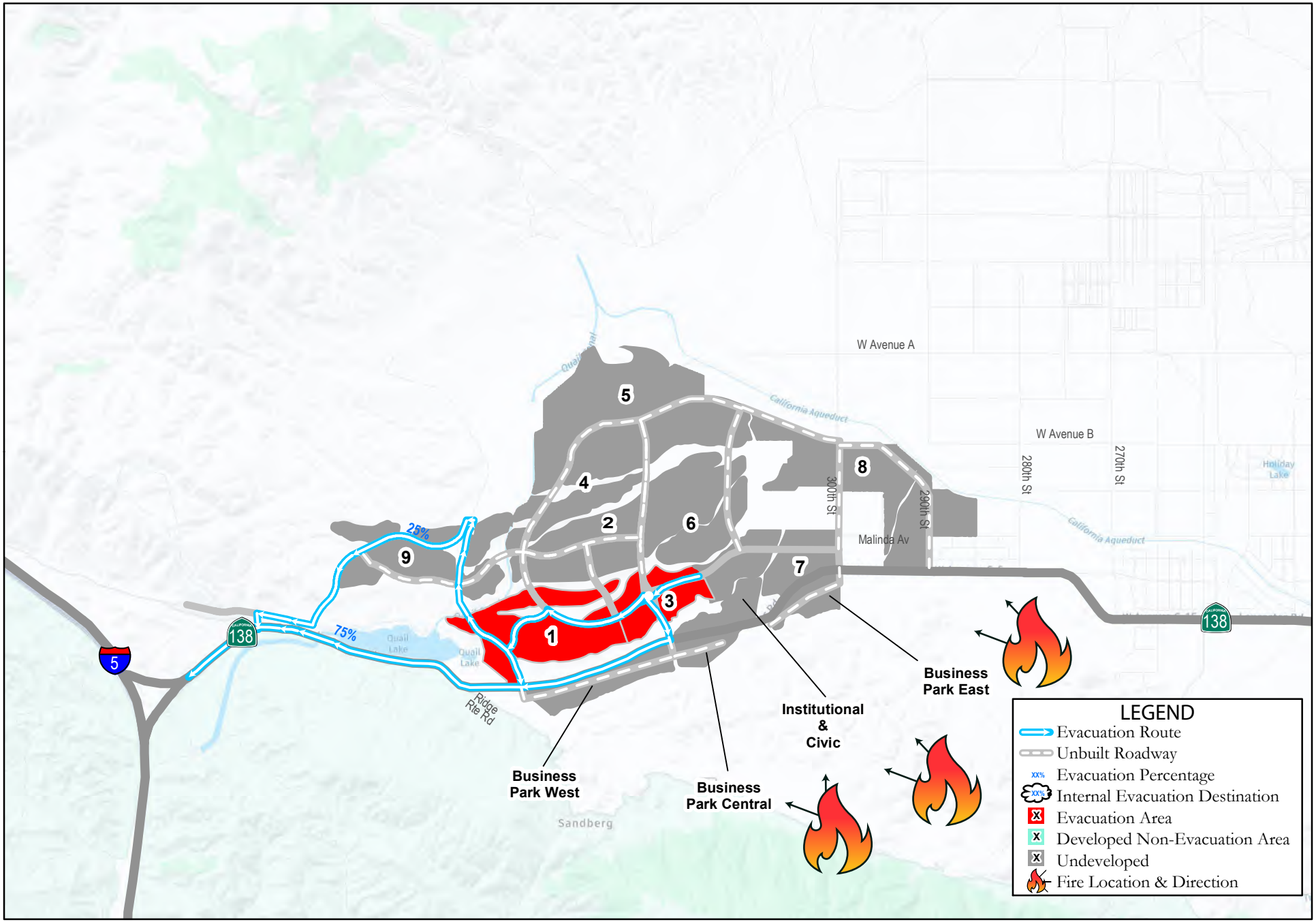
The evacuation capacity of each roadway varies due to factors such as stop-and-go traffic, yielding behavior, downstream or upstream congestion, and other driver behaviors that influence the actual number of vehicles passing through a specific roadway segment. The table below compares the capacity of SR-138 under non-evacuation conditions to that during evacuation scenarios, with the evacuation capacity directly measured from the Vissim microsimulation model.

SR-138 Segment	Function Classification	Number of Evacuating Lane	Traffic Study Roadway Capacity per 15 minutes	Evacuating Vehicles every 15 minutes (900 seconds)[27]					
				1800	2700	3600	4500	5400	6300
Gorman Post Road and Central Access	2-Ln Roadway	1	450	192	129	131	133	137	358
Central Access and 300th Street West	2-Ln Roadway	1	450	362	367	381	372	379	354

As shown, the evacuation roadway processing capacity is lower than the stable flow conditions due to the reasons mentioned above.

[27] Traffic volumes measured at each roadway segment every 900 seconds or 15 minutes

Attachment C
Project Phasing and Evacuation Area



Tejon Ranch Evacuation Technical Memorandum

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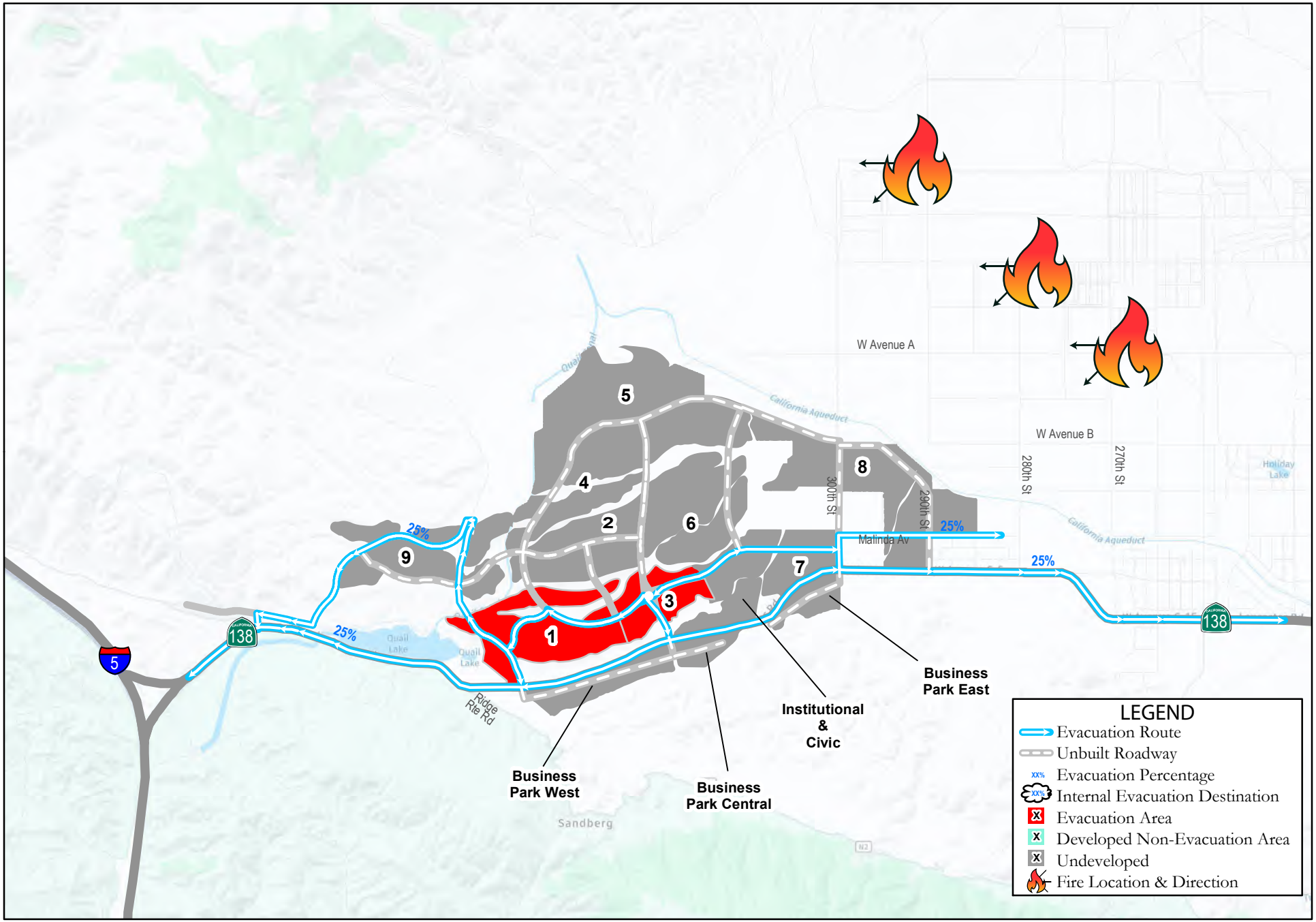
Evacuation Areas and Routes
Scenario 1



Tejon Ranch Evacuation Technical Memorandum

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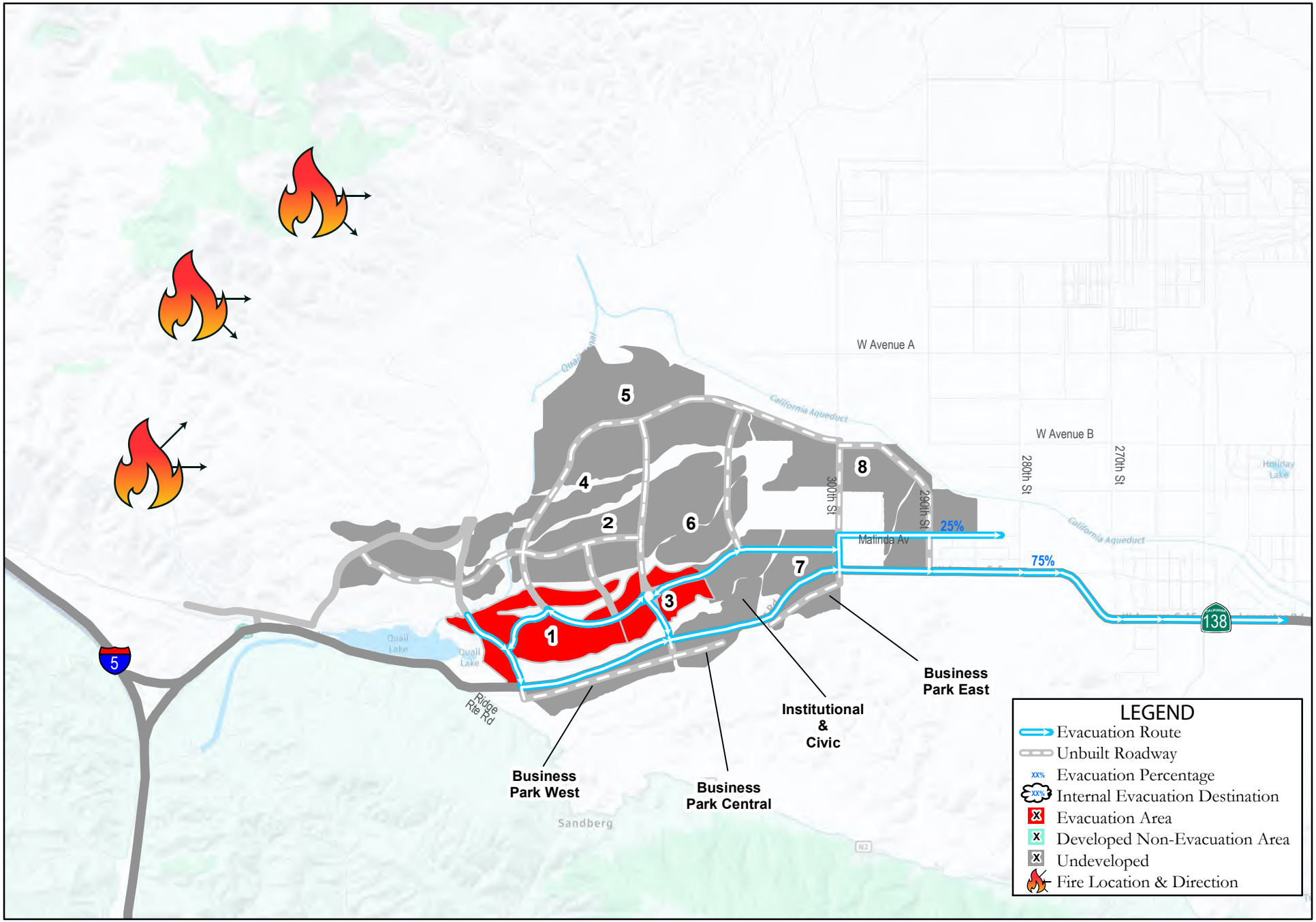
Evacuation Areas and Routes
Scenario 2



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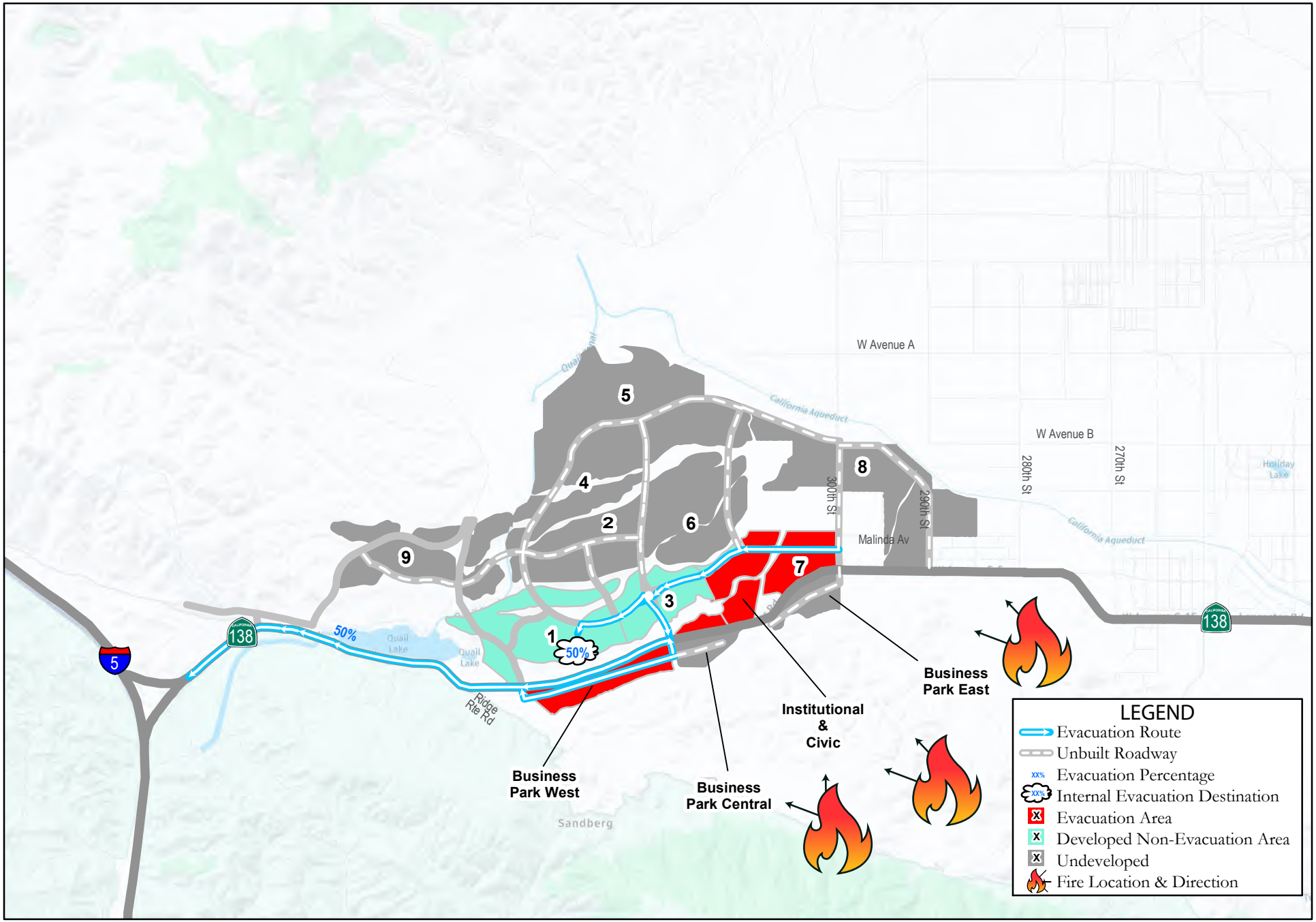
Evacuation Areas and Routes
Scenario 3



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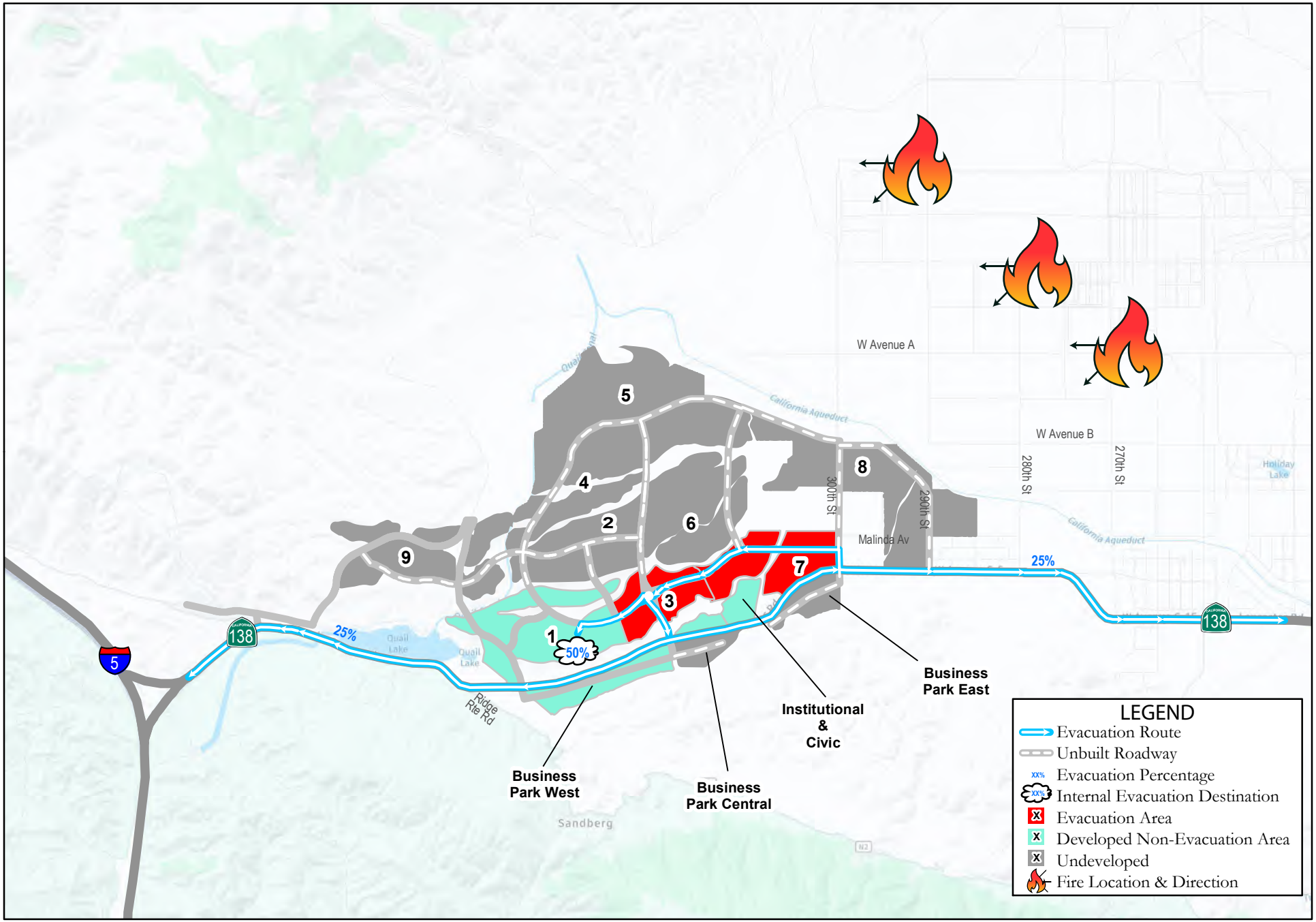
Evacuation Areas and Routes
Scenario 4



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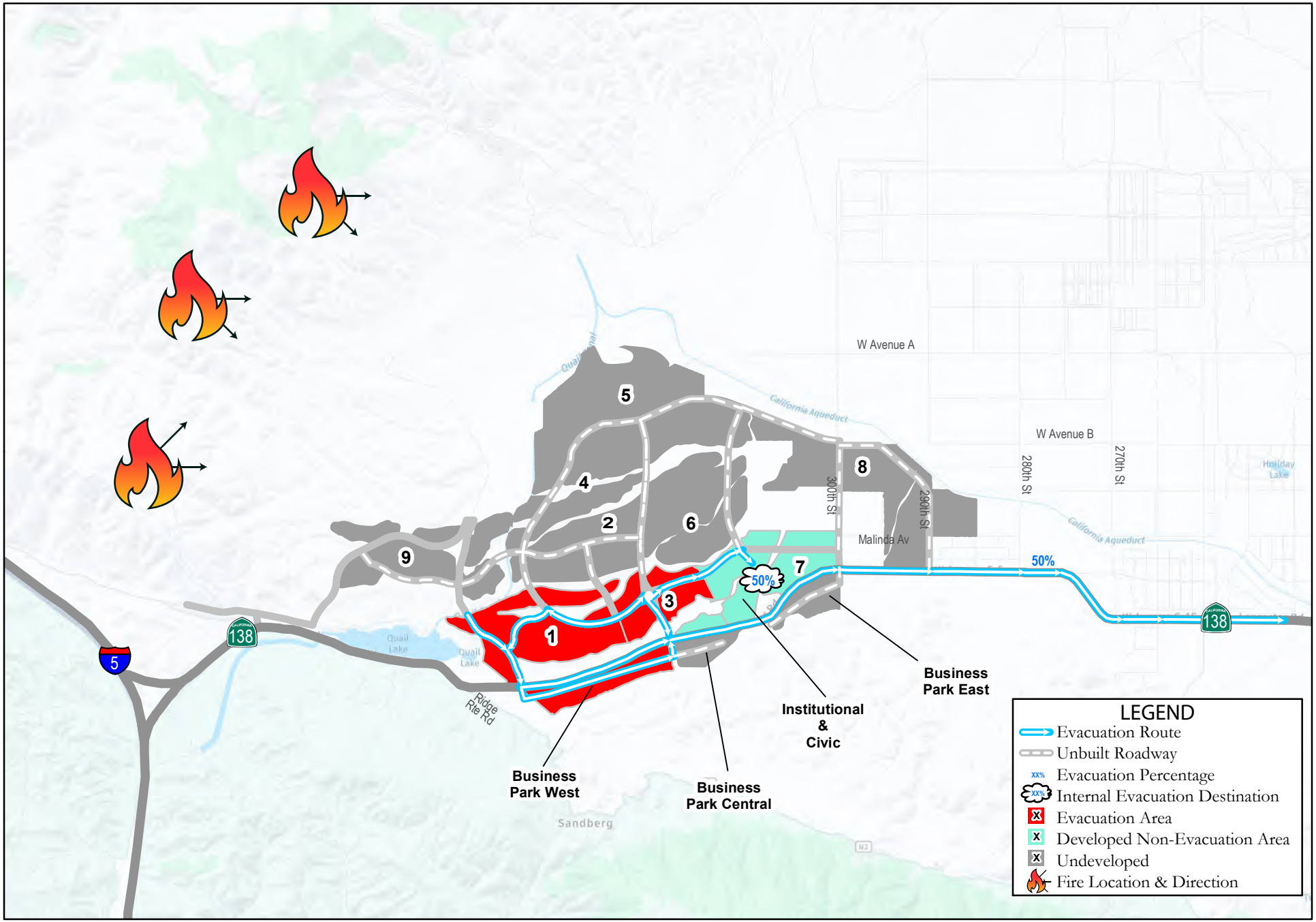
Evacuation Areas and Routes
Scenario 5



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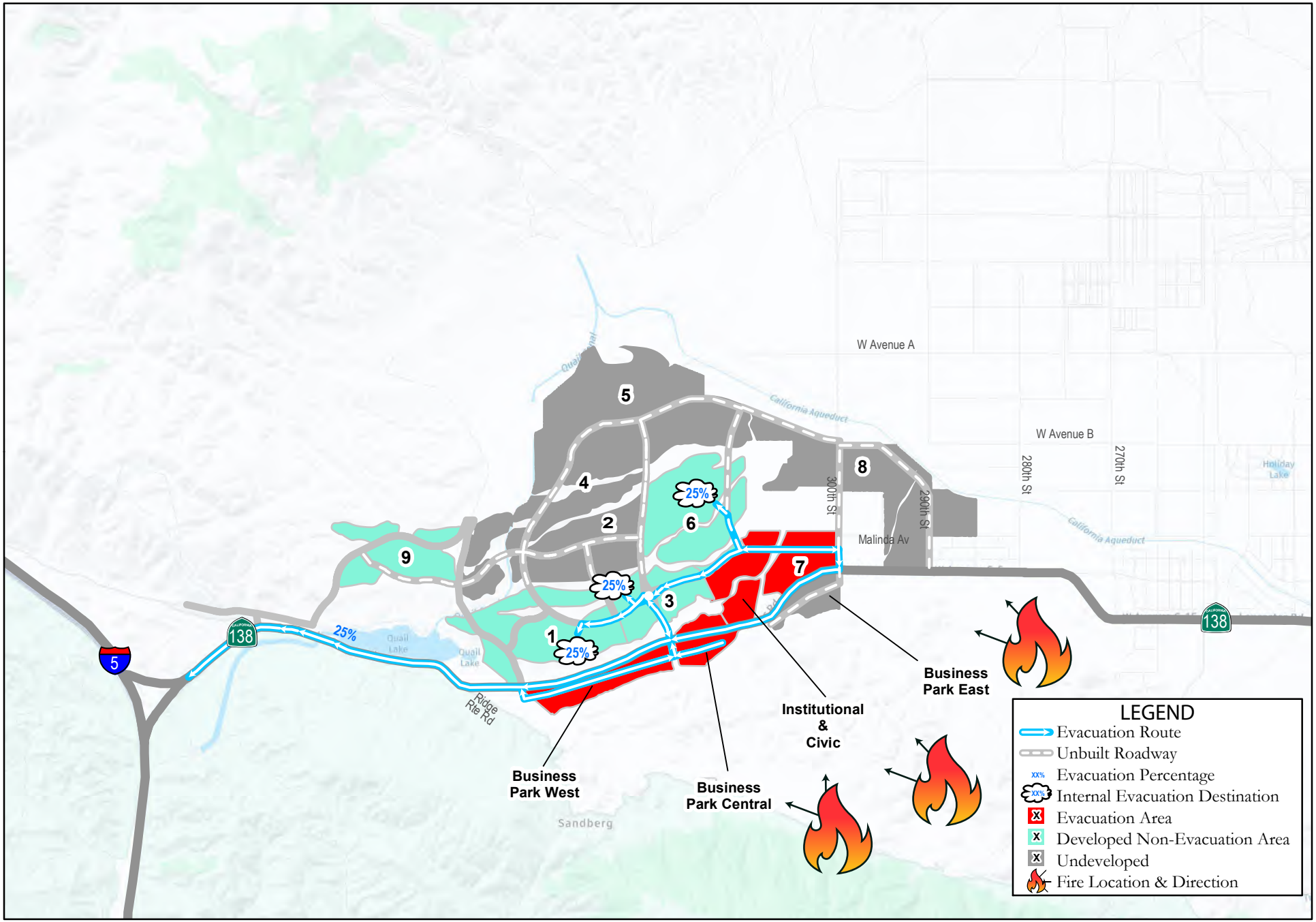
Evacuation Areas and Routes
Scenario 6



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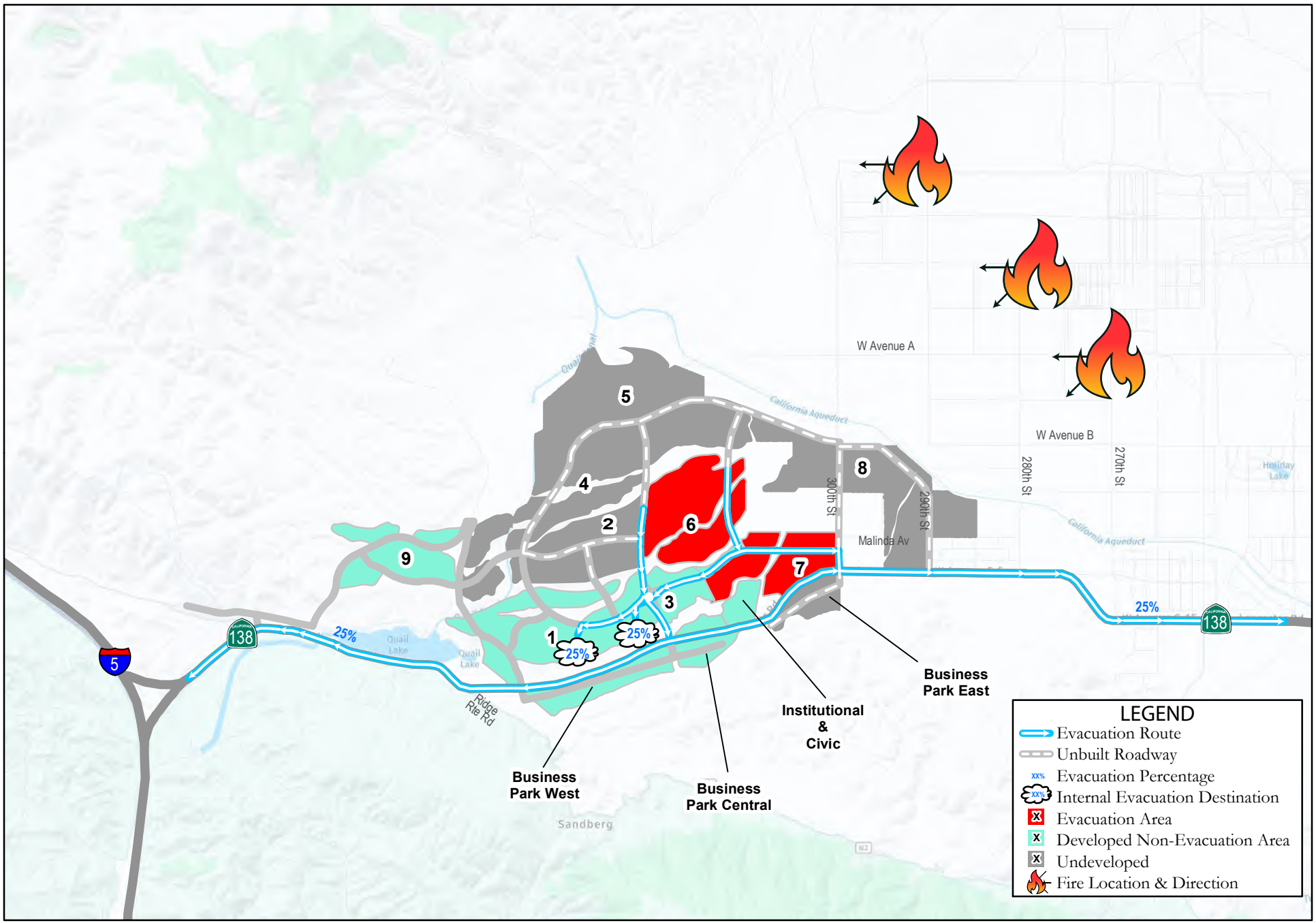
Evacuation Areas and Routes
Scenario 7



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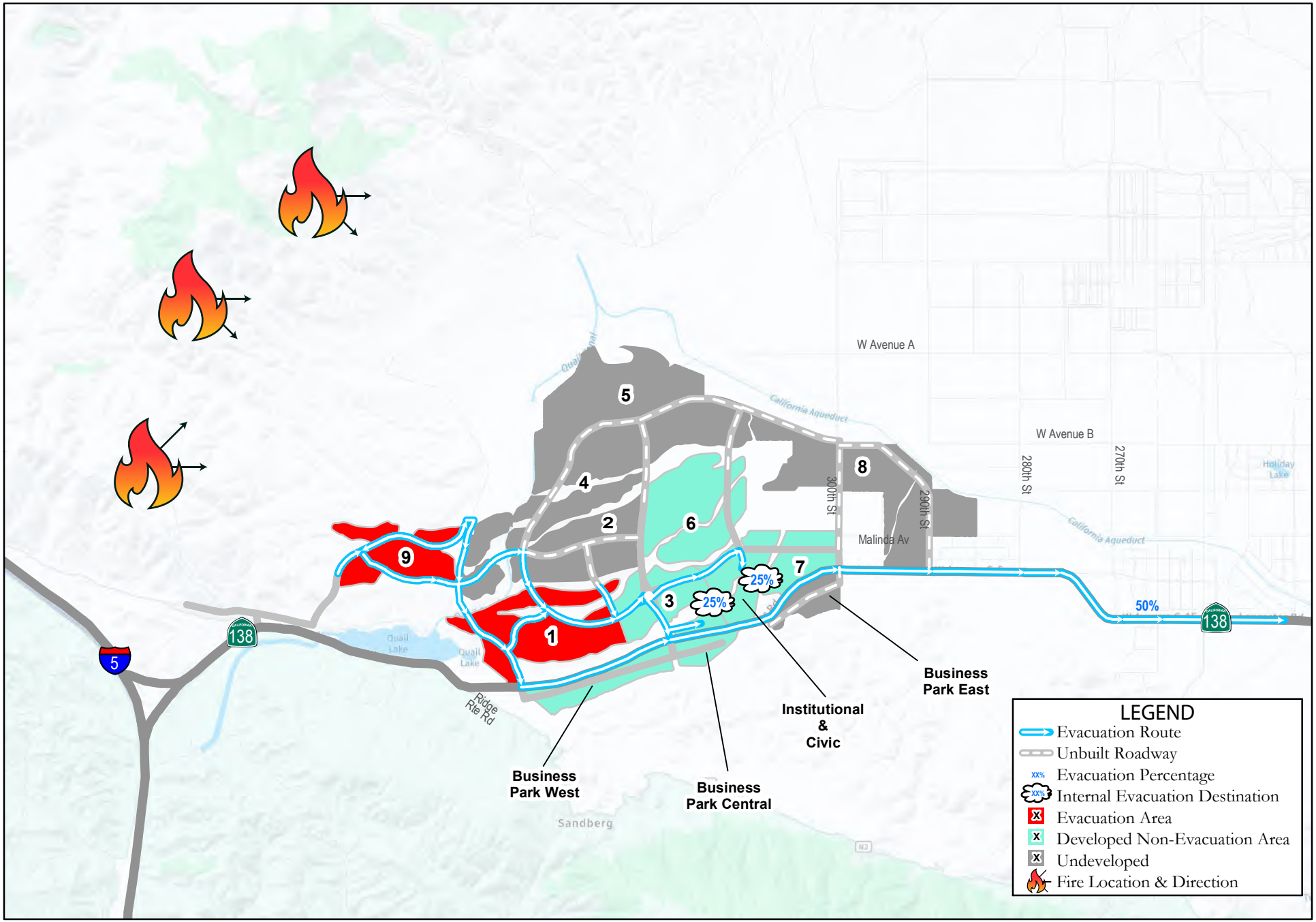
Evacuation Areas and Routes
Scenario 8



Tejon Ranch Evacuation Technical Memorandum

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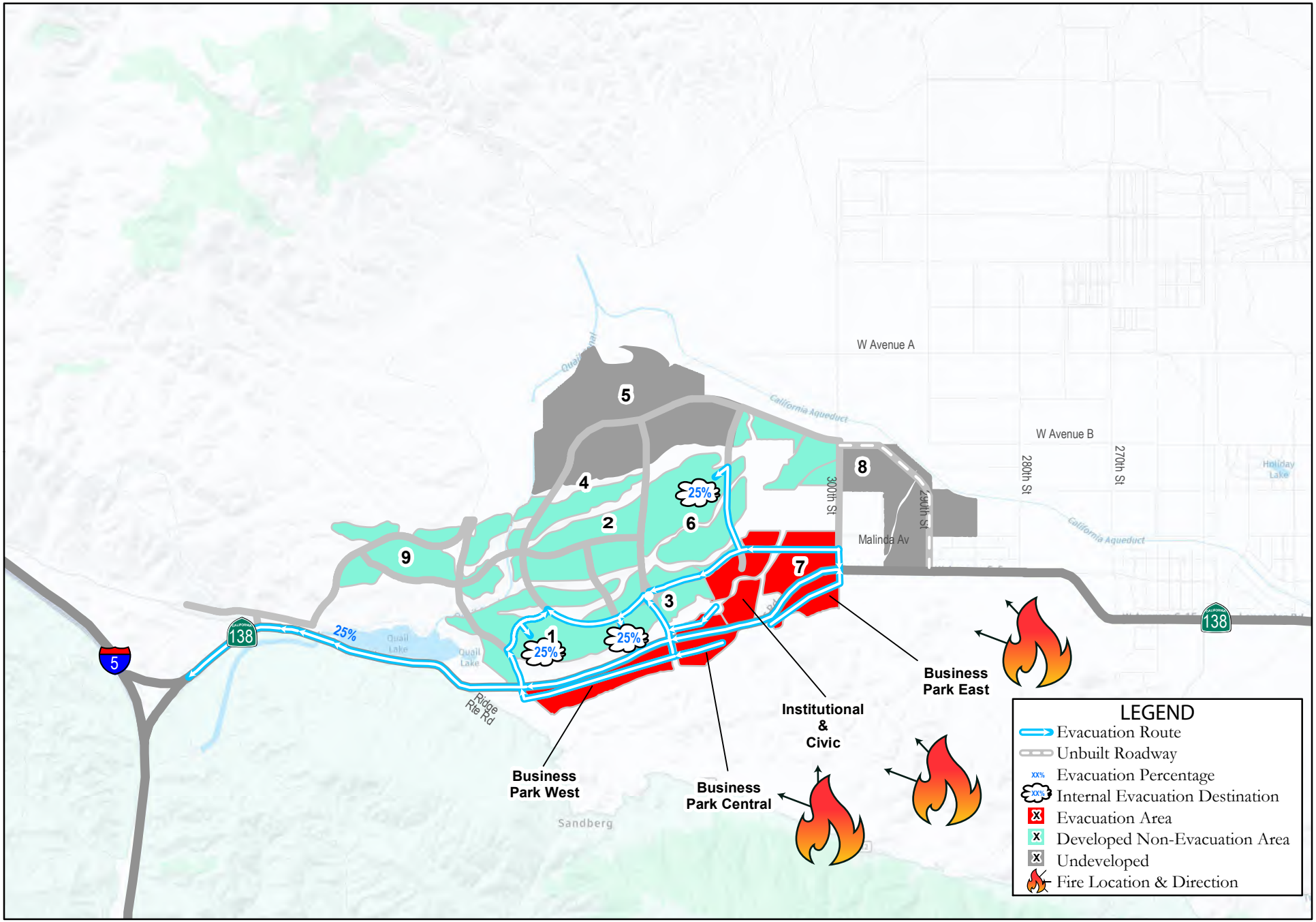
Evacuation Areas and Routes
Scenario 9



Tejon Ranch Evacuation Technical Memorandum

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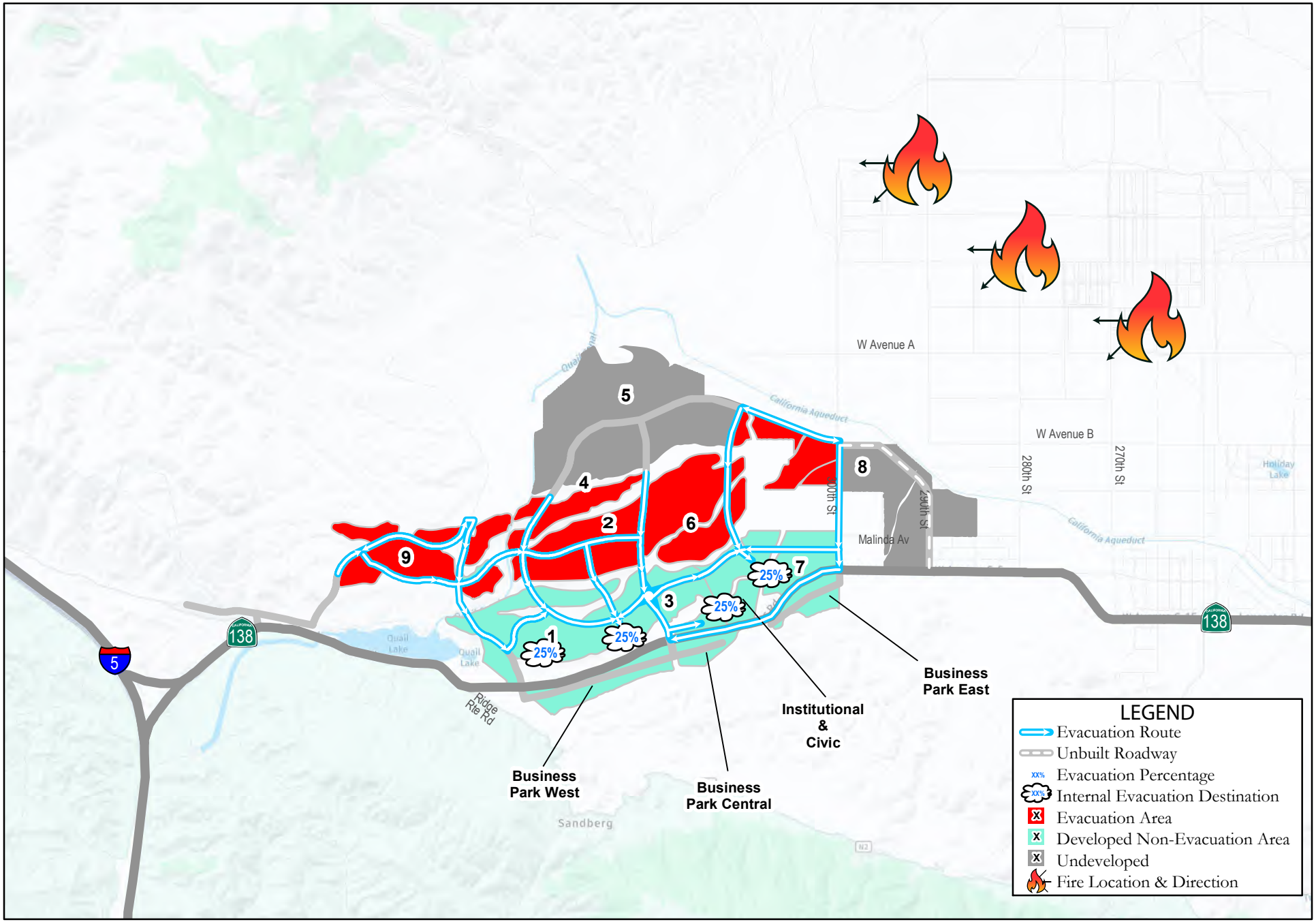
Evacuation Areas and Routes
Scenario 10



Tejon Ranch Evacuation Technical Memorandum

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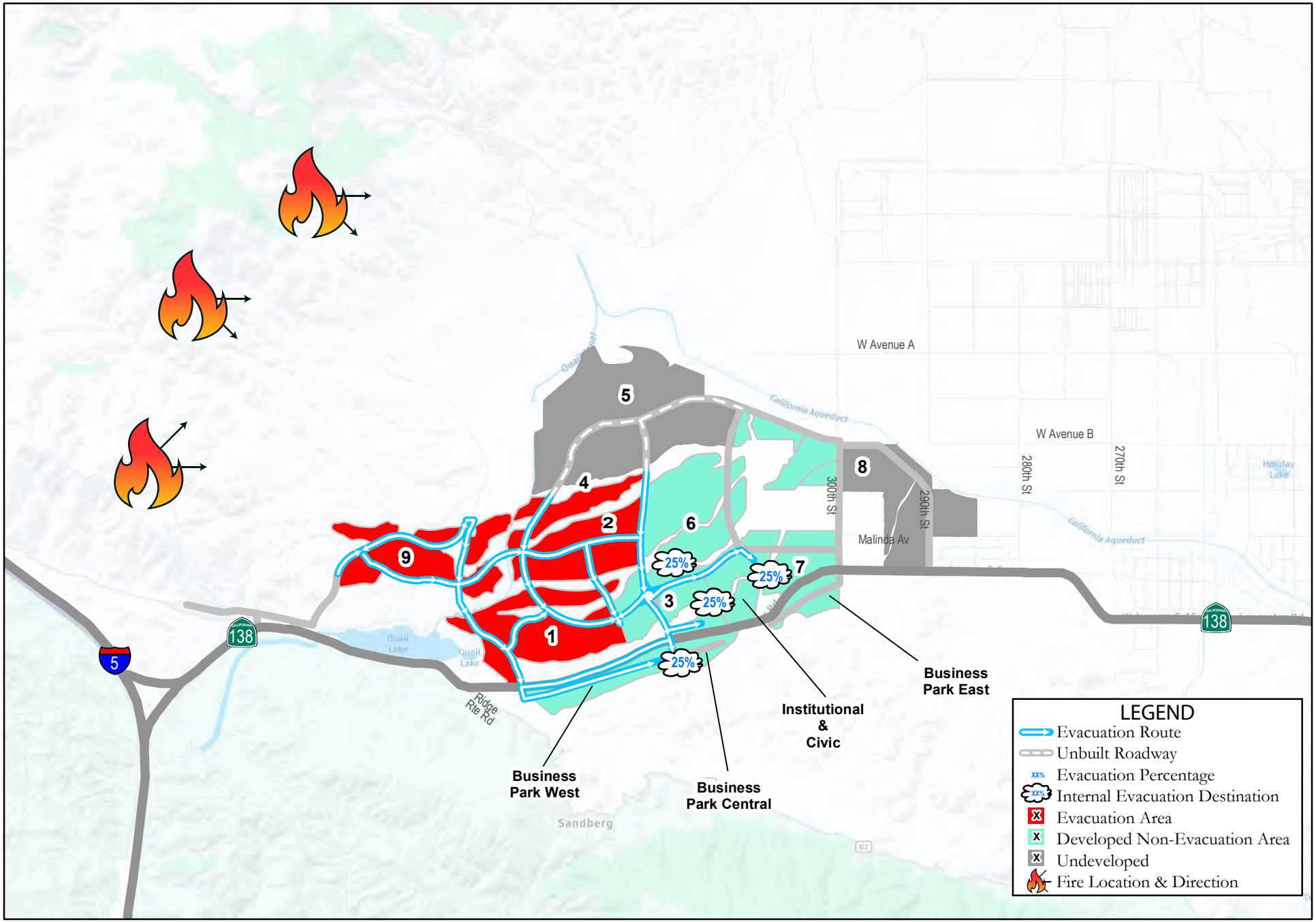
Evacuation Areas and Routes
Scenario 11



Tejon Ranch Evacuation Technical Memorandum

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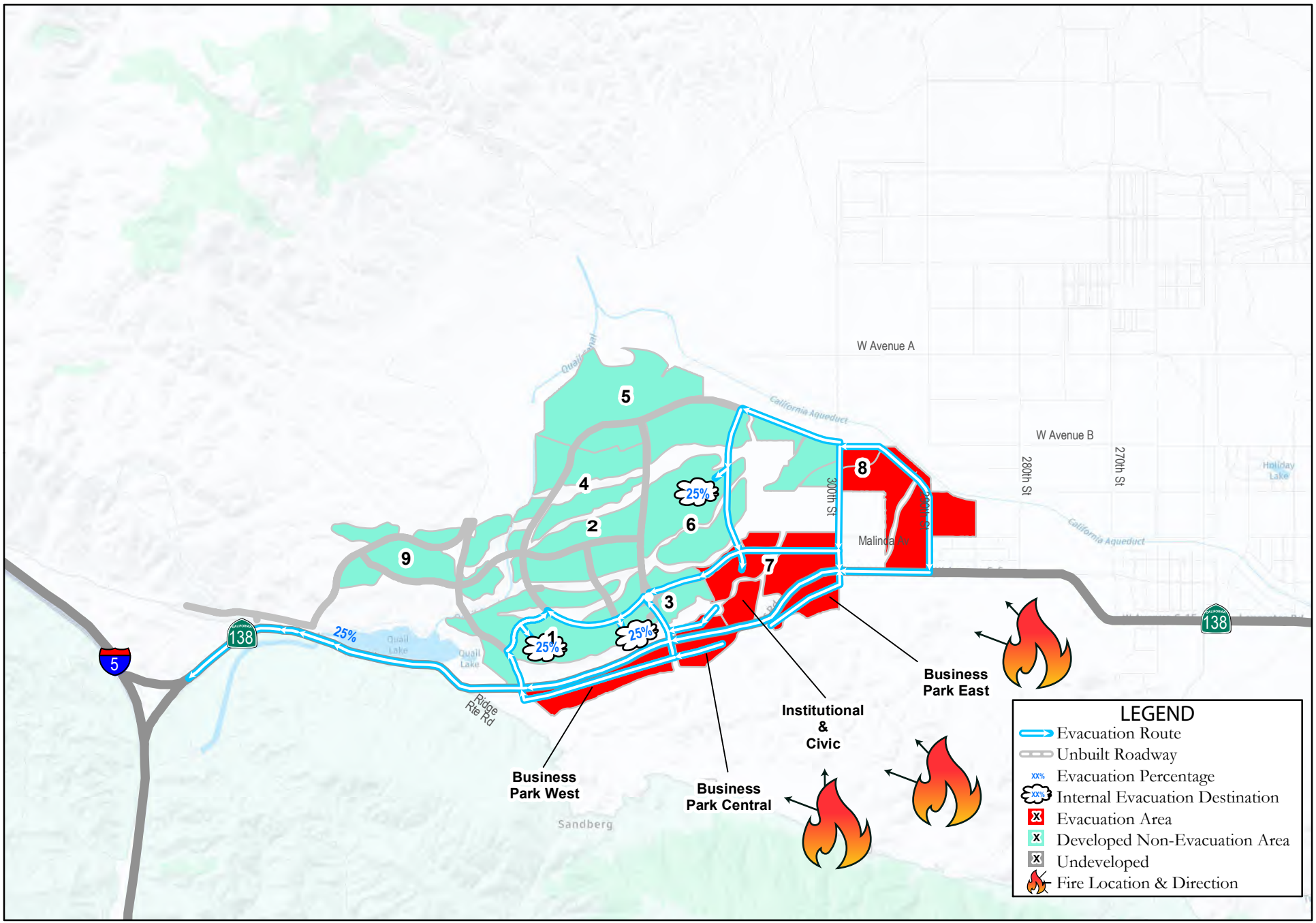
Evacuation Areas and Routes
Scenario 12



Tejon Ranch Evacuation Technical Memorandum

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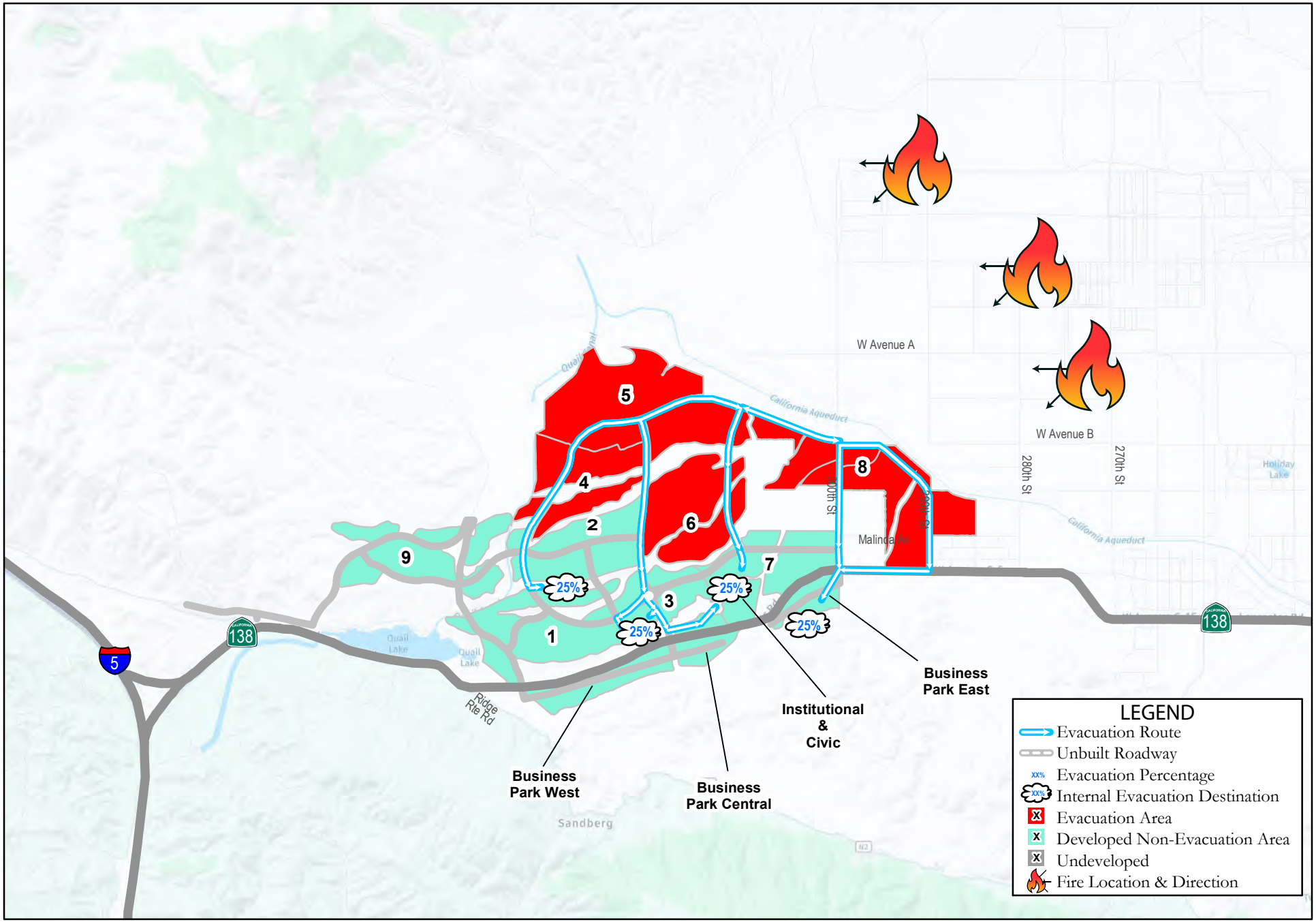
Evacuation Areas and Routes
Scenario 13



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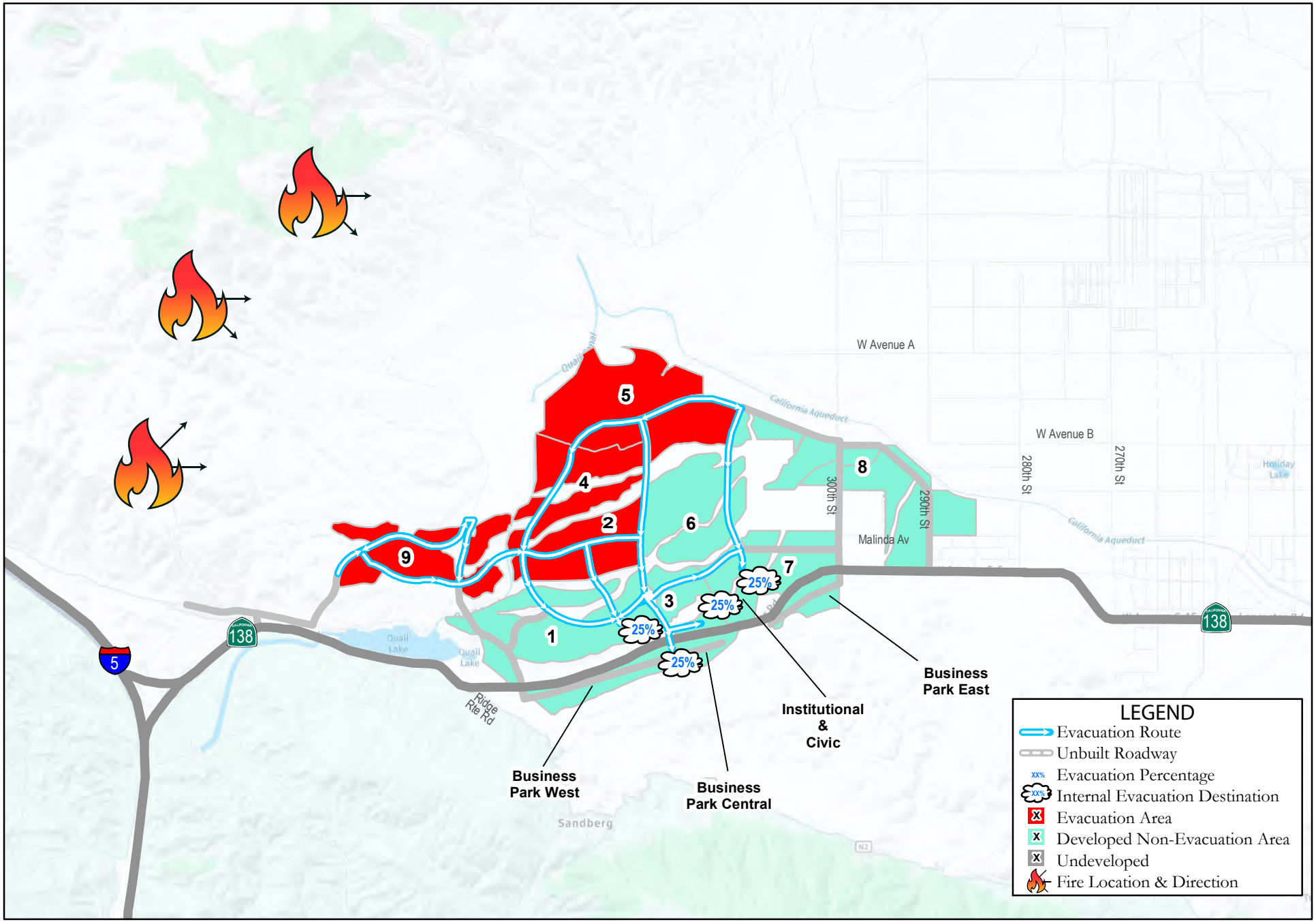
Evacuation Areas and Routes
Scenario 14



Tejon Ranch Evacuation Technical Memorandum

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Evacuation Areas and Routes
Scenario 15

Attachment D
Average vehicle ownership, residential units, and evacuating vehicles calculations

Average Vehicle Ownership Calculation

The average vehicle ownership rate was sourced from the US Census American Community Survey for the City of Lancaster, the nearest developed area to the Project site. It is assumed that residents of the Project will have a similar vehicle ownership rate to that of Lancaster.

TABLE ID:	B25044
SURVEY/PROGRAM:	American Community Survey
VINTAGE:	2022
DATASET:	ACSDT1Y2022
PRODUCT:	ACS 1-Year Estimates Detailed Tables
UNIVERSE:	Occupied housing units
MLA:	U.S. Census Bureau. "Tenure by Vehicles Available." American Community Survey, ACS 1-Year Estimates Detailed Tables, Table B25044, 2022, . Accessed on November 11, 2023.
FTP URL:	None
API URL:	https://api.census.gov/data/2022/acs/acs1

USER SELECTIONS

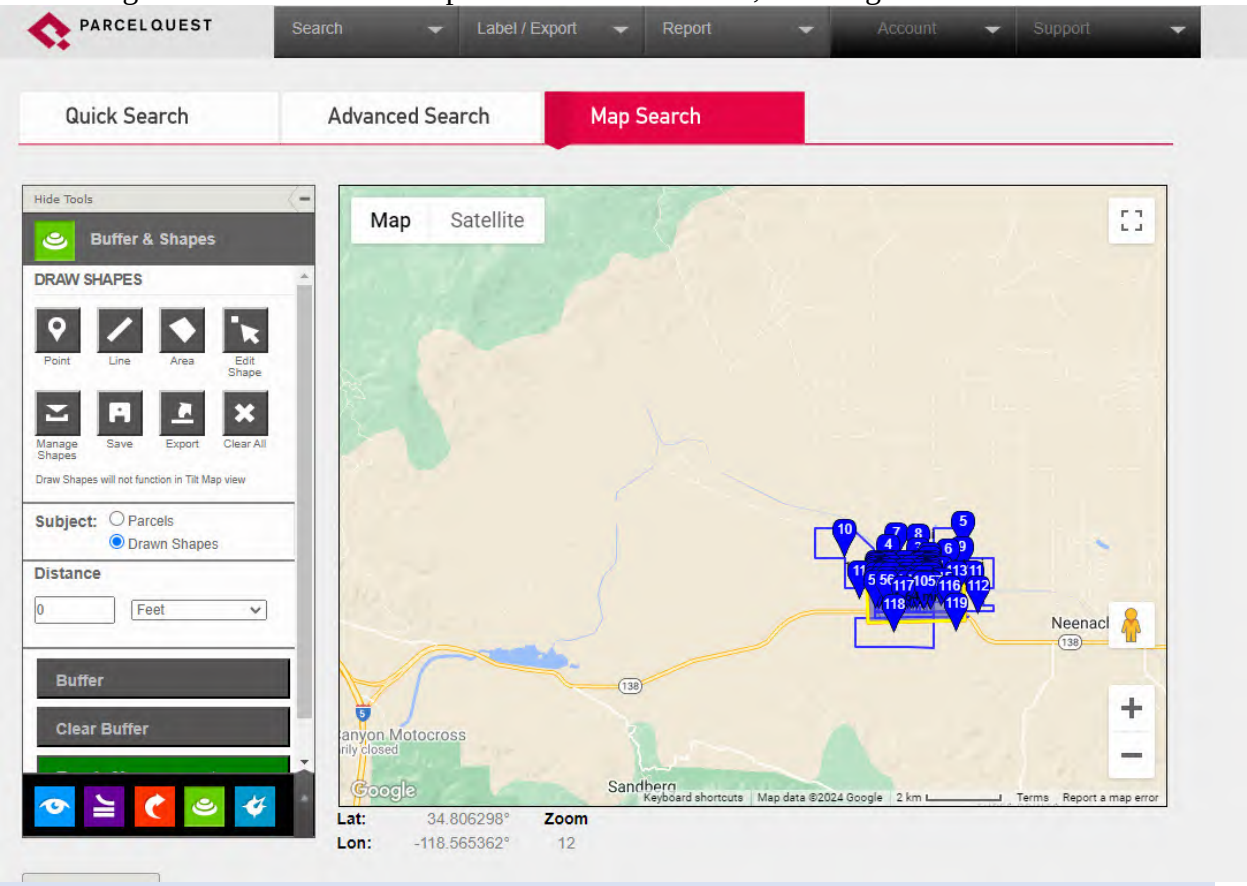
TOPICS	Owner/Renter (Tenure)
GEOS	Lancaster city, California

Vehicle Ownership by Household Type (Owner vs. Renter)	Number of Households	Total Vehicles
Owner occupied:	32,020	
No vehicle available	609	-
1 vehicle available	6,734	6,734
2 vehicles available	13,414	26,828
3 vehicles available	6,430	19,290
4 vehicles available	2,887	11,548
5 or more vehicles available	1,946	9,730
Renter occupied:	19,648	
No vehicle available	1,392	-
1 vehicle available	8,506	8,506
2 vehicles available	6,756	13,512
3 vehicles available	1,962	5,886
4 vehicles available	423	1,692
5 or more vehicles available	609	3,045
Total	51,668	106,771
Veh per Household	2.07	

Evacuation Vehicles Calculation

Evacuating Vehicles from Existing Land Use

The image and table below present the area, number of dwelling units, acreage, and building area for the existing land use located east of the Tejon Ranch Project. As indicated, there are 64 residential dwelling units in total, which, when multiplied by the average vehicle ownership of 2.07, would amount to 133 vehicles. However, based on an aerial image review, some properties have more than two vehicles on-site. Therefore, as a conservative estimate, the total number of evacuating vehicles was rounded up to the nearest hundred, resulting in 200 vehicles.



Land Use Type	Dwelling Units	Acres	Building Area
AGRICULTURAL	1	2.496	1128
MISCELLANEOUS		23.518	
OFFICE	1	6.351	1440
RESID. MOBILE/MANUFACTURED HOMES	26	89.824	43719
RESID. SINGLE FAMILY	38	121.369	67283
RETAIL SALES	1	0.459	900
VACANT		1988.155	
Grand Total	**67**	**2232.172**	**114470**

Evacuating Vehicles from the Proposed Project

This section summarizes the estimated number of vehicles to be evacuated under different scenarios. The number of evacuating vehicles was determined by multiplying the amount of land

use by either the average vehicle ownership rate for residential areas or the parking rate from the Institute of Transportation Engineers Parking Generation Manual for non-residential areas. The table below shows the average vehicle ownership or parking rate for various land uses.

Short Name	ID	Amount type[28]	Description	ITE Category	Vehicle Generation Rate	Modified Vehicle Generation Rate[29]
VLDR	1	DU	1. VLDR - Very Low Density Residential	N/A	2.07	2.07
LDR	2	DU	2. LDR - Low Density Residential	N/A	2.07	2.07
MDR	3	DU	3. MDR - Medium Density Residential	N/A	2.07	2.07
HDR	4	DU	4. HDR - High Density Residential	N/A	2.07	2.07
VHDR	5	DU	5. VHDR - Very High Density Residential	N/A	2.07	2.07
C	6	TSF	6. C-Commercial	Shopping Center	1.95	1.01
R/E	7	TSF	7. CR - Commercial Recreation	Shopping Center	1.95	1.01
BP	8	TSF	8. BP - Business Park	General Light Industrial	0.65	0.34
PF	9	ACRE	9. PF - Public Facilities	Recreational Community Center	2.07	1.08
I/C	10	TSF	10. CI - Civic	Recreational Community Center	2.07	1.08
K-8 SCHOOL	11	-	11. K-8 School	N/A	Assume not in operation	0
HIGH SCHOOL	12	-	12. High School	N/A	Assume not in operation	0
PARK	13	ACRE	13. Park	Public Park	0.47	0.24

It's important to note that the parking generation rates for non-residential land uses were adjusted to account for the internal trip generation rate provided in the traffic study. Since the traffic study indicated that approximately 48% of the total trips would be internal, it is assumed that the parking generation rate would reflect a similar proportion of internal capture. For example, if a resident drives to a commercial shopping center within the development, that vehicle would not be at home during an evacuation order. Therefore, the parking generation rate was adjusted with the internal capture rate to avoid double-counting evacuating vehicles. Excerpts from the Institute of Transportation Engineers Parking Generation Manual for relevant land uses are provided below.

[28] DU = Dwelling Unit, TSF = Thousand Square Feet
[29] 52% of the full rate, based on the internal capture percentage derived from the traffic study.

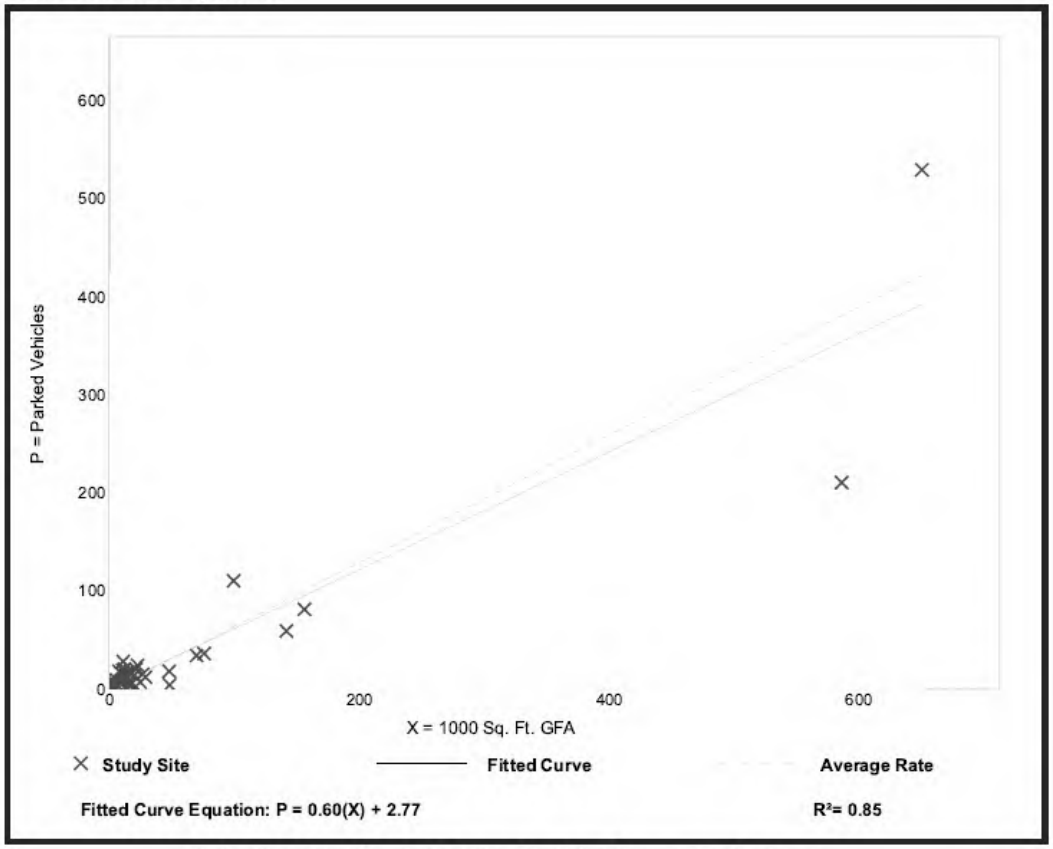
General Light Industrial
(110)

Peak Period Parking Demand vs: **1000 Sq. Ft. GFA**
On a: **Weekday (Monday - Friday)**
Setting/Location: **General Urban/Suburban**
Number of Studies: 40
Avg. 1000 Sq. Ft. GFA: 56

Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
0.65	0.11 - 7.89	0.58 / 1.94	0.52 - 0.78	0.41 (63%)

Data Plot and Equation



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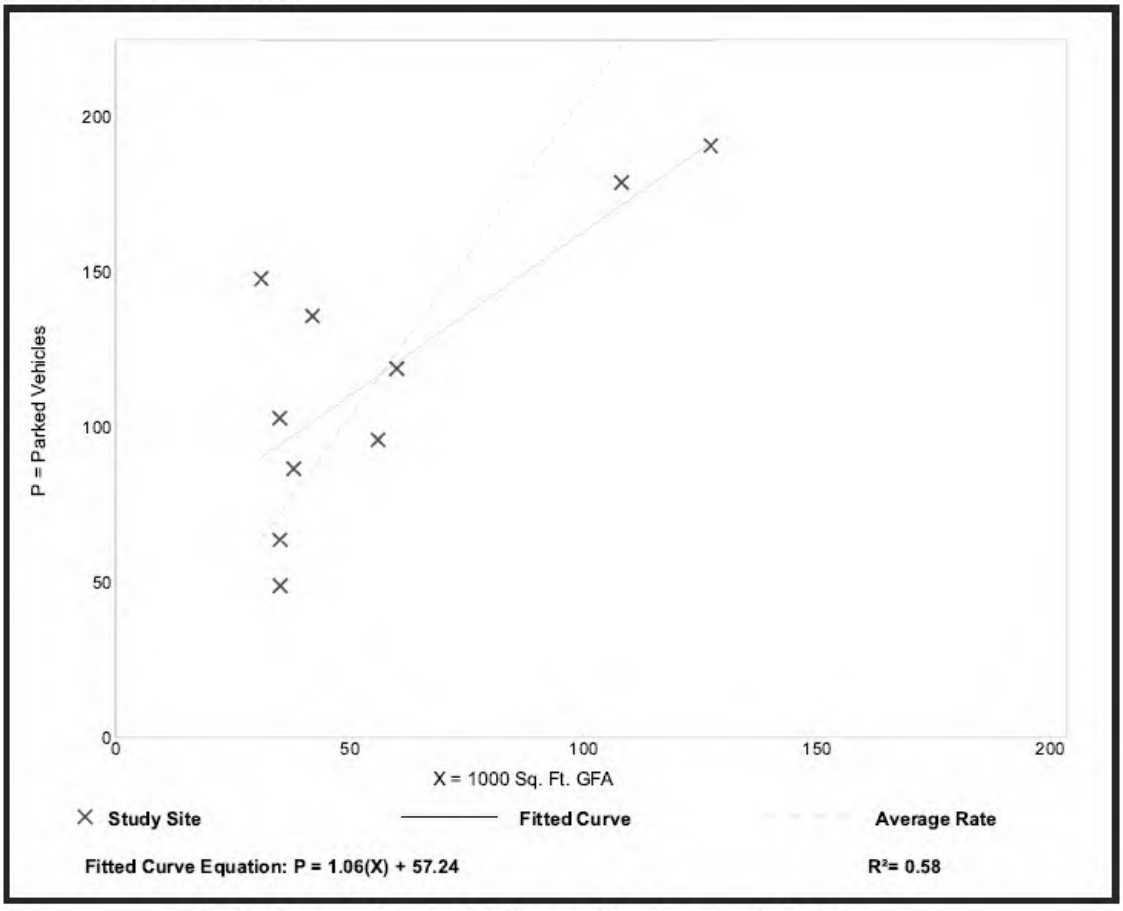
Recreational Community Center
(495)

Peak Period Parking Demand vs: **1000 Sq. Ft. GFA**
On a: **Weekday (Monday - Friday)**
Setting/Location: **General Urban/Suburban**
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 57

Peak Period Parking Demand per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
2.07	1.40 - 4.77	1.69 / 3.78	***	0.88 (43%)

Data Plot and Equation



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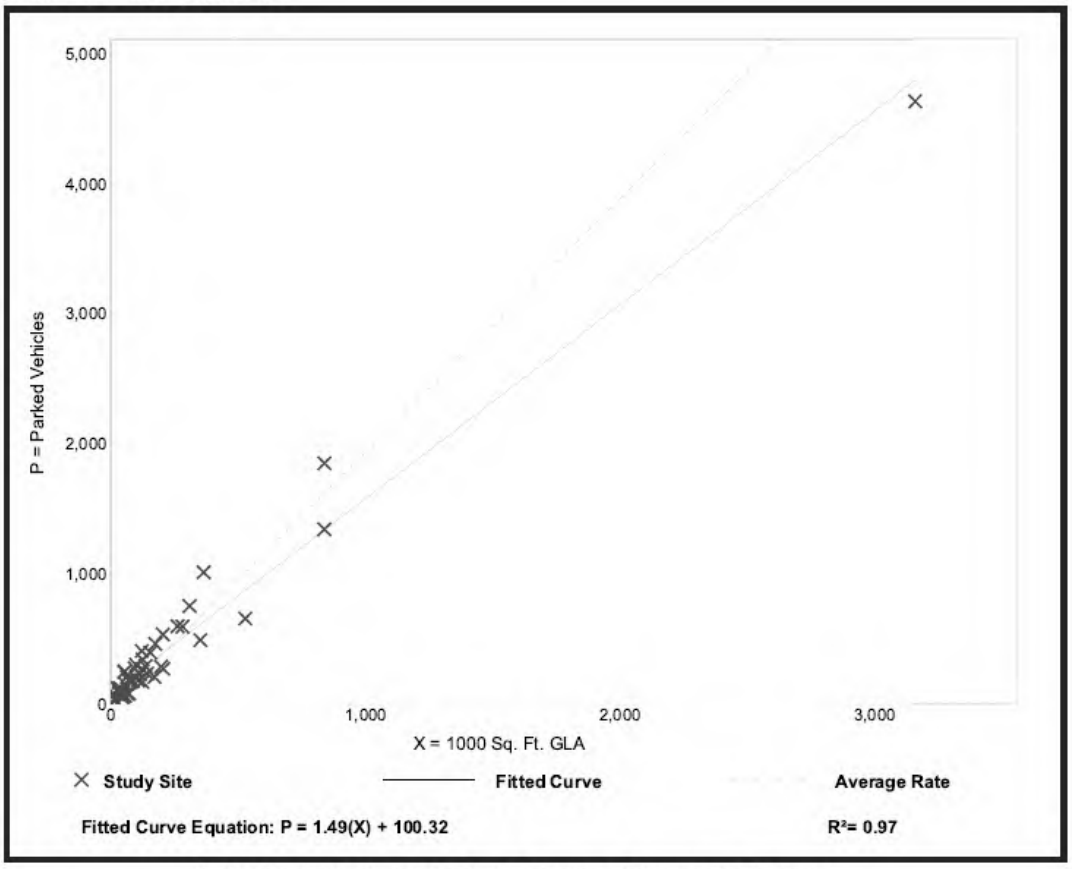
Shopping Center - Non-December
(820)

Peak Period Parking Demand vs: **1000 Sq. Ft. GLA**
On a: **Weekday (Monday - Thursday)**
Setting/Location: **General Urban/Suburban**
Number of Studies: 46
Avg. 1000 Sq. Ft. GLA: 218

Peak Period Parking Demand per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.95	1.27 - 7.98	1.99 / 3.68	1.73 - 2.17	0.75 (38%)

Data Plot and Equation



Parking Generation Manual, 6th Edition • Institute of Transportation Engineers

Project Evacuation Vehicle Generation Rate

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
1	9W	87.12	TSF	6. C-Commercial	1.01	88
2	9W	240	DU	2. LDR - Low Density Residential	2.07	497
2	9W	5	ACRE	13. Park	0.24	2
3	9W	360	DU	3. MDR - Medium Density Residential	2.07	746
4	9W	205	DU	2. LDR - Low Density Residential	2.07	425
5	9W	10.454	TSF	7. CR - Commercial Recreation	1.01	11
6	9W	8	ACRE	13. Park	0.24	2
7	9W	500	STU	11. K-8 School	0	0
9	9W	175	DU	2. LDR - Low Density Residential	2.07	363
11	9	180	DU	2. LDR - Low Density Residential	2.07	373
12	9	70	DU	2. LDR - Low Density Residential	2.07	145
13	9	255	DU	2. LDR - Low Density Residential	2.07	528
14	9W	90	DU	1. VLDR - Very Low Density Residential	2.07	187
20	9	44	ACRE	9. PF - Public Facilities	1.08	48
31	1	25	ACRE	13. Park	0.24	6
32	1	46	DU	2. LDR - Low Density Residential	2.07	96
33	1	46	DU	2. LDR - Low Density Residential	2.07	96
34	1	368	DU	2. LDR - Low Density Residential	2.07	762
34	1	5	ACRE	13. Park	0.24	2
35	1	87.12	TSF	7. CR - Commercial Recreation	1.01	88
36	1	141.57	TSF	6. C-Commercial	1.01	143
37	1	255	DU	4. HDR - High Density Residential	2.07	528
37	1	8	ACRE	13. Park	0.24	2
38	1	234	DU	3. MDR - Medium Density Residential	2.07	485
39	1	435	DU	2. LDR - Low Density Residential	2.07	901
40	1	95	DU	1. VLDR - Very Low Density Residential	2.07	197

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
41	1	110	DU	2. LDR - Low Density Residential	2.07	228
42	1	31	DU	1. VLDR - Very Low Density Residential	2.07	65
43	1	1500	STU	11. K-8 School	0	0
43	1	8	ACRE	13. Park	0.24	2
44	1	205	DU	2. LDR - Low Density Residential	2.07	425
51	3	2	ACRE	13. Park	0.24	1
52	3	34.848	TSF	10. CI - Civic	1.08	38
53	3	34.848	TSF	10. CI - Civic	1.08	38
54	3	34.848	TSF	10. CI - Civic	1.08	38
55	3	34.848	TSF	10. CI - Civic	1.08	38
56	3	98.01	TSF	6. C-Commercial	1.01	99
57	3	98.01	TSF	6. C-Commercial	1.01	99
58	3	98.01	TSF	6. C-Commercial	1.01	99
59	3	1500	STU	11. K-8 School	0	0
60	3	285	DU	4. HDR - High Density Residential	2.07	590
60	3	5	ACRE	13. Park	0.24	2
61	3	315	DU	4. HDR - High Density Residential	2.07	653
62	3	300	DU	5. VHDR - Very High Density Residential	2.07	621
63	3	243	DU	3. MDR - Medium Density Residential	2.07	504
64	3	198	DU	3. MDR - Medium Density Residential	2.07	410
65	3	333	DU	3. MDR - Medium Density Residential	2.07	690
66	3	198	DU	3. MDR - Medium Density Residential	2.07	410
71	2	1500	STU	11. K-8 School	0	0
72	2	9	ACRE	13. Park	0.24	3
73	2	65	DU	2. LDR - Low Density Residential	2.07	135
74	4S	90	DU	2. LDR - Low Density Residential	2.07	187
74	4S	99	DU	3. MDR - Medium Density Residential	2.07	205
74	4S	5	ACRE	13. Park	0.24	2

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
75	2	282	DU	2. LDR - Low Density Residential	2.07	584
76	2	189	DU	3. MDR - Medium Density Residential	2.07	392
76	2	5	ACRE	13. Park	0.24	2
77	4S	270	DU	4. HDR - High Density Residential	2.07	559
78	2	283	DU	2. LDR - Low Density Residential	2.07	586
79	2	369	DU	3. MDR - Medium Density Residential	2.07	764
79	2	5	ACRE	13. Park	0.24	2
80	4S	99	DU	3. MDR - Medium Density Residential	2.07	205
80	4S	98.01	TSF	6. C-Commercial	1.01	99
80	4S	6.97	TSF	7. CR - Commercial Recreation	1.01	8
81	4S	117	DU	3. MDR - Medium Density Residential	2.07	243
81	4S	210	DU	4. HDR - High Density Residential	2.07	435
81	4S	2	ACRE	13. Park	0.24	1
82	4S	210	DU	2. LDR - Low Density Residential	2.07	435
82	4S	3	ACRE	13. Park	0.24	1
91	4	48	DU	1. VLDR - Very Low Density Residential	2.07	100
92	4	208	DU	1. VLDR - Very Low Density Residential	2.07	431
92	4	10	ACRE	13. Park	0.24	3
93	4	94	DU	1. VLDR - Very Low Density Residential	2.07	195
94	4	60	DU	1. VLDR - Very Low Density Residential	2.07	125
95	4	370	DU	2. LDR - Low Density Residential	2.07	766
96	4	190	DU	2. LDR - Low Density Residential	2.07	394
97	5	210	DU	2. LDR - Low Density Residential	2.07	435
97	5	8.712	TSF	7. CR - Commercial Recreation	1.01	9
98	5	150	DU	2. LDR - Low Density Residential	2.07	311
98	5	8.712	TSF	7. CR - Commercial Recreation	1.01	9
99	5	315	DU	3. MDR - Medium Density Residential	2.07	653
99	5	5	ACRE	13. Park	0.24	2

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
100	5	432	DU	3. MDR - Medium Density Residential	2.07	895
111	5	230	DU	2. LDR - Low Density Residential	2.07	477
112	5	44	DU	1. VLDR - Very Low Density Residential	2.07	92
113	5	423	DU	3. MDR - Medium Density Residential	2.07	876
113	5	5	ACRE	13. Park	0.24	2
114	5	603	DU	3. MDR - Medium Density Residential	2.07	1249
115	5	555	DU	4. HDR - High Density Residential	2.07	1149
116	5	87.12	TSF	6. C-Commercial	1.01	88
117	5	8	ACRE	13. Park	0.24	2
118	5	1500	STU	11. K-8 School	0	0
119	5	459	DU	3. MDR - Medium Density Residential	2.07	951
120	5	72	DU	1. VLDR - Very Low Density Residential	2.07	150
120	5	5	ACRE	13. Park	0.24	2
121	5	459	DU	3. MDR - Medium Density Residential	2.07	951
122	5	160	DU	2. LDR - Low Density Residential	2.07	332
122	5	5	ACRE	13. Park	0.24	2
123	5	185	DU	2. LDR - Low Density Residential	2.07	383
124	5	95	DU	2. LDR - Low Density Residential	2.07	197
124	5	5	ACRE	13. Park	0.24	2
125	5	200	DU	2. LDR - Low Density Residential	2.07	414
126	5	95	DU	2. LDR - Low Density Residential	2.07	197
127	5	300	DU	2. LDR - Low Density Residential	2.07	621
131	8W	110	DU	2. LDR - Low Density Residential	2.07	228
132	8W	120	DU	2. LDR - Low Density Residential	2.07	249
133	8W	60	DU	2. LDR - Low Density Residential	2.07	125
134	8W	102	ACRE	9. PF - Public Facilities	1.08	111
135	8W	75	DU	2. LDR - Low Density Residential	2.07	156
136	8W	297	DU	3. MDR - Medium Density Residential	2.07	615

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
136	8W	6	ACRE	13. Park	0.24	2
137	8W	100	DU	2. LDR - Low Density Residential	2.07	207
138	8W	1500	STU	11. K-8 School	0	0
139	8	108.9	TSF	6. C-Commercial	1.01	110
140	8	445	DU	2. LDR - Low Density Residential	2.07	922
141	8	70	DU	2. LDR - Low Density Residential	2.07	145
142	8	45	ACRE	9. PF - Public Facilities	1.08	49
143	8	215	DU	2. LDR - Low Density Residential	2.07	446
143	8	5	ACRE	13. Park	0.24	2
144	8	240	DU	2. LDR - Low Density Residential	2.07	497
144	8	5	ACRE	13. Park	0.24	2
145	8	130	DU	1. VLDR - Very Low Density Residential	2.07	270
146	8	355	DU	2. LDR - Low Density Residential	2.07	735
147	8	320	DU	2. LDR - Low Density Residential	2.07	663
147	8	5	ACRE	13. Park	0.24	2
148	8W	165	DU	2. LDR - Low Density Residential	2.07	342
151	7	90	DU	2. LDR - Low Density Residential	2.07	187
152	7	265	DU	2. LDR - Low Density Residential	2.07	549
152	7	4	ACRE	13. Park	0.24	1
153	7	60	DU	1. VLDR - Very Low Density Residential	2.07	125
154	7	235	DU	2. LDR - Low Density Residential	2.07	487
155	7	163.35	TSF	6. C-Commercial	1.01	165
156	7	255	DU	2. LDR - Low Density Residential	2.07	528
157	7	315	DU	3. MDR - Medium Density Residential	2.07	653
157	7	165	DU	4. HDR - High Density Residential	2.07	342
158	7	8.712	TSF	7. CR - Commercial Recreation	1.01	9
158	7	6	ACRE	13. Park	0.24	2
159	7	52	DU	1. VLDR - Very Low Density Residential	2.07	108

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
161	6	25	ACRE	13. Park	0.24	6
162	6	425	DU	2. LDR - Low Density Residential	2.07	880
163	6	265	DU	2. LDR - Low Density Residential	2.07	549
163	6	2	ACRE	13. Park	0.24	1
164	6	81	DU	3. MDR - Medium Density Residential	2.07	168
164	6	1	ACRE	13. Park	0.24	1
164	6	54.45	TSF	6. C-Commercial	1.01	55
165	6	144	DU	3. MDR - Medium Density Residential	2.07	299
166	6	3500	STU	12. High School	0	0
167	6	34	DU	1. VLDR - Very Low Density Residential	2.07	71
168	6	34	DU	1. VLDR - Very Low Density Residential	2.07	71
168	6	5	ACRE	13. Park	0.24	2
169	6	56	DU	1. VLDR - Very Low Density Residential	2.07	116
170	6	40	DU	1. VLDR - Very Low Density Residential	2.07	83
171	6	205	DU	2. LDR - Low Density Residential	2.07	425
172	6	24	DU	1. VLDR - Very Low Density Residential	2.07	50
173	6	195	DU	2. LDR - Low Density Residential	2.07	404
173	6	81	DU	3. MDR - Medium Density Residential	2.07	168
173	6	2	ACRE	13. Park	0.24	1
174	6	30	DU	1. VLDR - Very Low Density Residential	2.07	63
174	6	5	ACRE	13. Park	0.24	2
175	6	68	DU	1. VLDR - Very Low Density Residential	2.07	141
181	IC	738.979	TSF	8. BP - Business Park	0.34	252
182	IC	1428.77	TSF	10. CI - Civic	1.08	1544
183	BP1	960.498	TSF	8. BP - Business Park	0.34	327
184	BP1	960.498	TSF	8. BP - Business Park	0.34	327
185	BP1	960.498	TSF	8. BP - Business Park	0.34	327
186	BP2	960.498	TSF	8. BP - Business Park	0.34	327

TAZ No.	Village	Amount	Unit	LU Name	Modified Vehicle Generation Rate	Total Vehicles
187	BP2	960.498	TSF	8. BP - Business Park	0.34	327
189	BP3	622.037	TSF	8. BP - Business Park	0.34	212
190	BP3	1200.312	TSF	8. BP - Business Park	0.34	409

Attachment E
Evacuation Analysis Worksheets

The tables below present the evacuation results for each scenario. The displayed times represent the maximum evacuation time for the area being evacuated, meaning the time when the last vehicle from a specific village or area crossed the "finish" line. The times are shown as the total number of seconds since the evacuation order was issued.

Scenario 1

- Phases: 1-2
- Build Land Use: Village 1 & Village 3
- Fire Approach Direction: South/Southeast
- Area Under Evacuation: Village 1, Village 3, Existing

Destination Point / Run Number	Existing	Village 1	Village 3
1	2004.5	12945.3	16419.5
2	1645.8	7116.4	12814.4
3	1520.7	7571.7	12873.4
4	1672.2	7181.2	12819.1
5	1872.9	7035.6	12914.7
6	1669	7250.6	12642.9
7	1672.1	7547.2	13168
8	1955.6	7270.5	13164.1
9	1894.6	6860.8	12962.4
10	1746.2	7244.8	13118.6
11	1751	6980	12739
12	1802.3	7275.8	12949.9
13	1806	7379.3	13009.4
14	1751.9	7112.7	12789.3
15	1677.6	7138	12809.1
16	1843.4	7251.7	12886.5
17	1742.2	6825.3	12596.1
18	1760.5	7214.1	12725.6
19	1743.9	6860.7	12777.2
20	1785.8	7404.8	12734.4
Average end time of 20 runs in seconds	1765.91	7473.325	13045.68
Average end time of 20 runs in hours : minutes	0:29	2:04	3:37

Scenario 2

- **Phases:** 1-2
- **Build Land Use:** Village 1 & Village 3
- **Fire Approach Direction:** North/Northeast
- **Area Under Evacuation:** Village 1, Village 3, Existing

Destination Point / Number of Runs	Existing	Village 1	Village 3
1	1043.9	5691.4	5485.1
2	977.4	5717	5851.5
3	1014.2	5581.3	5566.7
4	1060.5	5584.5	5851.6
5	1057	5838.2	5556
6	1059.1	5679.9	5782.9
7	971.8	5592.3	5727.1
8	1054.9	5471.9	5628.4
9	1026.1	5592.6	5920.9
10	1050.8	5597.1	5658.1
11	1017.7	5730.5	5748.8
12	954.5	5619.9	5654.1
13	1010.2	5552.1	5760.3
14	1010.8	5522	5514.1
15	1013.6	5543.9	5810.5
16	968.6	5464.7	5464.8
17	1039.6	5669.2	5578.6
18	1075.2	5440.3	5531.5
19	1015	5679.7	5631.5
20	1022.6	5456.5	5508.7
Average end time of 20 runs in seconds	1022.175	5601.25	5661.56
Average end time of 20 runs in hours : minutes	0:17	1:33	1:34

Scenario 3

- **Phases:** 1-2
- **Build Land Use:** Village 1 & Village 3
- **Fire Approach Direction:** West/Northwest
- **Area Under Evacuation:** Village 1, Village 3, Existing

Destination Point / Number of Runs	Existing	Village 1	Village 3
1	1043.9	7513.7	5756.1
2	977.4	7433.5	5789
3	1014.2	7408.2	5755.3
4	1060.5	7213.6	5817.2
5	1057	7350.9	5816.9
6	1059.1	7461	5841.3
7	971.8	7367.1	5938.9
8	1054.9	7265	5977.5
9	1026.1	7483.7	5810.9
10	1050.8	7464.4	5818.6
11	1017.7	7471.1	5827
12	954.5	7410	5785.6
13	1010.2	7284.9	5794.4
14	1010.8	7535.8	5786.2
15	1013.6	7336.1	5727.3
16	968.6	7306.5	5709.9
17	1039.6	7358.6	5667.8
18	1075.2	7334.7	5676
19	1015	7372.4	5695.2
20	1022.6	7352.8	5784
Average end time of 20 runs in seconds	1022.175	7386.2	5788.755
Average end time of 20 runs in hours : minutes	0:17	2:03	1:36

Scenario 4

- **Phases:** 1-4
- **Build Land Use:** Village 1, Village 3, Village 7, Business Park West, Institutional & Civic
- **Fire Approach Direction:** South/Southeast
- **Area Under Evacuation:** 50% of Village 7, Business Park West, Institutional & Civic

Destination Point / Number of Runs	50% of Village 7	western portion of Business Park	Institutional & Civic
1	3799.3	6716.4	5959.5
2	3790.8	6767.6	6530.8
3	3555.3	6955.3	6442.1
4	3759	6858.7	6152.8
5	3643.1	6856.9	6534.8
6	3670.1	6617.8	6323.1
7	3616.5	6900.2	6493.9
8	3750.2	6907.4	6497.9
9	3546.2	6753.8	6245
10	3643.9	6774.1	6203.9
11	3518.4	6963.9	6580.6
12	3582.6	6853.3	6037.8
13	3560.7	6890.5	6212.9
14	3734.6	6819.7	6269.6
15	3514.8	6945.8	6689.4
16	3689.3	6715	6302
17	3792.7	6999.6	6513.5
18	3671.3	6858.1	6305.9
19	3605	6838.5	6431.4
20	3634	7049.1	6812
Average end time of 20 runs in seconds	3653.89	6852.085	6376.945
Average end time of 20 runs in hours : minutes	1:00	1:54	1:46

Scenario 5

- **Phases:** 1-4
- **Build Land Use:** Village 1, Village 3, Village 7, Business Park West, Institutional & Civic
- **Fire Approach Direction:** North/Northeast
- **Area Under Evacuation:** 50% of Village 3, Village 7, Existing

Destination Point / Number of Runs	Existing	Village 3 Exit @ Village 1	Village 7 Exit @ Village 1	Village 7 @ Lancaster	V7 Exit @ I5
1	1082.8	3875.4	3893.7	2269.1	5126.4
2	1082.8	3875.4	3893.7	2269.1	5126.4
3	1096.1	4088	3857.5	2314.6	4917.1
4	1047.8	4203.3	3860.2	2446.6	5021.6
5	1077.7	3867.5	3867.8	2233	5029.9
6	1090.8	4169.5	3700.2	2382.6	4945
7	1092.1	4019.7	3949	2339.5	5131.5
8	1097.4	4032.5	3883.4	2295.6	5030
9	1064.8	4238.4	3811.2	2253.6	4983.2
10	1087.6	3939.8	3773.4	2413.1	5062.1
11	1087.3	4010.5	3858.3	2194.6	4900.6
12	1100	4071.7	3698.2	2302.9	4944
13	1069.8	4008	3848.2	2207.2	5044.5
14	1035.4	3975.3	3777.1	2223.6	4986.8
15	1070.6	4158.1	3869.4	2204.5	4939.9
16	1075.5	4202.9	3779.7	2353.8	5105.2
17	1074.2	3956.7	3833.4	2194	5021.8
18	1060.4	3747	3769.4	2314.2	5011.2
19	1082.6	3867.6	3845	2407.9	5115.3
20	1098.8	3600.4	3901.3	2323.5	5020.1
Average end time of 20 runs in seconds	1078.73	3995.385	3833.505	2297.15	5023.13
Average end time of 20 runs in hours : minutes	0:17	1:06	1:03	0:38	1:23

Scenario 6

- **Phases:** 1-4
- **Build Land Use:** Village 1, Village 3, Village 7, Business Park West, Institutional & Civic
- **Fire Approach Direction:** West/Northwest
- **Area Under Evacuation:** Village 1, 30% of Village 3, Business Park West, Existing

Destination Point / Number of Runs	Existing Exit East	Village 1 Exit East	30% of Village 3	Business Park West
1	1063.8	8673.7	2495.7	8394.7
2	1063.8	8673.7	2495.7	8394.7
3	1063.8	8673.7	2495.7	8394.7
4	1058.3	8814.1	2418.6	8497.6
5	1066.9	8756.4	2367.1	8403.3
6	1063.9	8623.1	2517.3	8389.1
7	1061.9	8546.6	2467.6	8391.1
8	1076.5	8771.9	2469.4	8439.4
9	1064.1	8895.1	2524.9	8497.5
10	1060.2	8647.8	2482.2	8304.2
11	1060.5	8796.7	2499.4	8538.2
12	1064.3	8788.7	2555.4	8529.8
13	1068.5	8865.8	2524.4	8725.1
14	1058	8902.7	2491	8672.9
15	1062.4	8821.9	2463.1	8608.7
16	1064.4	8756.8	2405.3	8538.4
17	1058.5	8952.6	2488.8	8792.2
18	1066.7	8776.6	2422.6	8579.6
19	1061.8	8820.5	2417.2	8595.6
20	1067.2	8698	2405.7	8459
Average end time of 20 runs in seconds	1063.775	8762.82	2470.355	8507.29
Average end time of 20 runs in hours : minutes	0:17	2:26	0:41	2:21

Scenario 7

- **Phases:** 1-6
- **Build Land Use:** Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic
- **Fire Approach Direction:** South/Southeast
- **Area Under Evacuation:** 50% of Village 7, Business Park West, Business Park Central, Institutional & Civic

Destination Point / Number of Runs	Village 7 Exit	Business West Exit	Central Business Exit	Civic Exit @ V3
1	2486.8	2982.1	3914.1	4735.7
2	2370.7	3030.5	4083.8	5027.2
3	2432.6	2951.7	4061.8	4780.5
4	2325.3	3017.6	3980.8	4829.8
5	2348.8	3017.9	3981.6	4832.5
6	2473.9	3018.1	4088.6	4794.6
7	2342	2973.9	3996.5	4838.6
8	2246.3	2933.4	4091.5	4993.9
9	2469.6	2924.1	4093	4706.7
10	2418.2	3047.8	4064.5	4877.2
11	2334.7	3044	4031.4	4789.8
12	2320.2	3029.8	4037.3	4829.4
13	2316.6	2967.2	3963.9	4684.1
14	2350.6	2992.7	4126.2	4944.8
15	2365.4	3072.7	4022	4789.6
16	2319.7	3036.7	3930.1	4788.1
17	2371.1	3105.8	3970.3	4951.4
18	2390.7	2984.8	4124.6	4911.1
19	2398.6	3007.3	3930.1	4788.1
20	2419.2	3048.8	4065.5	4878.2
Average end time of 20 runs in seconds	2375.05	3009.345	4027.88	4838.565
Average end time of 20 runs in hours : minutes	0:39	0:50	1:07	1:20

Scenario 8

- **Phases:** 1-6
- **Build Land Use:** Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic
- **Fire Approach Direction:** North/Northeast
- **Area Under Evacuation:** Village 6, Village 7

Destination Point / Number of Runs	Village 7 @ Lancaster	Village 6 @ V3	Village 6 @ V1	Village 6 @ I5
1	6630.8	12140.4	10255.3	12156.9
2	6573	12008.1	8989.8	12023.8
3	6688.5	12427.6	8918	12446.1
4	6495.3	12737.6	8982.9	12729.9
5	6582.6	12613.3	9334.3	12610.8
6	6612.2	12459.1	10191.4	12489.6
7	6610.7	12185.3	9234.8	12223.9
8	6491.3	12140.7	8678.1	12159.7
9	6691.8	12450.1	8967	12460.4
10	6373.7	12412.8	9062.6	12431.6
11	6472.3	12330.8	9273.5	12338.8
12	6492	12301	8898.1	12326.4
13	6511.2	12358.9	9049.1	12377.1
14	6468.2	12539.4	9214.8	12561.1
15	6636.5	12532.1	9027.3	12565.7
16	6544.4	12626.8	10214	12620.9
17	6585.4	12353.4	10253.9	12369.2
18	6918.4	12463.6	10295.7	12491.8
19	6660.8	12671	9127.8	12680.6
20	6469.7	12445.3	10239.4	12461.8
Average end time of 20 runs in seconds	6575.44	12409.87	9410.39	12426.31
Average end time of 20 runs in hours : minutes	1:49	3:26	2:36	3:27

Scenario 9

- **Phases:** 1-6
- **Build Land Use:** Village 1, Village 3, Village 6, Village 7, Village 9 West, Business Park West, Business Park Central, Institutional & Civic
- **Fire Approach Direction:** West/Northwest
- **Area Under Evacuation:** Village 1, Village 9 West, Existing

Destination Point / Number of Runs	Village 9 @ Village 3	Village 9 @ SR-135 / Business Park	Village 1 @ Village 3	Existing Exit
1	4266.4	3475.1	5052.1	1082.8
2	4171	3487.9	4880.9	1096.1
3	4267.2	3539.4	4894.1	1047.8
4	4318.3	3387.4	4834.8	1077.7
5	4215.9	3447.9	5043.5	1090.8
6	4214.6	3528.4	4962	1092.1
7	4530.6	3534	5057	1097.4
8	4336.3	3549.9	5042.8	1064.8
9	4082.2	3709.1	4801.9	1087.6
10	4218.4	3583.2	4912.4	1087.3
11	4250.2	3362.4	4990.2	1100
12	4380.1	3382.5	5009.4	1069.8
13	4292.5	3681	4926.7	1035.4
14	4215.9	3640.9	4940.2	1070.6
15	4207.2	3562.7	4831.1	1075.5
16	4236.9	3448.6	4894.2	1074.2
17	4183.9	3415.4	4892.1	1060.4
18	4356	3379.9	5018.6	1082.6
19	4218	3511.2	4863.3	1098.8
20	4299.6	3538.2	5024.3	1062.3
Average end time of 20 runs in seconds	4263.06	3508.255	4943.58	1077.7
Average end time of 20 runs in hours : minutes	1:11	0:58	1:22	0:17

Scenario 10

- **Phases:** 1-8
- **Build Land Use:** Village 1, Village 3, Village 7 E & West, Village 9 West, Village 6, Village 9 East, Village 8 West, Village 2, Village 4 South
- **Fire Approach Direction:** South/Southeast
- **Area Under Evacuation:** 50% of Village 7, Business Park West, Business Park Central, Business Park East, 30% of Institutional & Civic

Destination Point / Number of Runs	Village 7 Exit @ V6	Business West (1) Exit	Central Business Exit @ V1	Business East @V6	Civic Exit @ V3
1	4682	3967.3	2973.6	4859.6	1595.2
2	4510.9	4022.4	2855.7	4685.3	1637.6
3	4562.8	3966.7	2799.5	4646.4	1590.2
4	4502.9	4060.4	2870.9	4770.4	1589.9
5	4611.9	4003.2	2858.5	4725.1	1551.3
6	4696.6	4057.3	2842	4855.4	1489.1
7	4499.8	3975.8	2831.2	4736.3	1643.1
8	4461.4	3931.4	2876.4	4773.1	1615.8
9	4599.4	4003.3	2856	4693.1	1492.8
10	4639.6	4044.5	2847.6	4840.7	1586
11	4546.6	4085.5	2855.3	4679.1	1558.6
12	4538.6	4069.9	3009.1	4750.9	1454.5
13	4595.3	3988.8	2784.9	4865.4	1471.6
14	4501.8	4019.2	3000.5	4731.6	1615.7
15	4467.7	4058.5	2779.5	4628.8	1548.6
16	4521.9	4073	2933.8	4784.8	1549.4
17	4672.7	4093.8	2857.9	4910	1577
18	4561.4	4043.8	2832.3	4734.6	1563.1
19	4531.9	4080.5	2866.9	4782.1	1545
20	4315.2	3960.2	2879.7	4432.5	1664.1
Average end time of 20 runs in seconds	4551.02	4025.275	2870.565	4744.26	1566.93
Average end time of 20 runs in hours : minutes	1:15	1:07	0:47	1:19	0:26

Scenario 11

- **Phases:** 1-8
- **Build Land Use:** Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic
- **Fire Approach Direction:** North/Northeast
- **Area Under Evacuation:** 30% of Village 2, Village 4 South, 50% of Village 6, Village 8 West, 30% of Village 9

Destination Point / Number of Runs	Village 2 Exit	Village 4 Exit	Village 6 Exit	Village 8 Exit	Village 9 Exit
1	3199.2	3181.6	3204.2	3630.8	3008.1
2	3199.2	3181.6	3204.2	3630.8	3008.1
3	3322.1	3442.5	3316.1	3674.9	2923.8
4	3209	3316.6	3211.8	3778.5	2968.9
5	3211.2	3311.2	3191.2	3925.4	2960.7
6	3295.4	3264.1	3297.4	3746.1	3001
7	3118.8	3233.9	3106.1	3672.3	3038
8	3197.9	3118.2	3194.4	3646.7	3034.7
9	3233.7	3369.4	3224	3585.2	3079.1
10	3181.7	3016.2	3175.3	3706.5	2969.2
11	3150.9	3360.4	3133.9	3781.7	2961.9
12	3176.9	3426.5	3177.1	3745.1	2887.9
13	3137.6	3123.6	3134.9	3729.1	2860.2
14	3162.6	3091.5	3159.7	3723.5	2881.1
15	3229.2	3312	3229	3657.1	2895.7
16	3249.1	3218.4	3249.5	3633.4	2866.7
17	3259.7	3292.3	3260.3	3803.9	2846.1
18	3180.2	3089.8	3178	3725	2892.5
19	3204.3	3172.8	3213.6	3757.4	2936
20	3197	3187	3195.7	3844.5	2957.4
Average end time of 20 runs in seconds	3205.785	3235.48	3202.82	3719.895	2948.855
Average end time of 20 runs in hours : minutes	0:53	0:53	0:53	1:02	0:49

Scenario 12

- **Phases:** 1-8
- **Build Land Use:** Village 1, Village 2, Village 3, Village 6, Village 7, Village 9, Village 8 West, Village 4 South, Business Park West, Business Park Central, Business Park East, Institutional & Civic
- **Fire Approach Direction:** West/Northwest
- **Area Under Evacuation:** 30% of Village 1, 30% of Village 2, Village 4 South, Village 9

Destination Point / Number of Runs	Village 1 Exit @ Village 7	Village 2 Exit	Village 4 Exit	Village 9 Exit
1	3145.9	3421.3	2929.6	10626.3
2	3145.9	3421.3	2929.6	10626.3
3	3290.2	3717.4	3108.8	10674.9
4	3406	3444	2959.2	10670.8
5	3210.9	3479.5	2895.8	10676.9
6	3053.1	3290.7	2880.4	10752.8
7	3188.9	3396.1	2961.1	10852.7
8	3219.2	3368	2819.5	10863.7
9	3052.7	3646.8	3026.6	10761.9
10	3010.7	3384.1	2773.6	10593.5
11	2944.8	3481.6	2941.6	10522.7
12	3036.2	3532.4	2989.8	10750.7
13	3319.7	3318.6	2897.3	10692.6
14	3090.4	3399.6	2819.3	10664
15	3125.2	3520.4	3038.7	10589.1
16	3275.8	3327.7	2954.3	10611.1
17	3121.6	3484.5	2806.4	10652
18	2996.9	3523.3	2965.6	10692.5
19	3121.3	3453.7	2959.9	10697.9
20	3186.3	3190.1	2788.4	10679.8
Average end time of 20 runs in seconds	3147.085	3440.055	2922.275	10682.61
Average end time of 20 runs in hours : minutes	0:52	0:57	0:48	2:58

Scenario 13

- **Phases:** 1-10
- **Build Land Use:** Buildout
- **Fire Approach Direction:** South/Southeast
- **Area Under Evacuation:** Business Park West, Business Park Central, Business Park East, 30% of Institutional & Civic, 50% of Village 7, Village 8 East

Destination Point / Number of Runs	Business West (1) Exit	Central Business Exit @ V1	Business East Exit	Civic Exit @ V3	Village 7 Exit @ V6	Village 8 Exit
1	3967.3	3283.8	5631.8	1585.8	5804	8477.7
2	3967.3	3138.6	5631.8	1619.3	5804	8477.7
3	4022.4	3397	5508.5	1712.6	5402.7	8328.5
4	3966.7	3329	5382.4	1593	5864.6	8531.8
5	4060.4	3181.2	5437.5	1606.8	5388.9	8566.9
6	4003.2	3162	5596.4	1583.7	5599.1	8501.2
7	4057.3	3379.7	5566.4	1472.9	5549.3	8627.1
8	3975.8	3452.8	5536.6	1723.5	5336.2	8366.4
9	3931.4	3346.8	5444.7	1580.9	5242.8	8310.2
10	4003.3	3275.9	5541.6	1506.8	5941.4	8575.4
11	4044.5	3406.2	5621.1	1570.6	5568.8	8609.4
12	4085.5	3352.3	5506.9	1587.2	5458.8	8481
13	4069.9	3450.4	5470.5	1472.1	5562	8411.3
14	3988.8	3146.1	5643.8	1466.6	5381	8301.2
15	4019.2	3484	5520.7	1604.4	5388	8227.4
16	4058.5	3310.5	5313.5	1600.2	5733.2	8362.8
17	4073	3219.3	5456.7	1565.1	5330.4	8372.5
18	4093.8	3200.4	5665.2	1606.4	5684.1	8673.5
19	4043.8	3443.6	5540.5	1621.3	5839.4	8499.3
20	4080.5	3314.7	5479.1	1598.5	5591	8442.7
Average end time of 20 runs in seconds	4025.63	3313.715	5524.785	1583.885	5573.485	8457.2
Average end time of 20 runs in hours : minutes	1:07	0:55	1:32	0:26	1:32	2:20

Scenario 14

- **Phases:** 1-10
- **Build Land Use:** Buildout
- **Fire Approach Direction:** North/Northeast
- **Area Under Evacuation:** 30% of Village 4, Village 5, 30% of Village 6, Village 8 West, Village 8 East

Destination Point / Number of Runs	Village 4 Exit	Village 5 Exit	Village 6 Exit	Village 8 West Exit	Village 8 East Exit
1	3091.9	24651.8	2114.8	16260.3	12377.7
2	3091.9	24651.8	2114.8	16260.3	12377.7
3	2909.5	24282.6	1929.5	16780.7	11188.4
4	3073.5	24467.4	2104.5	16409.1	10924.8
5	3093.2	24166.7	2327.3	16565.2	10892.7
6	3141.7	23930.2	2207.7	16091.7	11342.7
7	3106.4	23763.4	1911.6	15660.6	11040.6
8	2985.8	24136	1958.6	15824.1	11233.1
9	3238.1	24166.3	1901.5	16881.6	10964.6
10	3739.5	24016.3	1939.6	16709.5	10968.3
11	2962.4	24045.7	2109.7	15747.4	10994.6
12	3055	23932.5	2033.5	16515.9	11084.8
13	3067.7	23981.2	2019.5	16141.2	11243.7
14	2836.8	23915.1	1895.1	16050.9	11039.2
15	2949.5	24324.3	2107.3	16530.2	11086
16	3030.8	24000.4	2011.8	16781.7	10847.4
17	3269.9	24057.6	2134.6	16460.2	10594.2
18	3133.4	23799	2097.1	16993.5	10938
19	2882.7	23777.8	1979.3	16224.7	10808.4
20	2968.6	24054.6	2000.6	16682.4	11263.5
Average end time of 20 runs in seconds	3081.415	24106.035	2044.92	16378.56	11160.52
Average end time of 20 runs in hours : minutes	0:51	6:41	0:34	4:32	3:06

Scenario 15

- **Phases:** 1-10
- **Build Land Use:** Buildout
- **Fire Approach Direction:** West/Northwest
- **Area Under Evacuation:** 30% of Village 2, 50% of Village 4, 50% of Village 5, Village 9

Destination Point / Number of Runs	Village 2 Exit	Village 4 Exit	Village 5 Exit	Village 9 Exit
1	3992.5	4042	9477.5	6793.2
2	3992.5	4042	9477.5	6793.2
3	4628.9	3828.5	10401.8	6706.2
4	4177.9	4230.9	10427.9	6791.9
5	4164.2	4329.8	9421.6	6739.6
6	4604.2	4343.1	9269	6913.2
7	4300.2	4042.7	9102.8	7037.9
8	4483.7	3679.9	9315.8	7172.6
9	4706	4026	9217.8	7037.9
10	4251.1	4207.3	9279.9	6813.3
11	4258.7	4069.9	9313.9	6665.3
12	4450.6	4130.6	9235.2	6856.5
13	4094.5	4070.7	9266	6793.3
14	4555.3	4030.2	9355.9	6967.6
15	4187.3	3993.8	9458.5	6667.1
16	3923.5	4151	9324.7	6708.8
17	4541.3	4135.3	9389.7	6704.1
18	4295.6	4403.2	9341.2	6859.4
19	4234.8	4032.1	9447	6833
20	4221.1	4072.4	9359	6850.3
Average end time of 20 runs in seconds	4303.195	4093.07	9444.135	6835.22
Average end time of 20 runs in hours : minutes	1:11	1:08	2:37	1:53