Appendix J-1

Fire Protection Plan

DRAFT

Fire Protection Plan

SDSU Evolve Student Housing Project

DECEMBER 2024

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AMSL	Above Mean Sea Level
APN	Assessor's Parcel Number
CAL FIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CBC	California Building Code
CFC	California Fire Code
CMU	Concrete Masonry Unit
DU	Dwelling Units
EMS	Emergency Medical Service
FAHJ	Fire Authority Having Jurisdiction
FMZ	Fuel Modification Zone
FPP	Fire Protection Plan
FRAP	Fire and Resource Assessment Program
GIS	Geographic Information System
HFR	Heartland Fire & Rescue Department
IBHS	Insurance Institute for Business and Home Safety
LRA	Local Responsibility Area
MPH	Miles Per Hour
NFPA	National Fire Protection Association
NWS	National Weather Service
OSFM	Office of the State Fire Marshal
PRC	Public Resources Code
RAWS	Remote Access Weather Station
SDFRD	San Diego Fire-Rescue Department
SMFD	San Miguel Fire Department
USDA	United States Department of Agriculture
VHFHSZ	Very High Fire Hazard Severity Zone
WUI	Wildland Urban Interface

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Executive Summary

This Fire Protection Plan (FPP), including related wildland fire risk analysis, provides a detailed analysis of the Proposed Project (Project), the potential risk from wildfire, and potential impacts on the San Diego Fire-Rescue Department (SDFRD), as well as an analysis of meeting or exceeding the requirements of the Office of State Fire Marshall (OSFM). Furthermore, the FPP provides requirements, recommendations, and measures to reduce the risk and potential impacts to acceptable levels, as determined by the OSFM.

The FPP was prepared in consideration of the requirements of the California Environmental Quality Act (CEQA), including the requirement to analyze whether the Proposed Evolve Student Housing Project would expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. The FPP evaluates and identifies the potential fire risk associated with the Proposed Project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, and fire protection systems, among other pertinent fire protection criteria. The purpose of the FPP is to generate and memorialize the fire safety requirements and standards of the OSFM along with project-specific measures based on the unique conditions present on the Project Site, its intended use, and its fire environment.

The Proposed Project involves the construction and development of new student housing, dining, and auxiliary uses on and adjacent to SDSU's main campus. The Proposed Project is comprised of two components – the Peninsula Component, which would be located adjacent to the main San Diego State University (SDSU) campus at the northern terminus of 55th Street; and the University Towers East Component, which would be located east and immediately adjacent to the existing University Towers on Montezuma Road.

The proposed Peninsula Component would be located on an approximately 10.3-acre site adjacent to the northwest portion of campus, just south of Interstate-8 (I-8) and west of Canyon Crest Drive. Development of the Peninsula Component would include demolition of all 13 existing buildings, which presently provides housing for 702 students, and the phased development of one 9-story student housing building and five student housing buildings up to 13 stories in height that would contain a total of approximately 4,450 student beds. The proposed University Towers East Component would be developed on an approximately 1.1-acre site located immediately east of the existing University Towers Building, south of Montezuma Road. The existing parking lot would be demolished to allow for redevelopment of the site to include a new 9-story student housing building that would accommodate approximately 720 students. Development of the Proposed Project would result in approximately 5,170 new student beds, a net increase of approximately 4,468 student beds to the main campus inventory.

The Peninsula Component of the Proposed Project lies within an area considered a Very High Fire Hazard Severity Zone (VHFHSZ), as designated by the California Department of Forestry and Fire Protection (CAL FIRE) and City of San Diego. Fire hazard designations are based on topography, vegetation, and weather, amongst other factors. VHFHSZ designation does not indicate that an area is not safe for development. It does indicate that specific fire protection features that minimize structure vulnerability will be required, including compliance with provisions set forth in Chapter 7A of the 2022 California Building Code (CBC) and provisions for maintaining fuel modification zones, amongst other features described in this FPP.

The Peninsula Component site currently contains six, two-story apartment-style student housing buildings, a three-story apartment-style student housing building, the SDSU International Student Center, the SDSU Passport Office, the SDSU Global Education Office, the SDSU Faculty International Engagement Office, and associated amenities (i.e., parking spaces, sidewalks, landscaped areas, etc.). The University Towers East Component site is currently utilized as a parking lot adjacent to University Towers student housing, which is located immediately east of the Project site. The University Towers East component Project site is situated on the interior portion of the relatively flat-lying natural terrace and is not immediately adjacent to any current or historic canyons. The Peninsula Component site is situated on a ridge of preserved terrace immediately south of Alvarado Canyon, between two relatively deep secondary canyons to the east and west. Steep slopes descend from the relatively flat-lying terrace into the canyons to the west, north, and east at gradients of 2:1 to 2.5:1 (horizontal to vertical units). Elevations on the Peninsula range from approximately 380 feet above mean sea level (amsl) at the northwestern point to approximately 420 feet amsl at the southern end at the intersection of Aztec Circle Drive and 55th Street.

Fire service for the Proposed Project would be provided by the SDFRD, specifically Stations 10, 31 and 17. The projected Proposed Project population and estimated number of calculated emergency calls were evaluated for their potential to impact SDFRD's response capabilities from its nearest existing stations. As detailed in this FPP, the Proposed Project would add fewer than 525 additional calls per year (Approximately 1 to 2 calls per day) to Station 10's 4,976 annual call volume, Station 31's 1,585 annual call volume, and Station 17's 5,600 annual call volume. The primary responding SDFRD stations, Stations 10, 31, and 17 would have response times that all conform to the SDFRD's response time standard of arriving on scene within 7 minutes and 30 seconds 90% of the time for both sites according to both the Speed Limit and Verisk formulas except for when Stations 31 and 17 would be in response to the furthest extent of the Peninsula component according to the Verisk formula. However, Stations 31 and 17 stations would primarily be responsible for secondary response and Station 10 would be capable of providing primary response as the first-in unit to all portions of the Proposed Project within SDFRD response time standards.

As determined during the analysis of the site and its fire environment, the Project site, in its current condition prior to implementation of the Proposed Project, and depending on the time of year, may include characteristics that, under favorable weather conditions, could have the potential to facilitate fire spread. Under extreme conditions, wind-driven wildfires from the west, north, and east may cast embers onto the property. More importantly, once the Proposed Project is in operation, the on-site fire hazard would be lower than its current condition due to fire safety requirements that would be implemented on the site. The proposed residential structures would be built using ignition-resistant Type I-B construction materials exceeding the 2022 California Fire and 2022 California Building Codes (including Chapter 7-A – focusing on structure ignition resistance from flame impingement and flying embers in areas designated as high fire hazard areas). The Proposed Project would also comply with Chapter 49 of the CFC which discusses development requirements in Wildland Urban Interface (WUI) areas. This would be complemented by:

- Site-wide, ignition resistant landscapes,
- Perimeter fuel modification zone
- Ample water availability and delivery system
- Project area firefighting resources,
- Fire department access throughout the developed areas,
- Monitored defensible space/fuel modification,
- Interior, automatic fire sprinkler systems in all structures,
- Fire response travel times based on city response guidelines, and
- Other components would provide properly equipped and maintained structures with a high level of fire ignition resistance.

Post-wildfire save and loss assessments have revealed specifics of how structures and landscapes can be constructed and maintained to minimize their vulnerability to wildfire. Among the findings following past wildfires in the San Diego region were: how construction materials and methods protect structures, how fire and embers contributed to the ignition of structures, what effects fuel modification had on structure ignition, the benefits of fast firefighter response, and how much (and how reliable) water was available. These findings are critically important to structure survivability. Following these findings over the last 20 years and continuing on an ongoing basis, the Fire and Building codes have been revised, appropriately. California now contains some of the most restrictive building codes in the country, in the world? for building within Wildland Urban Interface (WUI) areas that focus on preventing structure ignition from heat, flame, and burning embers.

As discussed in this report, the fire risk analysis conducted for the Proposed Project resulted in the determination that wildfire has little historical presence in proximity to the Project site due to expansive development, and the Proposed Project would provide ignition-resistant landscapes (drought-tolerant and low-fuel-volume plants), ignition-resistant structures, and defensible space with the implementation of specified fire safety measures. Based on modeling and analysis of the Project area to assess its unique fire risk and fire behavior, it was determined that the provided, nearly complete 100-foot-wide fuel modification zones (FMZs), with a code-exceeding Zone A, would provide a sufficient buffer to separate the site's structures from off-site fuels. The FMZ, when properly maintained, will effectively minimize the potential for structure ignition from direct flame impingement or radiant heat. The FMZs will be constructed from the structure outward toward undeveloped areas. In areas where the FMZs are restricted by parcel size and would not be able to achieve a full 100 feet in width, alternative materials & methods (AM&M) of construction are proposed for the adjacent building to meet the intent of the applicable codes. As required in the CFC, the FMZs for the Proposed Project would be maintained in perpetuity by the development's responsible, managing entity.

In conclusion, while the natural fuel beds adjacent to the Peninsular Component of the Proposed Project do pose a wildfire hazard, those hazards are minimized with the inclusion of nearly complete 100-foot wide FMZs, a looped fire access road network throughout the site providing access to all structures, as well secondary access to Aztec Circle Drive, ignition resistant buildings that would exceed the requirements of Chapter 7A of the CBC, ample provided water supply for fire suppression personnel, and National Fire Protection Association (NFPA) 13 compliant sprinkler systems throughout all buildings. Finally, the response capabilities of existing SDFRD stations to respond to all portions of the site within SDFRD's response time standards. Firstly, there are few wildfires on historical record in the past century within 5 miles of the Proposed Project which shows that while the fuels adjacent to the Project site do pose a hazard, the likelihood of an ignition and subsequent establishment of a structure-threatening wildfire is unlikely. If it were to occur, fire behavior would be reduced as it approached the ignition-resistant structures of the Proposed Project due to nearly complete 100-foot-wide FMZs that would include a non-combustible, looping, perimeter fire access road. This road, along with interior fire access roads would provide suppression personnel access within 150 feet of all first-story portions of all buildings where they would have an unimpeded path around each building and water supplies that would be code compliant in locations, volume, pressure and duration. SDFRD Station 10 would be able to reach all portions of both components of the Proposed Project within SDFRD response time standards while multiple other stations could also serve as the first-in unit to portions of the Proposed Project according to at least one calculation method and further stations could be available for a secondary response if needed. These measures, along with others described throughout this document, form the layered fire protection system that would serve to reduce the wildfire risk to Proposed Project structures and occupants.

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1 Introduction

This Fire Protection Plan (FPP) has been prepared for the proposed SDSU Evolve Student Housing Project in San Diego, California. The purpose of the FPP is to evaluate the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those risks to a level consistent with the OSFM thresholds. Additionally, the purpose of the plan is to generate and memorialize the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the OSFM, as well as to include analysis consistent with the requirements of the CEQA. Additionally, the San Diego Fire-Rescue Department (SDFRD) would provide emergency response to the Proposed Project, and therefore this FPP also evaluates the access and water supply for the Proposed Project for compliance with SDFRD requirements. Requirements and recommendations detailed in the FPP are based on site-specific characteristics, applicable code requirements, and input from the California State University/San Diego State University (SDSU), project planners, engineers, and architects.

As part of the assessment, the FPP has considered the fire risk presented by the Project site including the property location and its topography, geology, surrounding combustible vegetation (fuel types), climatic conditions, fire history, and the proposed land use. The FPP addresses water supply, access, structural ignitability, ignition resistive building features, fire protection systems and equipment, impacts on existing emergency services, defensible space, and vegetation management. The FPP also identifies fuel modification zones and recommends the types and methods of treatment that, when implemented and maintained, are designed to protect the Project's assets. In the limited areas where FMZs are not able to be code compliant in width due to Project Site constraints, AM&M has been proposed. The FPP also recommends measures for developers/builders and the Proposed Project's managing/responsible entity to implement in order to reduce the probability of structural and vegetation ignition. The Proposed Project is under the jurisdiction of the OSFM, but would be responded to by the SDFRD and thus the FPP addresses the SDFRD's response capabilities and response travel time within the Project Area.

The following tasks were performed toward the completion of this FPP:

- Gather site-specific climate, terrain, and fuel data,
- Collect site photographs. Field observations were used to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in the FPP. Refer to Appendix A, Representative Site Photographs, for site photographs of existing site conditions,
- Process and analyze the data using the latest geographic information system (GIS) technology,
- Predict fire behavior using scientifically based fire behavior models, comparisons with actual wildfires in similar terrain and fuels, and experienced judgment,
- Analyze and guide the design of proposed infrastructure,
- Analyze the existing emergency response capabilities,
- Assess the wildfire risk associated with the Project Site,
- Evaluate nearby firefighting and emergency medical response resources, and
- Detail how fire risk will be mitigated through a system of fuel modification, structural ignition resistance enhancements, and fire protection delivery system upgrades.

1.1 Project Summary

The Proposed Project is the construction and development of new student housing, dining, and auxiliary uses on and adjacent to SDSU's main campus. The Proposed Project is comprised of two components -- the Peninsula Component, which would be located adjacent to the main SDSU campus at the northern terminus of 55th Street; and the University Towers East Component, which would be located east and immediately adjacent to the existing University Towers on Montezuma Road. (refer to Figures 1, *Regional Map,* and Figure 2, *Project Vicinity Map*.)

The proposed Peninsula Component would be located on an approximately 10.3-acre site adjacent to the northwest portion of campus, just south of Interstate-8 (I-8) and west of Canyon Crest Drive. Development of the Peninsula Component would include demolition of all 13 existing buildings, which presently provide housing for 702 students, and the phased development of one 9-story student housing building and five student housing buildings up to 13 stories in height that would contain a total of approximately 4,450 student beds. The proposed University Towers East Component would be developed on an approximately 1.1-acre site located immediately east of the existing University Towers Building, south of Montezuma Road. The existing parking lot would be demolished to allow for redevelopment of the site to include a new 9-story student housing building that would accommodate approximately 720 students. Development of the Proposed Project would result in approximately 5,170 new student beds, a net increase of approximately 4,468 student beds to the main campus inventory.

1.1.1 Location

The SDSU campus is located along the I-8 corridor, approximately 8 miles from downtown San Diego (See Figure 1, *Regional Map* and Figure 2, *Project Vicinity Map*). The campus is located within the College Area Community of the City of San Diego. The College Area Community is characterized by SDSU as a major hub of activity, single and multi-family residential uses and neighborhood commercial developments that serve the surrounding community, including SDSU.

The proposed Peninsula Component would be located within the approximately 10.3-acre site at the northern terminus of 55th Steet, adjacent to the northwest portion of campus just south of Interstate-8 and west of Canyon Crest Drive (see Figures 3a - 3b, *Site Plan – Peninsula Component*). The proposed University Towers East Component would be located on an approximately 1.1-acre site on Montezuma Road that is currently utilized as a parking lot (see Figure 3c, *Site Plan -- University Towers East Component*). The Peninsula component is located in a Very High Fire Hazard Severity Zone (VHFHSZ) (see Figure 4, Project Fire Hazard Severity Zone Map) as determined by CAL FIRE and adopted by the City of San Diego.

The SDSU campus can be accessed from the north by College Avenue, which also provides local access to I-8. The campus can be accessed from the east or west by Montezuma Road, an east–west roadway near the southern boundary of the campus, and accessed from the south via College Avenue.

1.1.2 Current Land Use

Peninsula Component

The Peninsula component site currently contains six, two-story apartment-style student housing buildings, a three-story apartment-style student housing building, the SDSU International Student Center complex, the SDSU Passport Office, the SDSU Global Education Office, the SDSU Faculty International Engagement Office, and associated amenities (i.e., parking spaces, sidewalks, landscaped areas, etc.). The existing student housing buildings at the Peninsula Component site provide 702 student beds.

Surrounding uses include open space and residential housing to the west, open space, I-8, and residential housing to the north. University uses including parking, recreational fields, academic buildings, and student housing buildings are located to the east, south, and southwest of the Peninsula Component project site.

University Towers East Component

The University Towers East Component site is currently utilized as a parking lot adjacent to University Towers, which is located immediately east of the Project site. The existing parking lot provides 125 parking stalls. Surrounding uses include residential housing to the east, south and west. The site is bordered on the south by Mary Lane Drive, which separates the site from the adjacent single-family residences. Montezuma Road and university uses, including student-housing and recreation fields, are located to the north of the Project site.

1.1.3 Project Description

Peninsula Component

The Peninsula Component would involve the phased development of six student housing buildings, including one 9-story building and five buildings up to 13 stories in height, that would contain a total of approximately 4,450 student beds (see Figure 3a, Peninsula Component Site Plan Layout). The first phase of the Proposed Project would include the University Towers East component, the Amenities building, and Building 1 of the Peninsula component (see Figure 5, Phasing Schedule).

The nine-story building, which would be comprised of double rooms with ensuite bathrooms, would accommodate approximately 650 student beds. The nine-story building would be approximately 144,000 square feet in size, with each of the nine floors encompassing approximately 16,000 square feet. Every floor (excluding the ground-level floor) would include approximately 38, approximately 300 square foot units. Each unit in the nine-story building would include a private restroom shared by the unit residents. In total, the nine-story building would include 323 units and approximately 650 student beds. Building services, such as mechanical and electrical rooms, would be located on the ground level floor along the proposed service road. The ground level floor would also include laundry facilities. Social spaces would be distributed throughout the residential floors.

The five buildings to be built up to 13 stories in height (Apartment Buildings 1 through 5) would each have approximately 174,240 square feet, based on an estimated approximately 13,403 square feet per floor. The Apartment Buildings would primarily include 4-bedroom, 2-bathroom apartment-style units and 2-bedroom, 1 bathroom apartment-style units. Each Apartment Building would accommodate approximately 760 student beds, totaling approximately 3,800 student beds across all five buildings. Each building would include 95 units (95 4-bedroom units and 0 2-bedroom units). The 4-bedroom, 2-bathroom units would be approximately 1,600 square feet in size and would accommodate up to 8 student beds per unit. Every Apartment Building unit would include a kitchen equipped with a sink, stovetop, oven, and refrigerator. Laundry facilities and building services in Apartment Buildings 1 through 5 would be located on the ground-level floors. The proposed Peninsula component would also include a new two-story amenity building, approximately 23,000 square feet in size, that would be utilized for dining and other student use purposes.

Development of the Peninsula Component would result in a total of approximately 4,450 student beds. Demolition of the existing buildings would result in the removal of 702 existing onsite beds; thus, the Peninsula Component of the Proposed Project would result in a net increase of approximately 3,748 additional student beds in this location.

The existing Peninsula Component site contains approximately 400,000 square feet of impervious surfaces and approximately 190 trees. To accommodate the Project, approximately 190 trees would be removed. The Project proposes to install approximately 285,000 square feet of landscaping, including 195 trees, and 170,000 square feet of hardscaping. The landscape plan would include a combination of accent trees, shade trees, and drought tolerant plant material. The proposed irrigation system would include water-saving components such as a weather-based controller, rain shutoff device, master valve, flow sensor and efficient spray and drip irrigation.

Access to the proposed Peninsula Component housing would be provided via 55th Street, which is connected to the larger street system via Canyon Crest Drive, Remington Road, and Montezuma Road. Public vehicular access would terminate at the main entry arrival area, which would feature a turnaround for drop-offs, ridesharing, and pick-ups. Parking would be provided for operational uses, and short-term parking would be designated for deliveries and brief visits. Parking for student residents with vehicles would be available in existing SDSU parking lots and structures (see Figure 3a, *Proposed Peninsula Component Site Plan*).

A perimeter road would circle the proposed development. This road would be designated for pedestrians, student micro-mobility devices, and utility/service and emergency vehicle access. On event days (such as move-in or move-out), the perimeter road would be open to limited vehicular use. In addition to providing site circulation, the perimeter road would comply with the secondary access requirements (Section 503.1.6 of the CFC), as well double as a wellness and fitness path, accommodating a two-way bicycle/micro-mobility path, and a separate pedestrian path. This roadway would link outdoor amenity spaces and offer panoramic views of the central campus and surrounding canyons. The proposed perimeter road would also serve as a minimum 26-foot-wide secondary emergency vehicle fire access roadway. The fire lane is expected to consist of a pedestrian-friendly hardscape surface with adjacent turf blocks, porous pavers, or other suitable materials to blur the edges of the fire lane while still meeting the required vehicular loading standards for fire apparatus.

The Peninsula Component site would be enclosed by a security fence encompassing the peninsula area, effectively preventing non-resident pedestrian and vehicular access. This barrier would also secure the area against unauthorized entry from the surrounding community and canyon area. Pedestrian access will be secured with card readers at the primary pedestrian entry gate adjacent to the drop-off. Vehicular gates at the main entry and loop road's end would further ensure fire access throughout the development. All building lobbies would be situated to maintain visibility from the main circulation paths.

University Towers East Component

The existing parking lot at the University Towers East Component site would be removed to allow for redevelopment of the site to include one 9-story student-housing building that would include approximately 720 student beds (see Figure 3c, *University Towers East Component Site Plan Layout*). The proposed University Towers East building would be site-planned as a horseshoe layout, with a courtyard plaza located in the middle of the building. The building would be approximately 133,200 square feet, with each floor encompassing approximately 14,800 square feet. Each floor (aside from the ground-level floor) would include approximately 42, 165 square-foot units, and up to 3 student beds per unit. The ground level floor would include a lobby, resident lounge, mail room, and other maintenance rooms (e.g., mechanical, plumbing, trash, etc.). Table 2-2, Proposed Evolve Student Housing Summary, provides a summary of the proposed elements of the University Towers East Component.

The University Towers East Component site contains approximately 50,000 square feet of existing impervious surfaces. Additionally, the site contains approximately 46 palm trees. To accommodate the Project, approximately 29 palm trees would be removed. As part of the Proposed Project, approximately 14,000 square feet of landscaping, including 30 trees, and 24,000 square feet of hardscaping would be installed. The Proposed Project would include streetscaping along Montezuma Road to include lighting and canopy trees to be aesthetically consistent with the existing character along the frontage of the site. Similar to the Peninsula Component, the landscape plan for the University Towers East Component would include a combination of accent trees, shade trees, and drought tolerant plant material. The proposed irrigation system would include water-saving components such as a weather-based controller, rain shutoff device, master valve, flow sensor and efficient spray and drip irrigation.

The proposed University Towers East Component would be accessed by Montezuma Road to the immediate north and Mary Lane Alley to the immediate south. A security fence would be installed to provide security connecting to the existing University Towers Building. Access gates for residents would be provided at three locations. As with the Peninsula Component, parking for student residents of the University Towers East Component would be available in existing SDSU parking lots and structures (see Figure 3c, Proposed University Towers East Components Site Plan).

There is an existing fire access lane between the existing University Towers building and the proposed building. This fire access lane provides the fire department access to a standpipe along the eastern portion of the existing University Towers building. Further coordination would be required with the fire department to understand if this existing fire access lane can be removed during the construction stage. The Proposed Project would also include a fire lane located along the alley situated south of the proposed building and an additional fire lane located along Montezuma Road.

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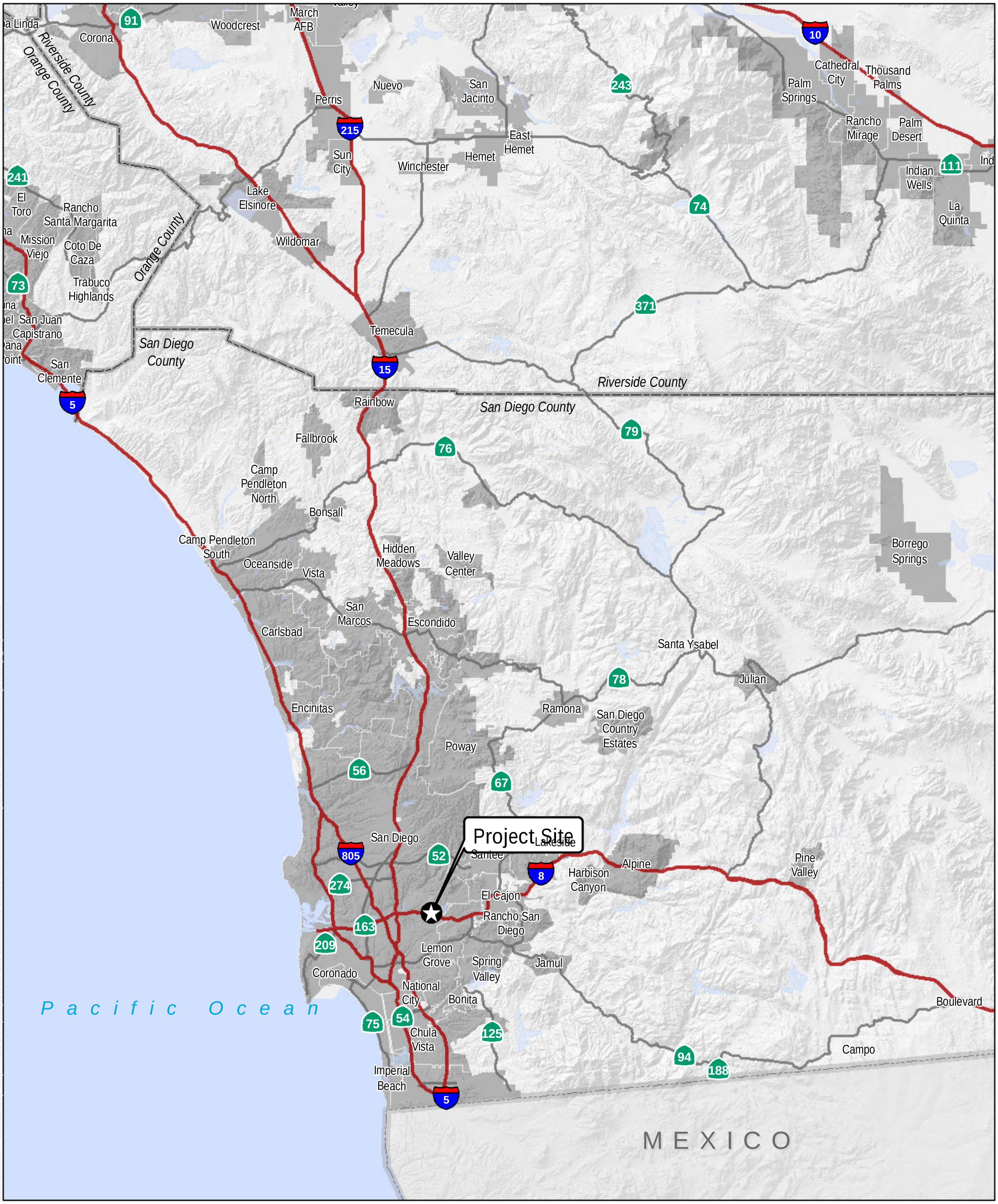

SOURCE: SOURCE: ESRI

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FIGURE 1
Regional Map
Fire Protection Plan for the SDSU Evolve Student Housing Project

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SOURCE: AERIAL - SANGIS IMAGERY 2023

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0 500 1,000 Feet

FIGURE 2

Vicinity Map

Fire Protection Plan for the SDSU Evolve Student Housing Project

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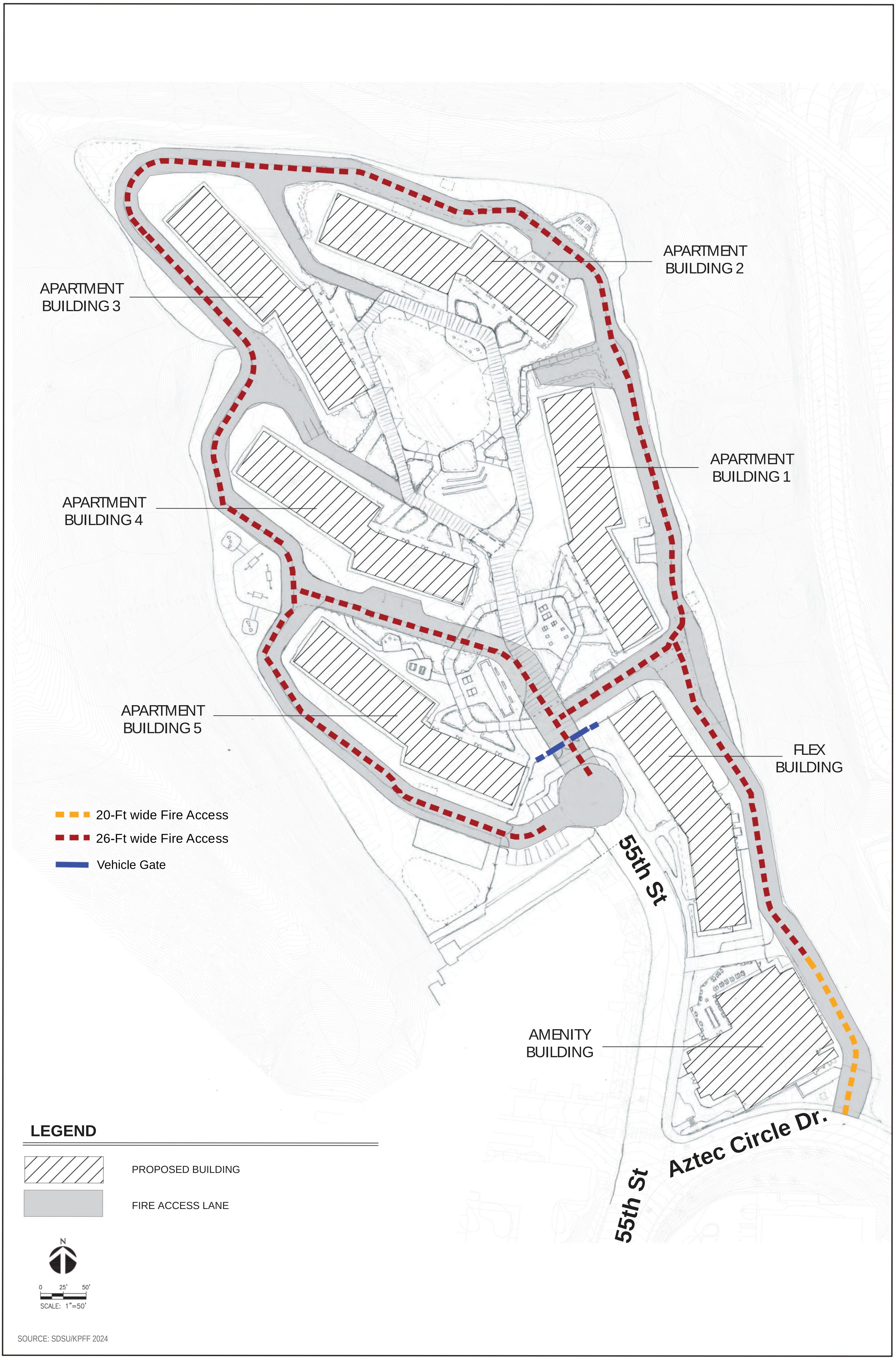

FIGURE 3A

Proposed Peninsula Component Site Plan

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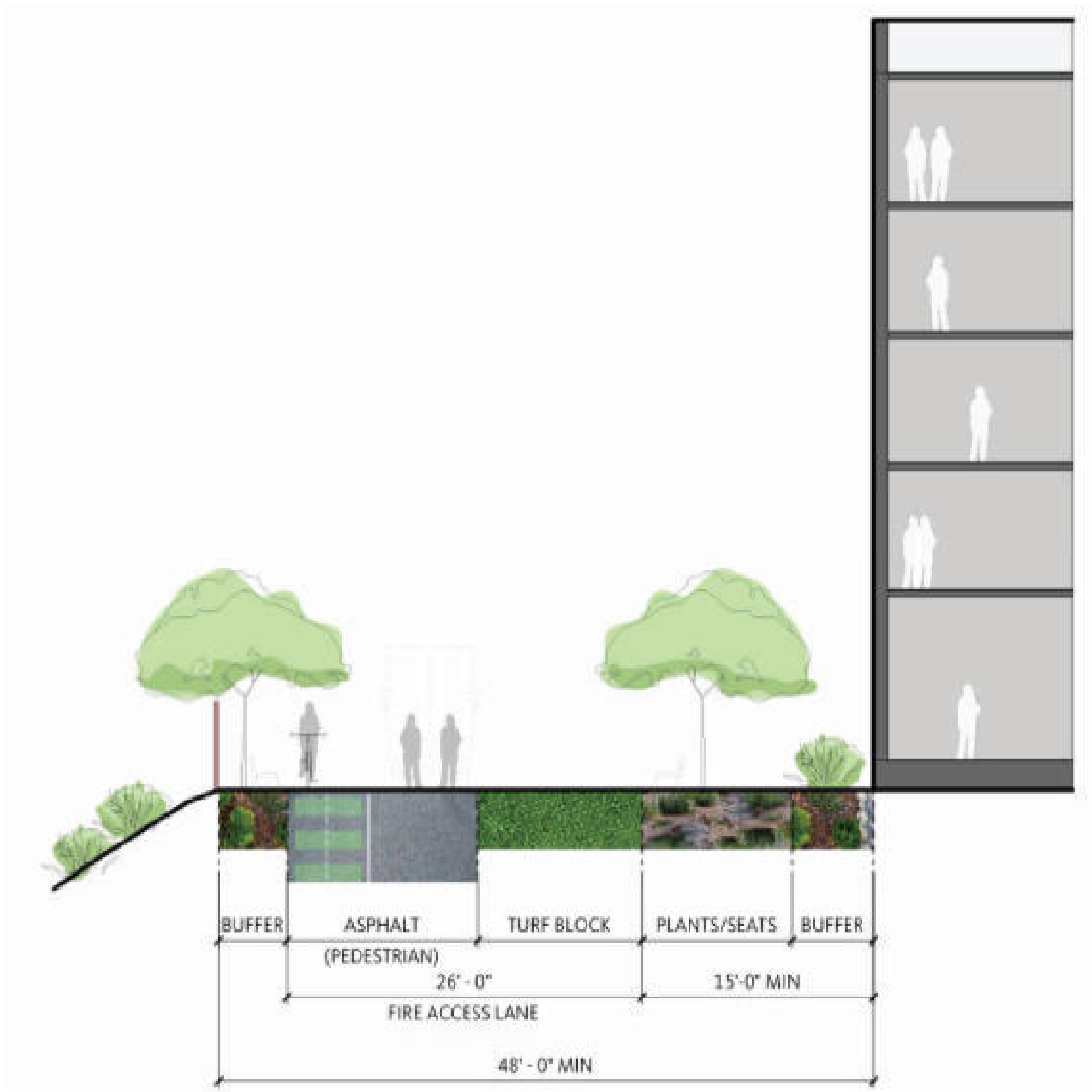

SOURCE: SDSU 2024

FIGURE 3B

Proposed Peninsula Perimeter Road Detail

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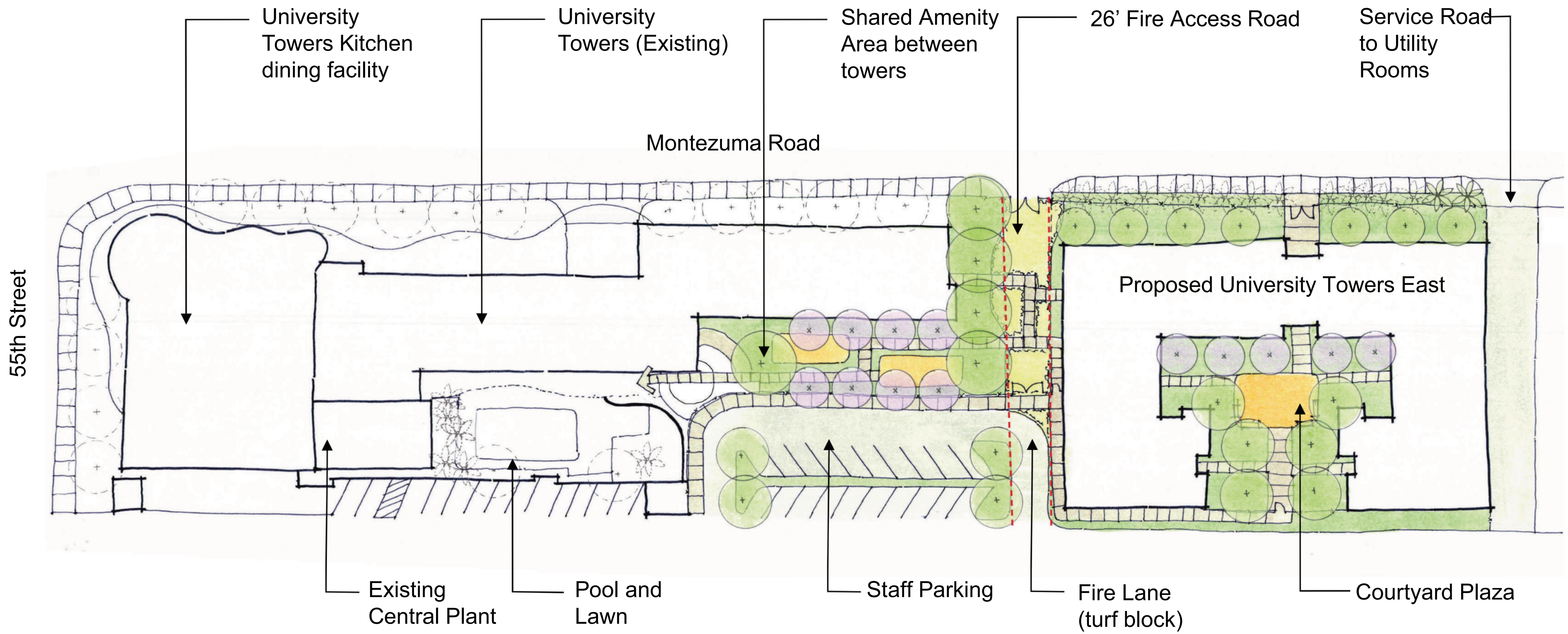

SOURCE: SDSU 2024

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FIGURE 3C

Proposed University Towers East Component Site Plan

Fire Protection Plan for the SDSU Evolve Student Housing Project

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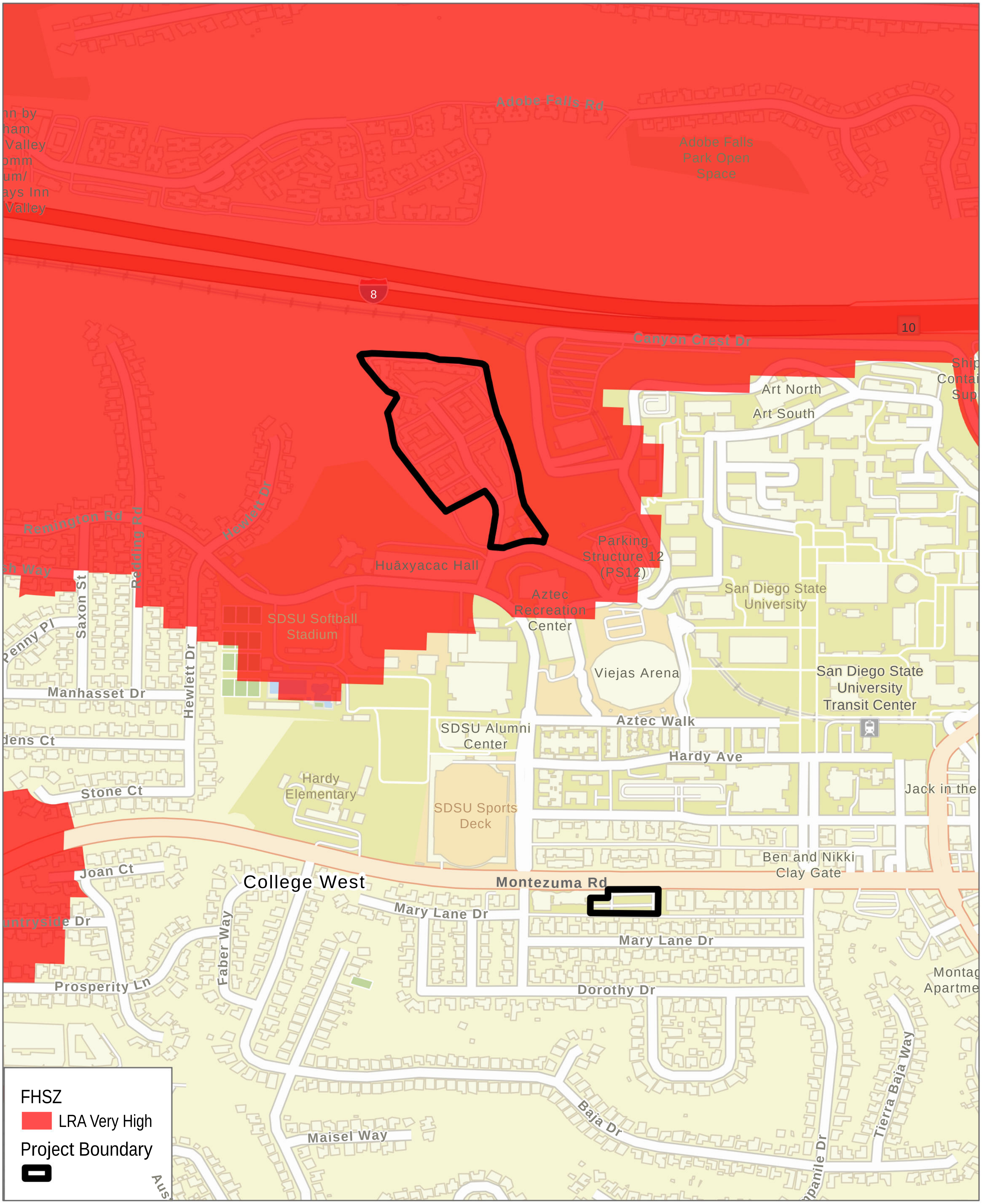

SOURCE: ESRI; CAL FIRE

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0 350 700 Feet

FIGURE 4

Fire Hazard Severity Zone

Fire Protection Plan for the SDSU Evolve Student Housing Project

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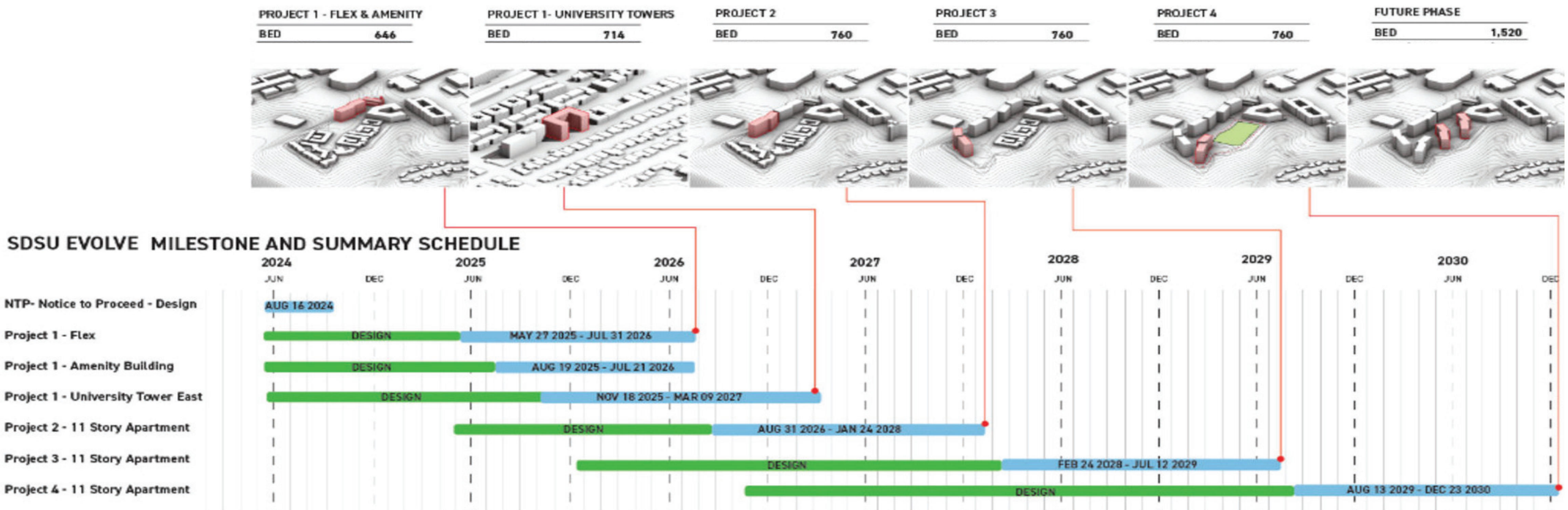

SOURCE: SDSU 2024

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FIGURE 5

SDSU Evolve Student Housing Project Phasing Plan

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1.2 Applicable Codes/Existing Regulations

As explained throughout this FPP, the Proposed Project would comply with all applicable portions of federal, state, and local regulations governing fire protection and developments within VHFHSZs. A summary of applicable codes and existing regulations is provided below:

1.2.1 Applicable Federal Codes/Existing Regulations

1.2.1.1 National Fire Protection Association (NFPA) Codes, Standards, Practices, and Guides

NFPA codes, standards, recommended practices, and guides are developed through a consensus standards development process approved by the American National Standards Institute. NFPA standards are recommended guidelines and nationally accepted good practices in fire protection, although they are not binding laws or regulations. Nonetheless, Automatic Fire Sprinklers for the Proposed Project would be chosen and installed in accordance with NFPA 13. NFPA 13 is the standard for the design and installation of automatic fire sprinkler systems in a building. It provides the requirements for the type of system needed in a particular occupancy, water supply, sprinkler head flow and pressures, the locations of sprinkler heads, and installation of the system. This standard is referenced by the California Fire Code.

1.2.1.2 International Fire Code

The International Fire Code (IFC) addresses a wide variety of hazardous conditions to life and property, including fire, explosions, and hazardous materials handling or usage. Although it is not a federal regulation but a product of the International Code Council, the IFC places an emphasis on prescriptive and performance-based approaches to fire prevention and fire protection systems. The IFC is updated every three years and uses a hazard classification system to determine the appropriate measures to be incorporated to protect life and property. Other times these measures include construction standards and specialized equipment. The IFC uses a permit system based on hazard classification to ensure that the required measures are instituted. The 2021 edition of the IFC is adopted by the County of San Diego.

1.2.2 Applicable State and Local Codes/Existing Regulations

1.2.2.1 San Diego Fire–Rescue Department Access Codes & Standards

Since the Proposed Project is under the jurisdiction of the OSFM, most requirements are dictated by State Codes. However, the San Diego Fire–Rescue Department would be the primary agency responding to emergencies at the site, and thus the Proposed Project is assessed to ensure compliance with the SDFRD's access requirements to make sure that their apparatus can safely reach all areas of the Proposed Project. The San Diego Fire Code has adopted, with amendments, the 2022 California Fire Code, so the two documents largely mirror each other; San Diego Fire Code access requirements are noted in this document in any instance they differ from that of the California Fire Code.

1.2.2.2 California Public Resource Code

The Proposed Project would comply with applicable sections of the California Public Resource Code (PRC). Notable sections of the PRC are as follows:

- **Public Resources Code Sections 4201–4204, Fire Hazard Severity Zones –** Public Resources Code (PRC) Sections 4201–4204, and Government Code Sections 51175–89 direct CAL FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones referred to as fire hazard severity zones (FHSZ), define the application of various mitigation strategies to reduce the risk associated with wildland fires. The Project is located within a Very High Fire Hazard Severity Zone (VHFHSZ) as designated by the California Department of Forestry and Fire Protection (CAL FIRE) (FRAP 2007).
- **Public Resource Code Section 4290, Fire Safety Standards –** PRC 4290 requires minimum fire safety standards related to defensible space that apply to residential, commercial, and industrial building construction in State Responsibility Area lands and lands classified and designated as VHFHSZs. These regulations include road standards for fire apparatus access, standards for signs identifying roads and buildings, fuel breaks and green belts, and minimum water supply requirements. It should be noted that these regulations do not supersede local regulations which are equal to or exceed minimum regulations required by the state. Additionally, since the OSFM is the Authority Having Jurisdiction for the Proposed Project, the Proposed Project is evaluated for compliance with state-level codes and requirements. However, since San Diego Fire-Rescue Department would be the agency providing emergency response to the Proposed Project, it is also evaluated for SDFRD access requirements. Projects situated in VHFHSZ require fire hazard analyses and the application of fire protection measures to create ignition-resistant structures and defensible communities within these wildland-urban interface (WUI) locations. VHFHSZ designations do not, in and of themselves, indicate that it is unsafe to build in these areas.
- **Public Resource Code Section 4291, Defensible Space –** PRC 4291 requires a reduction of fire hazards around buildings located adjacent to a mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with inflammable material. Under Section 4291, such buildings are required to maintain a minimum of 100 feet of vegetation management around all buildings, and such requirement is the primary mechanism for conducting fire prevention activities on private property within CAL FIRE jurisdiction. Further, PRC 4291 requires the removal of dead or dying vegetative materials from the roof of a structure, and trees and shrubs must be trimmed from within 10 feet of the outlet of a chimney or stovepipe.

1.2.2.3 California Code of Regulations

The Proposed Project would be subject to relevant sections of the California Code of Regulations (CCRs). More specifically, it would be subject to those portions of the CCRs that contain regulatory requirements that relate to fire safety, accessibility, water supply, and development in fire hazard areas.

1.2.2.4 California Fire Code

The Proposed Project would be required to comply with the 2022 edition of the CFC as adopted by the Office of the State Fire Marshal. The CFC 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 CFC 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 WUI areas. Specific code compliance features are discussed in Section 5 Buildings, Infrastructure, and Defensible Space.

Chapter 49 of the California Fire Code provides guidelines aimed at preventing the spread of wildfires towards and away from structures in WUI Fire Areas. It's designed to address the risk of wildfires engulfing buildings, endangering lives, and overwhelming firefighting efforts, as well as causing significant property damage. The chapter aims to minimize these risks by setting both performance and prescriptive standards for construction and development in areas designated as having Moderate, High, or Very High Fire Hazard Severity Zones, encompassing State Responsibility Areas (SRA) and Local Responsibility Areas (LRA). Key elements include the development of fire protection plans, landscape strategies, and ongoing vegetation management, along with the establishment and upkeep of defensible space.

1.2.2.5 California Building Code

The California Building Standards Code (CCR Title 24) contains provisions for building and safety standards, including fire safety standards for new buildings that are provided in the California Building Code (CCR Title 24, Part 2) and the CFC (CCR Title 24, Part 9). These standards apply to all occupancies in California, except where state agencies and local governing bodies adopt more stringent standards.

The CBC includes several chapters relevant to fire safety and protection that address types of construction, fire and smoke protection features, construction materials and methods, and rooftop construction. Typical CFC safety requirements include fire sprinklers in all high-rise buildings; fire-resistance standards for fire doors, building materials, and particular types of construction; debris and vegetation clearance within a prescribed distance from occupied structures within wildfire hazard areas; and fire-flow requirements, fire hydrant spacing, and access road specifications. The Project would be consistent with the 2022 CBC.

1.2.2.5.1 Chapter 7A

Part 2 of the CBC contains Chapter 7A which regulates building materials, systems, and/or assemblies used in the exterior design and construction of new buildings located within WUI areas. Chapter 7A of the CBC addresses reducing ember penetration into homes, a leading cause of structure loss from wildfires (California Building Standards Commission 2021). The CBC focuses on mitigating former structural vulnerabilities through construction techniques and materials so that the buildings are resistant to ignitions from direct flames, heat, and embers, as indicated in the 2022 California Building Code (Chapter 7-A, Section 701A Scope, Purpose, and Application) (California Building Standards Commission 2022). New buildings located in such areas must comply with the ignition-resistant construction standards outlined in CBC Chapter 7A. Thus, code compliance is an important component of the requirements of the FPP. As described throughout this FPP, the Project would meet applicable code requirements for building in these higher fire hazard areas. Specific code compliance features are discussed in Section 5: Buildings, Infrastructure, and Defensible Space.

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2 Project Site Risk Analysis

2.1 Environmental Setting and Field Assessment

After review of the available digital information relating to the Project Site, including topography, vegetation types, fire history, and the Project's development footprint, Dudek Fire Protection Planners conducted a site evaluation on August 23, 2024, in order to confirm/acquire additional site information, document existing site conditions, and to determine potential actions for addressing the protection of the Proposed Project's structures. While within the Project Site and Study Area, Dudek's Fire Planners assessed the area's topography, natural vegetation, fuel loading, surrounding land use, and general susceptibility to wildfire. The Peninsula Study Area encompasses the immediate parcels surrounding and abutting the Peninsula Component that are owned by SDSU and/or the State of California. The approximate centroid of the Peninsula Component is 32°46'39.6"N 117°04'38.6"W and is located on Assessor's Parcel Numbers 4622301900, 4621800900, 4614500900, 4621801000, 4621800100, 4622200100, 4622200200, 4622200300, 4622200400, and 4621300700. The field tasks that were completed for both the Peninsula Component and the University Towers East Component (where applicable) included:

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

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

2.2 Site Characteristics and Fire Environment

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

The following sections discuss the characteristics of the Project Site and the surrounding area. Thereafter, the following sections discuss the characteristics of the Project Site on a regional scale. The intent of evaluating conditions at a macro-scale provides a better understanding of the regional fire environment, which is not constrained by property boundary delineations.

2.2.1 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep slopes result in faster fire spread up-slope and slower spread down-slope. Terrain that forms a funneling effect, such as canyons, canyon features (chimneys or chutes), or saddles on the landscape can result in especially intense fire behavior. Conversely, flat terrain tends to have little effect on fire spread, resulting in fires that are driven by vegetation and wind.

The Project sites are located on an elevated natural terrace to the south of Alvarado Canyon. Several smaller secondary canyons have incised into this terrace, some of which have been filled in and built over during historic development in the area. Review of historic aerial images and topographic maps indicate that grades at the Project sites were not changed significantly during initial development and no significant canyon in-fill was identified at either Project site.

The University Towers East Component Project site is situated on the interior portion of the relatively flat-lying natural terrace and is not immediately adjacent to any current or historic canyons. The Peninsula Component site is situated on a ridge of preserved terrace immediately south of Alvarado Canyon, between two relatively deep secondary canyons to the east and west. Steep slopes descend from the relatively flat-lying terrace into the canyons to the west, north, and east at gradients of 2:1 to 2.5:1 (horizontal to vertical units). Elevations on the Peninsula range from approximately 380 feet above mean sea level (amsl) at the northwestern point to approximately 420 feet amsl at the southern end at the intersection of Aztec Circle Drive and 55th Street.

2.2.2 Climate

The Project Site, like much of Southern California, is influenced by the Pacific Ocean and a seasonal, migratory subtropical high-pressure cell known as the "Pacific High." Wet winters and dry summers with mild seasonal changes characterize the Southern California climate. This climate pattern is occasionally interrupted by extreme periods of hot weather, winter storms, or dry, easterly Santa Ana winds. The average high temperature for the Project area is approximately 74°F, with average highs peaking in July through September at approximately 81-83°F. The area is considered to be a semi-arid climate. Relative humidities average approximately between 45 and 60 percent year-round and are at their lowest between October and February. Daily minimum relative humidities average between 30 and 50 year-round and are lowest from November through January. Precipitation averages approximately 9.4 inches annually with approximately 6.9 inches of that total occurring between December and March on average (FEMS 2024).

From a regional perspective, the fire risk in southern California can be divided into three distinct "seasons" (Nichols et al. 2011, Baltar et al 2014). The first season, the most active season and covering the summer months, extends from late May to late September. This is followed by an intense fall season characterized by fewer but larger fires. This season begins 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 which can occur from September to March, most commonly occurring from October through March. 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. Localized wind patterns on the Project Site are strongly affected by both regional and local topography.

The prevailing wind pattern is from the west (on-shore), but the presence of the Pacific Ocean causes a diurnal wind pattern known as the land/sea breeze system. During the day, winds are from the west-southwest (sea), and at night winds are from the northeast (land). Wind speeds average approximately 5 to 7 mph throughout the year. Hourly gust speeds average approximately 10-15 mph throughout the year, with monthly average highs of approximately 20-25 mph between November and April and approximately between 15 and 20 between May and October. The fastest gust ever recorded was 41 mph in February of 2017 and the fastest gust ever recorded during fire season was 33.5 mph during November of 2022 (FEMS 2024). The highest wind velocities are associated with downslope, canyon, and Santa Ana winds. The Peninsula portion of the proposed Project is on a peninsular mesa with slopes on the west, north and east on the south side of Alvarado Canyon. Canyons adjacent to the Project site can funnel winds and should wind direction be aligned with Project Site-adjacent slopes, fire behavior can be amplified.

The proposed Project would be located in the San Diego County Coastal Areas California Fire Zone 243 of the National Weather Service (NWS) and National Oceanic and Atmospheric Association (NOAA)'s zoning system. Since 2006, 51 Red Flag Warnings (RFW) have been issued within California Fire Zone 243. The NWS defines a RFW as environmental conditions where warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger and Santa Ana winds often create such conditions. By looking at the historical frequency of Red Flag Warnings for a given region, one can approximate how many of such events can be expected annually in the future. On average, approximately 3 RFW events can be expected to occur annually. However, this has ranged from as little as 0 to as many as 16, and individual events can vary in duration. Approximately 78% of the RFWs occurred between October and January (Iowa State University, 2024). This emphasizes the temporally unique fire danger experienced during autumn months when dry fuels from the end of the seasonal drought coincide with the extreme wind events associated with RFW conditions.

2.2.3 Vegetation

Site-adjacent vegetation (off-site and adjacent to the fuel modification zone) is important relative to wildfire as some vegetation, such as sage scrub and grassland habitats are highly flammable while other vegetation, such as riparian communities or forest understory, are less flammable due to their perennially higher plant moisture content, fuel arrangement, ignition resistance, compact structure, and available shading from overstory tree canopies. Within the Peninsula Study Area, Dudek mapped one native plant community, Diegan coastal sage scrub, (predominantly disturbed), four non-native vegetation types including ornamental, eucalyptus woodland, non-native riparian, and disturbed land, as well as one land cover type, unvegetated channel. The acreages of the vegetation communities and land cover types within the Proposed Project components and study area are presented in Table 1, and their spatial distributions are presented on Figure 6, Biological Resources within Peninsula Component and Peninsula

Study Area. It should be noted that the table includes the acreage of both the Peninsula and University Towers East components (entirely developed), while the figure included is for the Peninsula Component only.

Table 1. Vegetation Communities/Land Cover Types within the Project Components and Study Area

Habitat Types/Vegetation Communities	Acreages within the Proposed Project Study Area
Non-Native Vegetation Communities/Land Cover Types	
Developed (DEV)	16.73[1]
Ornamental Plantings (ORN)	3.10
Non-Native Riparian (NNR)	0.90
Eucalyptus Woodland (EW)	2.30
Disturbed Habitat (DH)	0.75
Unvegetated Channel (UVC)	0.03
Subtotal	*23.81*[2]
Native Vegetation Communities	
Diegan Coastal Sage Scrub (CSS) (disturbed)	12.97
Subtotal	*12.97*
Total*	**36.78**[2]

Notes:
1 Does not include Aztec Circle Drive.
2 Acreages may not sum due to rounding.

2.2.3.1 Vegetative Fuel 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. Hazardous fuels include live and dead vegetation that exists in a condition that readily ignites; transmits fire to adjacent structures or ground, surface, or overstory vegetation; and is capable of supporting extreme fire behavior. All vegetation burns, however, some plants exhibit characteristics that make them more flammable than others. Flammability can be defined as a combination of ignitability, combustibility, and sustainability. Ignitability is the ease of or the delay of ignition; combustibility is the rapidity with which a fire burns; and sustainability is a measure of how well a fire continues to burn with or without an external heat source (White and Zipperer 2010). Flammability is influenced by several factors, which can be classified into two groups: physical structure (e.g., branch size, leaf size, leaf shape, surface-to-volume ratio, and retention of dead material) and physiological elements (e.g., volatile oils, resins, and moisture content) (Moritz and Svihra 1996; UCCE 2016; UCFPL 1997; White and Zipperer 2010). Plants that are less flammable have low surface-to-volume ratios, high moisture contents, and minimal dead material or debris. Examples of such plants include agave and olive trees. More flammable species have high surface-to-volume ratios, exhibit low moisture contents, contain volatile oils, and have high levels of dead material or debris (Moritz and Svihra 1996; UCFPL 1997; UCCE 2016; White and Zipperer 2010). Examples of such plants include pampas grass, juniper, and pine. Plant condition and maintenance is also an important factor in flammability potential. Some plants that have more flammable characteristics can become less flammable if well maintained and irrigated. Conversely, plants can be explosively flammable when poorly maintained, situated on south-facing slopes, in windy areas, or in poor soils (Moritz and Svihra 1996).

It is critical to consider the dynamic nature of vegetation communities. Wildfire disturbances have dramatic impacts on plants themselves and plant community composition. Heat shock, accumulation of post-fire charred wood, and change in photoperiods due to removal of shrub canopies may all stimulate seed germination of certain plant species. This type of germination is common in chaparral and scrub plant communities. Fire presence and absence at varying cycles or regimes affect plant community succession. The 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. 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. Further, biomass and associated fuel loading increase over time, assuming that disturbance or fuel reduction efforts are not diligently implemented.

Vegetation distribution throughout the Project Site varies by location and topography. As described, vegetation communities on the Project Site primarily consist of coastal sage scrub, eucalyptus woodland, ornamental vegetation, and disturbed habitat. The native shrublands that comprise the coastal sage scrub communities throughout the Project Site are a high potential hazard based on such criteria.

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

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SOURCE: AERIAL-SANGIS IMAGERY 2023

DUDEK

0 110 220 Feet

FIGURE 6

Peninsula Component and Peninsula Study Area Biological Resources

Fire Protection Plan for the SDSU Evolve Student Housing Project

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2.2.3.2 Diegan Coastal Sage Scrub

According to Holland (1986), Diegan coastal sage scrub is comprised of a variety of soft, low shrubs, characteristically dominated by drought-deciduous species such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and sages (*Salvia* spp.), with scattered evergreen shrubs, including lemonadeberry (*Rhus integrifolia*), and laurel sumac (*Malosma laurina)*. It typically develops on xeric (dry) slopes.

Diegan coastal sage scrub and all its variants generally are recognized as sensitive plant communities by local, state, and federal resource agencies. It supports a diversity of sensitive plants and animals, and it is estimated that it has been reduced by 75% to 80% of its historical coverage throughout Southern California. Virtually all of the Diegan coastal sage scrub vegetation within the study area is disturbed and located within the Peninsula Study Area. The disturbed Diegan coastal sage scrub totals 12.97 acres and is dominated by California sagebrush, California buckwheat, Menzies's golden bush (*Isocoma menziesii*), coyote brush (*Baccharis pilularis*), lemonadeberry, and laurel sumac, with approximately 25% cover of non-native *Acacia* species, compact brome (*Bromus madritensis*), and Smilo grass (*Stipa Miliacea*) growing throughout and along the edges.

2.2.3.3 Eucalyptus Woodland

Although not recognized by Holland (1986) as a native plant community, eucalyptus woodland is a distinct "naturalized" vegetation type that is fairly widespread in southern California and is considered a woodland habitat. It typically consists of monotypic stands of introduced Australian eucalyptus trees (*Eucalyptus* spp.). The understory is either depauperate or absent owing to shade and the possible allelopathic (toxic) properties of the eucalyptus leaf litter. However, the understory of the stand onsite is presently relatively dense with non-native vegetation growing with little apparent maintenance. Although eucalyptus woodlands are of limited value to most native plants and animals, they frequently provide nesting and perching sites for several raptor species. A total of 2.30 acres of eucalyptus woodland habitat is present within the southeastern corner of the Peninsula Component and Peninsula Study Area, adjacent to the developed areas.

2.2.3.4 Ornamental Plantings

Ornamental plantings are a land cover type that refers to areas where non-native ornamental species and landscaping schemes have been installed and maintained. A total of 3.10 acres of ornamental plantings associated with the landscaping around existing SDSU buildings is mapped in several locations throughout the Peninsula Component as well as the Peninsula Study Area, specifically around the perimeter of the developed areas. This habitat type supports a myriad of ornamental species, including, not limited to, bank catclaw (*Acacia redolens*), hottentot fig (*Carpobrotus edulis*), jade plant (*Crassula ovata*), Brazilian pepper tree (*Schinus terebinthifolius*), and ornamental pines (*Pinus* spp.).

2.2.4 Fire History

Fire history is an important component of a site-specific FPP. Fire history data provides valuable information regarding fire spread, fire frequency, ignition sources, and vegetation/fuel mosaics across a given landscape. One important use for this information is as a tool for pre-planning. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the site, and how a fire may spread.

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

According to available data from CAL FIRE in the FRAP database[1], 9 fires have burned within 5 miles of the Project Site since the beginning of the historical fire data record with the oldest fire occurring in 1989 and the most recent occurring in 2003 (Cedar Fire), which was also the largest of the nine at 270,686 acres. However, only a small portion of the 2003 Cedar Fire burned within the 5 mile buffer of the Proposed Project. Of the 9 fires, none have burned onsite with the nearest being an unnamed 1944 fire that burned within approximately 90 feet of the Peninsula portion of the Proposed Project and approximately 1,400 feet from the University Towers portion of the Proposed Project. Recorded wildfires within 5 miles range from approximately 107 acres to approximately 270,686 acres and the average fire size is approximately 31,878 acres or 2,027 acres if not including the Cedar Fire. SDFRD may have data regarding smaller fires (less than 10 acres) that have occurred near the site that have not been included herein.

Fire history for the general vicinity of the Project Site is illustrated in the map in Appendix B, *Fire History Map*. The lack of many fires having occurred near the Proposed Project during the historical record can be largely attributed to the presence of much development that predates the dataset. Such development makes the spread of wildfire less likely due to the presence of infrastructure that is non-combustible or less likely to ignite than natural fuels. Further, the development would have also meant emergency response to any ignition would have likely been faster with greater access to water than in a wildland setting. Given the large amount of development around the site of the Proposed Project, a large wildfire advancing through a vast bed of natural fuels towards the Project site is not a threat, as seen in the recent historical record. This leaves the adjacent canyons as the greatest threat to the Proposed Project from a wildland fire perspective. This area is limited in size and thus should any ignition occur within the area, it would not have to spread very far to reach the Proposed Project at the top of the slope, however, the fire would likely remain narrow and have a narrow impact with the Project. Additionally, while there is certain risk of wildland fire, available construction practice, including, but not limited to, fire-retardant materials and brush management requirements, that will be employed as part of the Proposed Project, will reduce the risk present to those residing in the area.

1 Based on polygon GIS data from CAL FIRE's FRAP, which includes data from CAL FIRE, USDA Forest Service Region 5, BLM, NPS, Contract Counties and other agencies. The data set is a comprehensive fire perimeter GIS layer for public and private lands throughout the state and covers fires 10 acres and greater between 1878–2022.

3 Analysis of Offsite Ignition Risk

3.1 Analysis of Wildfire Risk from Adding New Residents

Humans (i.e., human related activities or human created features, services, or processes) are responsible for the majority of California wildfires (Syphard et al. 2007; Romero-Calcerrada et al. 2008). Certain human activities result in sparks, flames, or heat that may ignite vegetative fuels without proper prevention measures in place. These ignitions predominantly occur as accidents, but may also be purposeful, such as in the case of arson. Roadways are a particularly high source for wildfire ignitions due to high usage and vehicle caused fires (catalytic converter failure, overheated brakes, dragging chains, tossed cigarette, and others) (Harris 2019; Dudek 2008). In Southern California, and San Diego County, the population living at, working in, or traveling through the wildland urban interface is vast and provides a significant opportunity for ignitions every day. However, it is a relatively rare event when a wildfire occurs, and an even rarer event when a wildfire escapes initial containment efforts. Approximately 90 to 95 percent of wildfires throughout California are controlled below 10 acres (CAL FIRE n.d.).

Research indicates that the type of clustered developments with one perimeter interface, like SDSU Evolve Student Housing Project's Peninsula portion, are not associated with increased vegetation ignitions (Syphard & Keeley, 2015). As a contrast, low density developments have more extensive gaps between structures where there are fuels available for surface fire to spread between and engulf structures. As mentioned, the Proposed Project would be a clustered development with dense structures and a single perimeter to the adjacent natural vegetation with only hardscape and maintained, irrigated landscaping in between structures. Syphard and Keeley (2015) summarize all wildfire ignitions included in the CAL FIRE - Fire and Resource Assessment Program (FRAP) database – dating back over 100 years. They found, in the case of San Diego County, equipment-caused fires were by far the most numerous, and these also accounted for most of the area burned, followed closely by the area burned by power line fires. The risk of the latter, power line fires, would be reduced by burying electrical lines throughout the Proposed Project. Ignitions classified as equipment-caused frequently resulted from exhaust or sparks from power saws or other equipment with gas or electrical motors, such as lawn mowers, trimmers, or tractors, and that the use of this equipment was associated with low to moderate density housing. In terms of location of ignitions within San Diego County, they were more likely to occur close to roads and structures, and at low to intermediate structure densities.

Community design and density directly influences susceptibility to fire because in clustered developments, there is one interface (the community perimeter) with the wildlands, whereas lower density development creates more structural exposure to wildlands, less or no ongoing landscape maintenance (an intermix rather than interface), and consequently more difficulty for limited fire resources to protect well-spaced homes. The intermix includes housing amongst the unmaintained fuels, whereas the Proposed Project converts all fuels within the footprint and provides a wide, managed fuel modification zone separating structures from unmaintained fuel and creating a condition that makes defense easier. Syphard and Keeley go on to state that "The WUI, where housing density is low to intermediate is an apparent influence in most ignition maps" further enforcing the conclusion that lower density, interspersed housing poses a higher ignition risk than higher density, clustered communities. They also state that "Development of low-density, exurban housing may also lead to more homes being destroyed by fire" (Syphard et al. 2013). As discussed in detail throughout this FPP, SDSU Evolve Student Housing Project is a planned ignition resistant development designed to include professionally managed and maintained fire protection components, modern fire code compliant safety features and specific measures provided where ignitions are most likely to occur (such as roadways). Therefore, the development of the SDSU Evolve Student Housing Project would not be expected to materially increase the risk of vegetation ignitions.

As discussed above, research indicates that it is less likely for higher density developments to be impacted by wildfires than lower density developments. The same protections that starve wildfire of fuels and minimize or prevent wildfire from transitioning into a higher density community serve to minimize or prevent on-site fires from transitioning into the wildlands. Further, the requirement that all structures comprising the Proposed Project will include interior fire sprinklers significantly reduces the likelihood that a building fire spreads to the point of flashover, where a structure will burn beyond control and produce embers. Interior sprinklers are very efficient, keeping fires to the room of origin, or extinguishing the fire before the fire transitions to other structures or until the responding firefighters arrive. Similarly, the irrigated fuel modification zones are positioned throughout the development areas as well as the first zones on the perimeter of the Proposed Project. Irrigated zones include plants with high internal moisture and spacing between plants and plant groups that 1) make it difficult to ignite and 2) make it difficult for fire to spread plant to plant. Lastly, in addition to other fire protection measures discussed later, the future increased human presence on-site would likely result in fast detection of fires and fast firefighter response, a key in limiting the growth of fires beyond the incipient stage.

4 Anticipated Fire Behavior

4.1 Fire Behavior Modeling

Following field data collection efforts and available data analysis, fire behavior modeling was conducted to document the type and intensity of the fire that would be expected adjacent to the Peninsula Component of the Project Site given characteristic site features such as topography, vegetation, and climate/weather. The University Towers East Component was not included in this analysis because there is no wildland exposure to this part of the Proposed Project as it is entirely surrounded by development with over 500 feet of distance to the nearest, isolated pocket of natural vegetation. As such, references to the “Proposed Project” or “Project Site” throughout the fire behavior modeling analysis are in reference to the Peninsula Component unless stated otherwise. Dudek utilized BehavePlus software package version 6 (Andrews, Bevins, and Seli 2008) to analyze potential fire behavior. A discussion of fire behavior modeling is presented in Appendix C, Fire Behavior Modeling.

4.1.1 Fire Behavior Modeling Analysis

An analysis was conducted to evaluate fire behavior variables and to objectively predict flame lengths, intensities, and spread rates for five modeling scenarios for both existing and post-Project conditions[2]. These fire scenarios incorporated observed fuel types representing the dominant vegetation representative of the Project Site and adjacent land, in addition to slope gradients, wind, and fuel moisture values. Modeling scenario locations were selected to better understand different fire behavior that may be experienced on or adjacent to the Project Site.

Vegetation types derived from the field assessment for the Project Site and review of vegetation mapping were classified into a fuel model. Fuel models are selected by their vegetation type, fuel stratum most likely to carry the fire, and depth and compactness of the fuels. Fire behavior modeling was conducted for vegetative types that are both on and adjacent to the proposed development. Fuel models were also assigned to illustrate post-Project fire behavior changes. Fuel models were selected from *Standard Fire Behavior Fuel Models: a Comprehensive Set for Use with Rothermel’s Surface Fire Spread Model* (Scott and Burgan 2005).

Based on the anticipated pre- and post-Project vegetation conditions, five different fuel models were used in the fire behavior modeling effort presented herein (NB1 [non-burnable paved areas] cannot carry wildland fire and is thus not included in modelling runs). Tables 2 and 3 describe the fuel models observed that were subsequently used in the analysis for the Project. Modeled areas include eucalyptus woodland, coastal sage scrub, and ornamental vegetation. For modeling the post-development condition, fuel model assignments were re-classified to Fuel Models GR1 (short, sparse dry climate grass) and SH2 (moderate load shrubs) to reflect the irrigated landscaping and thinned vegetation, respectively.

2 Each scenario utilizes a different set of modeling input variables including location, fuel type (vegetation), fuel moisture, weather (wind), topography (slope and aspect), and other related factors.

Table 2. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) [1]
GR1	Short, Sparse Dry Climate Grass	Represents the low-flammability vegetation at the top of the slope at the northern end of the peninsula.	0.4 ft.
GR 4	Moderate-load Dry Climate Grass	Represents the non-native grasses dispersed throughout the shrubs of the slopes east and west of the peninsula.	2.0 ft.
SH5	High-load, Dry Climate Shrubs	Represents the sage scrub and chaparral vegetation east, north, and west of the peninsula	1.0 ft.
SH7	Very High-load, Dry- Climate Shrubs	Represents the dense chaparral vegetation on the hillsides east/southeast of the peninsula	6.0 ft.
TU5	High-load Dry Climate Timber-Shrub	Represents the understory of the eucalyptus stand southeast of the peninsula	1.0 ft.

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

Table 3. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)[1]
GR1	Short, Sparse Grasses	Zone A: 30+' from structures	0.4 ft.
SH2	Moderate-load Shrubs	Zone B: 100' from structures	1.0 ft.
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft.

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

Table 4 summarizes the weather and wind input variables used in the BehavePlus modeling process. Weather and wind input variables were determined using local Remote Automated Weather Station (RAWS) data.

Table 4: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	GR4, SH5, SH7	GR1, GR2, SH5, SH7, TU5
1 h fuel moisture	9%	2%
10 h fuel moisture	10%	3%
100 h fuel moisture	15%	8%
Live herbaceous moisture	48%	30%
Live woody moisture	96%	60%
20 ft. wind speed	7 mph (sustained winds)	10 mph (sustained winds); wind gusts of 50 mph

Table 4: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Wind Directions from north (degrees)	270	0 to 60
Wind adjustment factor	0.4	0.4
Slope	45 to 50%	45 to 50%

4.1.2 Fire Behavior Modeling Results

The results of the fire behavior modeling analysis for pre-and post-project conditions are presented in Tables 5 and 6, respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 7.
Fire Scenario locations and descriptions:

- *Scenario 1.* This scenario depicts a fire within the eucalyptus woodland southeast of the Peninsula portion of the Proposed Project. Such a fire would likely be ignited from within the area or by a vehicle either on Aztec Circle Drive or Canyon Crest Drive. The fire would be fanned by extreme 10 mph winds from the west-northwest and up to 50 mph gusts as the head fire advances through the dense understory vegetation up slope to the Project site. The eucalyptus woodland has a canopy height of approximately 50 feet with a low canopy base height due to the dispersed presence of ladder fuels at points throughout the woodland.
- *Scenario 2*. This scenario depicts a fire burning up from Canyon Crest Drive towards the western side of the Peninsula portion of the Proposed Project. Such a fire would most likely be ignited by a vehicle on Canyon Crest Drive, but it should be noted that there is an approximately 4- to 5-foot-tall retaining wall between the road and the vegetated slope. Under this scenario, the fire would be fanned by extreme 10 mph winds from the west-northwest and up to 50 mph gusts as the head fire advances through the patches of high-load shrubs and moderate-load grasses up slope to the Project site.
- *Scenario 3.* This scenario depicts a fire burning up from Interstate-8 and/or the adjacent trolley tracks towards the northern end of the Peninsula portion of the Proposed Project. It should be noted that there is a large, approximately 25 feet tall, retaining wall supporting the trolley tracks south of Interstate-8. Under this scenario, the fire would be fanned by extreme 10 mph winds from the north and up to 50 mph gusts as the head fire advances through the high-load shrubs up towards the reduced combustibility landscaping at the top of the slope.
- *Scenario 4* This scenario depicts a fire from within the canyon to the west of the Peninsula portion of the Proposed Project burning upslope towards the northwestern side of the site. Such a fire could ignite from Interstate-8, the adjacent trolley route, persons within the canyon, or the residential area to the west. Under this scenario, the fire would be fanned by average 7 mph onshore winds from the west as the head fire advances through the patches of high-load shrubs and moderate-load grasses up slope to the Project site.
- *Scenario 5.* This scenario also depicts a fire burning from within the canyon to west of the Peninsula portion of the Proposed Project site, but further south than Scenario 4 as it would impact the southwestern portion of the site most directly. Under this scenario, the fire would be fanned by average 7 mph onshore winds from the west as the head fire advances through the patches of high-load shrubs ornamental vegetation up slope to the Project site.

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

4.1.2.1 Existing Conditions

As presented in Table 5, wildfire behavior in the eucalyptus woodland southeast of the Peninsula Component (modeled in Scenario 1) represents the most extreme conditions of the existing condition scenarios due to the potential crown fire behavior. This is followed by Scenarios 2 and 3 where combustion of the disturbed coastal sage scrub is amplified by the extreme conditions and fanned by extreme winds, which commonly come between the north and the east, pushing such fires uphill towards the Proposed Project. Scenarios 4 and 5 show fires burning from the west under average conditions, where an onshore wind would be more likely to drive such fires uphill towards the Proposed Project.

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

Fuel Models	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance 1 (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet/ second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site (2)							
Very High-load Timber-Shrub (TU5)	11.5 (22.2)	1,149 (4,816)	0.2 (1.0)	0.3 (1.5)	53.3 (228.5)	4,345 (38, 626)	0.3 (0.9)
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site (2)							
High-load Shrub (SH5)	19.9 (42.1)	3,769 (19,290)	1.3 (6.5)	0.5 (2.3)	N/A	N/A	N/A
Moderate-load Grass (GR4)	13.5 (33.9)	1,638 (12,036)	2.0 (14.5)	0.4 (2.0)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site (2)							
High-load Shrub (SH5)	20.4 (42.3)	3,991 (19,511)	1.3 (6.6)	0.5 (2.3)	N/A	N/A	N/A
Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
High-load Shrub (SH5)	11.5	1,153	0.5	0.3	N/A	N/A	N/A
Moderate-load Grass (GR4)	8.0	514	0.8	0.2	N/A	N/A	N/A

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

Fuel Models	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance 1 (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet/ second)	Crown Spotting Distance (miles)
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Very High-load Shrubs (SH7)	10.6	969	0.3	0.2	N/A	N/A	N/A

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

4.1.2.2 Post-Project Conditions

As presented in Table 6, Dudek also conducted modeling of the site for post-development fuel modification recommendations for the Project. Fuel modification includes treatment areas of thinned native vegetation, irrigated landscaping, and hardscaping on the periphery of the proposed development. The existing fuel model assignments were re-classified for each scenario to reflect the fuel modification recommendations. Typical fuel modification includes the establishment of a minimum 30-foot-wide irrigated zone (Zone A) and a 70-foot-wide thinning zone (Zone B) on the periphery of the Project Site, beginning at the structure. The Proposed Project would meet the 100-foot total requirement with a code-exceeding Zone A that varies from 35 feet to over 100 feet in width. For modeling the post-FMZ treatment condition, the fuel model assignment was re-classified according to the specific fuels management (e.g., irrigated, fire-resistive landscaping, and 50% thinning) treatment.

The fire intensity and flame lengths in untreated, open space areas would remain the same. Conversely, the FMZ areas would experience a significant reduction in flame length and intensity. The surface fire flame lengths of the eucalyptus woodland in Scenario 1 would be reduced from over 10 feet to less than two feet and as a result along with a higher canopy base height, no transition to crown fire would be anticipated. Flame lengths within the coastal sage scrub of the extreme Scenarios (2 and 3) would be reduced from approximately 20 feet to approximately 7 feet. Similar vegetation under the average conditions of Scenarios 4 and 5 would have flame lengths of less than two feet. Overall, fire intensity and spread rates would be reduced, allowing for greater time for a fire suppression response, a response by University Public Safety or Emergency Operations in directing the student body, and lesser likelihood of structure ignition. The pavement and hardscape in the fuel modification areas have no combustible material and would not contribute to the spread of fire.

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

Fuel Models	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance[1] (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet/ second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site (2)							
Zone A & B: Low-load Broadleaf Litter (TL2)	1.3 (1.9)	11 (22)	0.0 (0.1)	0.1 (0.3)	N/A[3]	N/A[3]	N/A[3]
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site (2)							
Zone A: Short, Sparse Grasses (GR1)	3.0 (3.1)	63 (67)	0.4 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone B: Moderate-load Shrub (SH2)	6.7 (15.5)	353 (2,181)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site (2)							
Zone A: Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone B: Moderate-load Shrub (SH2)	6.9 (15.5)	378 (2,207)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
Zone A: Short, Sparse Grasses (GR1)	1.7	19	0.2	<0.1	N/A	N/A	N/A
Zone B: Moderate-load Shrub (SH2)	1.4	12	<0.1	<0.1	N/A	N/A	N/A
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Zone A: Short, Sparse Grasses (GR1)	1.7	18	0.2	<0.1	N/A	N/A	N/A
Zone B: Moderate-load Shrub (SH2)	1.3	11	<0.1	<0.1	N/A	N/A	N/A

Note:
1 Wind-driven surface fire.
2 Values in parentheses represent the respective output in the presence of 50 mph gusts.
1 Due to prescribed pruning and reduced understory fuels, a surface fire is not anticipated to transition to a crown fire.

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

4.2 Project Area Fire Risk Assessment

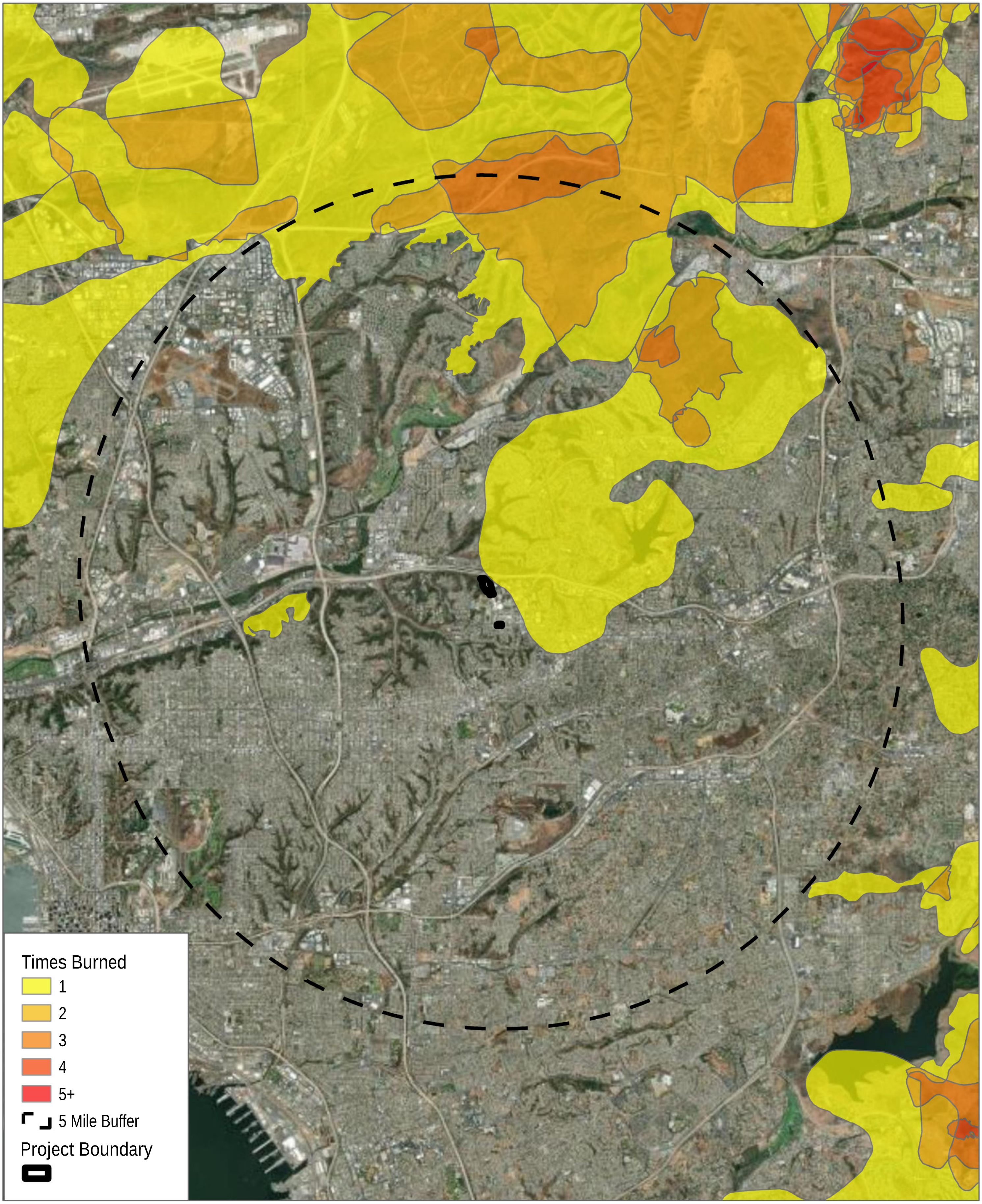
Wildland fires are a common natural hazard in California with a long and extensive history. Southern California landscapes include a diverse range of plant communities, including vast tracts of shrublands and grasslands, like those found on and adjacent to the Project Site. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from 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.

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

Therefore, it will be important that the latest fire protection technologies, developed through intensive research and real-world wildfire observations and findings by fire professionals, for both ignition-resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced.

Additionally, the Proposed Project would implement the latest fire protection measures, including fuel modification along the perimeter edges of the development. In addition, the 100-foot-wide FMZ widths for the site would be approximately two-and-a-half to ten times wider than the longest calculated flame length conditions of the adjacent sage scrub plant communities. Due to the surrounding development, the potential for off-site wildfire encroaching on or showering embers on the Project Site is considered low, but the risk of ignition to the Project Site from such encroachments or ember showers remains due to adjacent vegetation. However, the Proposed Project, once developed, would not facilitate wildfire spread and would reduce projected flame lengths to levels that would be manageable by firefighting resources for protecting the site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire site landscape.

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



SOURCE: CALFIRE 2023; ESRI WORLD IMAGERY

DUDEK

0 0.75 1.5 Miles

FIGURE 7

Fire History

Fire Protection Plan for the SDSU Evolve Student Housing Project

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5 Emergency Response and Service

The following sections analyze the Project in terms of current San Diego Fire-Rescue Department capabilities and resources to provide Fire Protection and Emergency Services. While the OSFM is the authority having jurisdiction for the Proposed Project, emergency response would be provided by SDFRD and adjacent entities through mutual aid agreements. The analysis that follows examines the ability of the existing fire stations of SDFRD and adjacent entities to adequately serve the Proposed Project. Nearby entities that may respond to the project include Heartland Fire & Rescue Department (HFR) and San Miguel Fire Department (SMFD). Response times were evaluated using Proposed Project build-out conditions. It was assumed that phased construction would include access roads to the newly constructed buildings and that the shortest access route to those structures would be utilized.

5.1 Emergency Response and Fire Facilities

The Proposed Project is located within the SDFRD jurisdictional response area. Regionally, the SDFRD provides fire, emergency medical, and rescue services from 51 stations. The Department serves nearly 1.5 million residents throughout a 343 square mile coverage area. The Project Site lies within the response area of Battalion 4 and more specifically Engine 10 of Station 10. SDFRD Station 10 would provide an initial response to the Project; however, Stations 31, 17, and 26 are available to provide a secondary response to the Proposed Project, if needed. These existing stations were analyzed herein due to their proximity to the Project Site. Table 7 provides a summary of the five nearest fire stations and all stations with aerial apparatus within 10 miles of travel distance to the Proposed Project. Rows highlighted in light blue signify that the station is equipped with aerial fire apparatus.

As shown in Table 7, the closest existing fire station to the SDSU Evolve Student Housing Project is SDFRD Station 10, located at 4605 62nd St, San Diego, which includes a four (4) person Engine Company and a four (4)-person Truck Company. The next closest stations, in order of closest to farthest, are SDFRD Stations 31, 17, and 26, and HFR Station 11. There are also 10 total stations located within a 10-mile road travel distance of the Proposed Project that are equipped with aerial firefighting apparatus.

Table 7. Nearby Fire Stations & Equipment

Station	Location	Equipment
SDFRD 10	4605 62nd St, San Diego, CA 92115	Engine 10, Truck 10, Brush 10
SDFRD 31	6002 Camino Rico, San Diego, CA 92120	Engine 31, Medic 31
SDFRD 17	4206 Chamoune Ave, San Diego, CA 92115	Engine 17, Medic 17
SDFRD 26	2850 54th St, San Diego, CA 92105	Engine 26, Medic 26
HFR 11	8054 Allison Ave, La Mesa, CA 91942	Engine 11, Truck 11, Medic 11
SDFRD 45	9366 Friars Rd, San Diego, CA 92108	Engine 45, Truck 45
SDFRD 14	4011 32nd St, San Diego, CA 92104	Engine 14, Truck 14, Brush 14
SDFRD 12	4964 Imperial Ave, San Diego, CA 92113	Engine 12, Truck 12, Medic 12, Brush 12
SDFRD 28	3880 Kearny Villa Rd, San Diego, CA 92123	Engine 28, Truck 28, Medic 28
SMFD 14	3255 Helix St, Spring Valley, CA 91977	Truck 14

Table 7. Nearby Fire Stations & Equipment

Station	Location	Equipment
HFR 6	100 East Lexington Avenue, El Cajon	Engine 6, Truck 6
SDFRD 11	945 25th St, San Diego, CA 92102	Engine 11, Truck 11, Medic 11
SDFRD 1	1222 First Ave., San Diego, CA 92101	Engine 1, Engine 201, Truck 1, Medic 1

Notes:
1 Equipment information sourced from SDFRD "Fire Stations" webpage.

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

5.2 Emergency Response Travel Time Coverage

In an effort to understand fire department response capabilities, Dudek conducted an analysis of the travel-time response coverage from the closest, existing station (SDFRD Station 10). The response time analysis was conducted using travel distances that were derived from Google road data and Proposed Project development plan data. Travel times were calculated applying the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH) as well as the nationally recognized Verisk Public Protection Classification Program's Response Time Standard formula (T=0.65 + 1.7 D, where T= time and D = distance) for comparison. The Verisk response travel time formula takes into account reduced speed for intersections, vehicle deceleration, and acceleration, though it does not include turnout time (i.e., the time between the call coming into the dispatch center and the time the truck actually leaves the station).

Tables 8 and 9 present tabular results of the emergency response time analysis using the Speed Limit formula and the Verisk formula, respectively. The San Diego Fire-Rescue Department's response time standard is to respond to emergency calls within 7 minutes and 30 seconds, 90% of the time (OIBA 2017). Emergency response time target thresholds include travel time along with dispatch and turnout time, which can add two minutes to travel time. As shown in Tables 8 and 9, the response time from Station 10 (the station that would provide an initial response as the closest fire station) to the SDSU Evolve Student Housing Project conforms to the SDFRD response time standard for both the Peninsula portion and the University Towers portion of the Proposed Project. Specifically, total response time, including dispatch and turnout time, from Station 10 is calculated at roughly 5 minutes and 26 seconds to the furthest area within the Peninsula Component and at 4 minutes and 45 seconds for the University Towers East Component as calculated with the Speed Limit Formula. Total response time, including dispatch and turnout time, from Station 10 is calculated at roughly 6 minutes and 23 seconds to the furthest area within the Peninsula Component and at 5 minutes and 22 seconds for the University Towers East Component as calculated with the Verisk Formula. All response calculations are based on an average response speed of 35 mph, consistent with nationally recognized National Fire Protection Association (NFPA) 1710.

Table 8. Proposed Project Emergency Response Analysis using Speed Limit Formula

Station Nos.	Travel Distance to Project Entrance (miles)	Travel Time to Project Entrance[1]	Maximum Travel Distance (miles)	Maximum Travel Time[2]	Total Response Time[3]
Peninsula Component of Proposed Project					
SDFRD 10	1.7	2 minutes 55 seconds	2.0	3 minutes 26 seconds	5 minutes 26 seconds
SDFRD 31	2.4	4 minutes 7 seconds	2.7	4 minutes 38 seconds	6 minutes 38 seconds
SDFRD 17	2.7	4 minutes 38 seconds	3.0	5 minutes 9 seconds	7 minutes 9 seconds
SDFRD 26	3.1	5 minutes 19 seconds	3.4	5 minutes 50 seconds	7 minutes 50 seconds
HFR 11	3.6	6 minutes 10 seconds	3.9	6 minutes 41 seconds	8 minutes 41 seconds
SDFRD 45	4.4	7 minutes 33 seconds	4.7	8 minutes 3 seconds	10 minutes 3 seconds
SDFRD 14	4.7	8 minutes 3 seconds	5.0	8 minutes 34 seconds	10 minutes 34 seconds
SDFRD 12	5.6	9 minutes 36 seconds	5.9	10 minutes 7 seconds	12 minutes 7 seconds
SDFRD 28	7.4	12 minutes 41 seconds	7.7	13 minutes 12 seconds	15 minutes 12 seconds
SMFD 14	8	13 minutes 43 seconds	8.3	14 minutes 14 seconds	16 minutes 14 seconds
HFR 6	8.3	14 minutes 14 seconds	8.6	14 minutes 45 seconds	16 minutes 45 seconds
SDFRD 11	8.7	14 minutes 55 seconds	9.0	15 minutes 26 seconds	17 minutes 26 seconds
SDFRD 1	9.8	16 minutes 48 seconds	10.1	17 minutes 19 seconds	19 minutes 19 seconds
University Towers East Component of Proposed Project					
SDFRD 10	1.5	2 minutes 34 seconds	1.6	2 minutes 45 seconds	4 minutes 45 seconds
SDFRD 31	2.4	4 minutes 7 seconds	2.5	4 minutes 17 seconds	6 minutes 17 seconds
SDFRD 17	2.4	4 minutes 7 seconds	2.5	4 minutes 17 seconds	6 minutes 17 seconds
SDFRD 26	2.8	4 minutes 48 seconds	2.9	4 minutes 58 seconds	6 minutes 58 seconds
HFR 11	3.5	6 minutes 0 seconds	3.6	6 minutes 10 seconds	8 minutes 10 seconds
SDFRD 45	4.1	7 minutes 2 seconds	4.2	7 minutes 12 seconds	9 minutes 12 seconds

Table 8. Proposed Project Emergency Response Analysis using Speed Limit Formula

Station Nos.	Travel Distance to Project Entrance (miles)	Travel Time to Project Entrance[1]	Maximum Travel Distance (miles)	Maximum Travel Time[2]	Total Response Time[3]
SDFRD 14	4.4	7 minutes 33 seconds	4.5	7 minutes 43 seconds	9 minutes 43 seconds
SDFRD 12	5.7	9 minutes 46 seconds	5.8	9 minutes 57 seconds	11 minutes 57 seconds
SDFRD 28	7.1	12 minutes 10 seconds	7.2	12 minutes 21 seconds	14 minutes 21 seconds
SDFRD 11	7.4	12 minutes 41 seconds	7.5	12 minutes 51 seconds	14 minutes 51 seconds
HFR 6	7.7	13 minutes 12 seconds	7.8	13 minutes 22 seconds	15 minutes 22 seconds
SMFD 14	8.1	13 minutes 53 seconds	8.2	14 minutes 3 seconds	16 minutes 3 seconds
SDFRD 1	9.5	16 minutes 17 seconds	9.6	16 minutes 27 seconds	18 minutes 27 seconds

Notes:

1 Assumes travel distance and time to the proposed Project entrance nearest the respective station, and application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed, and does not include turnout time.

2 Assumes travel distance and time to the furthest point within the proposed Project development from the respective station, and application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed, and does not include turnout time.

3 Emergency response time target thresholds include travel time to furthest point within the proposed Project development from fire station, and application of the speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed along with dispatch and turnout time, which can add an additional two minutes to travel time

4 Rows highlighted in light blue signify that the station is equipped with aerial fire apparatus.

Table 9. Emergency Response Analysis using Verisk Formula

Station Nos.	Travel Distance to Project (miles)	Travel Time to Project Entrance[1]	Maximum Travel Distance (miles)	Maximum Travel Time[2]	Total Response Time[3]
Peninsula Component of Proposed Project					
SDFRD 10	1.7	3 minutes 32 seconds	2.2	4 minutes 23 seconds	6 minutes 23 seconds
SDFRD 31	2.4	4 minutes 44 seconds	2.9	5 minutes 35 seconds	7 minutes 35 seconds
SDFRD 17	2.7	5 minutes 14 seconds	3.2	6 minutes 5 seconds	8 minutes 5 seconds
SDFRD 26	3.1	5 minutes 55 seconds	3.6	6 minutes 46 seconds	8 minutes 46 seconds
HFR 11	3.6	6 minutes 46 seconds	4.1	7 minutes 37 seconds	9 minutes 37 seconds

Table 9. Emergency Response Analysis using Verisk Formula

Station Nos.	Travel Distance to Project (miles)	Travel Time to Project Entrance[1]	Maximum Travel Distance (miles)	Maximum Travel Time[2]	Total Response Time[3]
SDFRD 45	4.4	8 minutes 8 seconds	4.9	8 minutes 59 seconds	10 minutes 59 seconds
SDFRD 14	4.7	8 minutes 38 seconds	5.2	9 minutes 29 seconds	11 minutes 29 seconds
SDFRD 12	5.6	10 minutes 10 seconds	6.1	11 minutes 1 seconds	13 minutes 1 seconds
SDFRD 28	7.4	13 minutes 14 seconds	7.9	14 minutes 5 seconds	16 minutes 5 seconds
SMFRD 14	8	14 minutes 15 seconds	8.5	15 minutes 6 seconds	17 minutes 6 seconds
HFR 6	8.3	14 minutes 46 seconds	8.8	15 minutes 37 seconds	17 minutes 37 seconds
SDFRD 11	8.7	15 minutes 26 seconds	9.2	16 minutes 17 seconds	18 minutes 17 seconds
SDFRD 1	9.8	17 minutes 19 seconds	10.3	18 minutes 10 seconds	20 minutes 10 seconds
University Towers East Component of Proposed Project					
SDFRD 10	1.5	3 minutes 12 seconds	1.6	3 minutes 22 seconds	5 minutes 22 seconds
SDFRD 31	2.4	4 minutes 44 seconds	2.5	4 minutes 54 seconds	6 minutes 54 seconds
SDFRD 17	2.4	4 minutes 44 seconds	2.5	4 minutes 54 seconds	6 minutes 54 seconds
SDFRD 26	2.8	5 minutes 25 seconds	2.9	5 minutes 35 seconds	7 minutes 35 seconds
HFR 11	3.5	6 minutes 36 seconds	3.6	6 minutes 46 seconds	8 minutes 46 seconds
SDFRD 45	4.1	7 minutes 37 seconds	4.2	7 minutes 47 seconds	9 minutes 47 seconds
SDFRD 14	4.4	8 minutes 8 seconds	4.5	8 minutes 18 seconds	10 minutes 18 seconds
SDFRD 12	5.7	10 minutes 20 seconds	5.8	10 minutes 31 seconds	12 minutes 31 seconds
SDFRD 28	7.1	12 minutes 43 seconds	7.2	12 minutes 53 seconds	14 minutes 53 seconds
SDFRD 11	7.4	13 minutes 14 seconds	7.5	13 minutes 24 seconds	15 minutes 24 seconds
HFR 6	7.7	13 minutes 44 seconds	7.8	13 minutes 55 seconds	15 minutes 55 seconds
SMFD 14	8.1	14 minutes 25 seconds	8.2	14 minutes 35 seconds	16 minutes 35 seconds
SDFRD 1	9.5	16 minutes 48 seconds	9.6	16 minutes 58 seconds	18 minutes 58 seconds

Notes:

1 Assumes travel distance and time to the proposed Project entrance nearest the respective station, and application of the distance at speed limit formula (T=(D/S) * 60, where T=time, D=distance in miles, and S=speed in MPH), a 35 mph travel speed, and does not include turnout time.

2 Assumes travel distance and time to the furthest point within the Project site from the fire station, and application of the ISO formula, T=0.65+1.7(Distance), a 35 mph travel speed, and does not include turnout time.

3 Emergency response time target thresholds include travel time to the furthest point within the Project Site from a fire station, and application of the ISO formula, T=0.65+1.7(Distance), a 35 mph travel speed along with dispatch and turnout time, which can add two minutes to travel time.

4 Rows highlighted in light blue signify that the station is equipped with aerial fire apparatus.

5.3 Estimated Calls and Demand for Service

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 SDFRD documented 166,838 total incidents for 2023 generated by a city-wide service area total population of approximately 1,419,845 persons across an approximately 343 square mile service area (SDFRD 2024a; SDFRD 2024b). Based on this data, the County's per capita annual call volume is approximately 118 calls per 1,000 persons. The resulting per capita call volume is 0.118.

Development of the Proposed Project would result in approximately 5,170 new student beds, a net increase of approximately 4,468 student beds to the main campus inventory due to demolition of all 13 existing buildings in the peninsular portion of the Proposed Project, which presently provides housing for 702 students. Using San Diego Fire Rescue's estimated per capita call volume of 0.118 (118 annual calls per 1,000 population), the SDSU Evolve Student Housing Project's estimated 4,468 new residents would generate up to 525 additional calls per year (approximately 1 to 2 calls per day). The type of calls expected would primarily be medical related as is the case with most jurisdictions, including SDFRD where 73.5% of total calls in 2023 were non-life threatening, urgent, or life-threatening emergency medical responses (SDFRD 2024b). The estimated incident call volume at buildout from the Project is based on a conservative estimate of the maximum potential number of persons on-site at any given time (considered a "worst-case" scenario).

5.3.1 Response Capability Impact Assessment

The available firefighting and emergency medical resources in the vicinity of the Project Site include an assortment of fire apparatus and equipment considered fully capable of responding to the type of fires and emergency medical calls potentially occurring within the Project Site. In 2023, the engine, truck, and brush engine of SDFRD Station 10, the primary responding station for the Project, responded to a total of 4,796 incidents with an approximate call volume of 13 calls per day. Should Station 10 be occupied at the time of an incident, SDFRD Stations 31, 17 and 26 could provide response to the Proposed Project and thus would share in fulfilling some of the increased demand created by the Proposed Project.

The increase of approximately 525 calls per year associated with the Proposed Project would be an approximately 11% increase to Station 10's current workload, but as previously mentioned, some of this would likely be shared by other nearby SDFRD stations.

6 Proposed Project Fire Safety Features: Buildings, Infrastructure, and Defensible Space

This section describes those features of the Proposed Project that serve as the system of fire protection components and demonstrates that the Proposed Project would comply with applicable portions of the 2022 California Fire Code. While the OFSF is the authority having jurisdiction, the SDFRD would be the first-in response to any emergency, and thus applicable portions of the Proposed Project comply with City of San Diego Fire Code, as amended and adopted by reference to the 2022 edition of the CFC when applicable to fire department access including Appendix D. The Proposed Project also complies with Chapter 7A of the 2022 California Building Code (CBC). The Proposed Project will meet the relevant requirements for building construction, infrastructure, and defensible space, or will provide alternative materials and/or methods. While these standards will provide a high level of protection to structures for the Proposed Project, there is no guarantee that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

The following summaries highlight important fire protection features related to the Proposed Project. All underground utilities, hydrants, water mains, curbs, gutters, and sidewalks will be installed, and the drive surface shall be approved prior to combustibles being brought on site.

6.1 Fire Apparatus Access

The Peninsula portion of the Proposed Project would be accessed from 55th Street, north of Aztec Circle Drive. There would be a looping perimeter road that complies with the secondary access requirements (Section 503.1.6 of the 2022 CFC) and interior access for emergency vehicles as well. The University Towers Component of the Proposed Project would be accessed from Montezuma Road and the alley between it and Mary Lane Drive to the south, with a fire access lane planned between the existing structure and the planned structure. In addition to fire access roads being provided, walkways shall be provided as required by the code as reference below:

- Exterior doors and openings required by this code or the California Building Code shall be maintained readily accessible for emergency access by the fire department. An approved access walkway leading from fire apparatus access roads to exterior openings shall be provided where required by the fire code official (CFC 504.1).
- A Knox box shall be provided for every building with 4 sets of 4400 Series keys within 10 feet of the entrance to the building at a height not to exceed 7 feet to the top of the box, but preferably 5 feet. (SDFRD Policy K-20-1)

6.1.1 Access Roads

The Proposed Project would involve the construction of new structures and roadways. All portions of first-story exterior walls of all structures would be within 200 feet of a fire access road, parking will not be allowed on either side of fire access roads, and appropriate signage will be provided. Project Site access, including road widths and connectivity, shall be consistent with the City's roadway standards and the 2022 CFC Section 503 and Appendix D:

Fire Access Road Proximity

- Approved fire apparatus access roads shall be provided for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (200 feet in sprinklered buildings), of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility. (CFC 503.1.1, SDFRD Policy A-14-1)

Fire Lane Signage

- Where required by the fire code official, approved signs or other approved notices or markings that include the words "NO PARKING—FIRE LANE" shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. The means by which fire lanes are designated shall be always maintained in a clean and legible condition and be replaced or repaired when necessary to provide adequate visibility. (CFC 503.3)
  - Where required by the Fire Code Official, fire apparatus access roads shall be marked with permanent NO PARKING-FIRE LANE signs complying with California Vehicle Code Section 22500.1. Signs shall be posted on one or both sides of the fire apparatus road as required by Section D103.6.1 or D103.6.2 (San Diego Fire Code D103.6).
  - Where required by the fire code official, fire apparatus access roads shall be marked with permanent "NO PARKING—FIRE LANE" signs complying with Figure D103.6. Signs shall have a minimum dimension of 12 inches wide by 18 inches high and have red letters on a white reflective background. Signs shall be posted on one or both sides of the fire apparatus road every 100 feet as required by Section D103.6.1 or D103.6.2. (D103.6, SDFRD Policy A-14-1)
  - All curbs that outline the access roadway shall be painted red. White 4 inch high letters reading "No Parking – Fire Lane" shall be stenciled every 30 feet on the red curb. If no curb is present, an 8 inch wide red stripe shall be painted on the pavement. The stripe shall be lettered the same as the curb. (SDFRD Policy A-14-1)
    - Red fire lane curbs on public streets do not require the white stenciled lettering
  - Fire lane signs as specified in Section D103.6 shall be posted on both sides of fire apparatus access roads that are 20 to 26 feet wide. (D103.6.1)
  - Fire lane signs as specified in Section D103.6 shall be posted on one side of fire apparatus access roads more than 26 feet wide and less than 32 feet. (D103.6.2)

Obstructions

- Fire apparatus access roads shall not be obstructed in any manner, including the parking of vehicles. The minimum widths and clearances established in Sections 503.2.1 and 503.2.2 shall be maintained at all times. (CFC 503.4)
- Traffic calming devices shall be prohibited unless approved by the fire code official. (CFC 503.4.1)

6.1.2 Gates

Multiple gate access locations throughout the Proposed Project would separate the main public roadway from the private internal roadways for the residential units. The locking mechanism for gates and emergency opening devices shall be submitted and approved by OSFM/SDFRD. It is recommended to include a remote operating system of the latest technology to the approval of SDFRD that will enable the gate to be monitored and opened via internet protocol or cellular access during an emergency or wildfire situation. Gates on private roads are permitted, but subject to Fire Code requirements and standards, including:

- The fire code official is authorized to require the installation and maintenance of gates or other approved barricades across fire apparatus access roads, trails or other accessways, not including public streets, alleys or highways. Electric gate operators, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200. (CFC 503.5)
  - Where required, gates and barricades shall be secured in an approved manner. Roads, trails and other accessways that have been closed and obstructed in the manner prescribed by Section 503.5 shall not be trespassed on or used unless authorized by the owner and the fire code official. (CFC 503.5.1)
  - Where it is determined, in coordination with SDFRD, that a Knox-keyed device is needed to improve accessibility for emergency responders, the Knox device shall be installed and tested per SDFRD Policy K-20-2.
- The installation of security gates across a fire apparatus access road shall be approved by the fire code official. Where security gates are installed, they shall have an approved means of emergency operation. The security gates and the emergency operation shall be maintained operational at all times. Electric gate operators, where provided, shall be listed in accordance with UL 325. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200. (CFC 503.6)
- The minimum gate width shall be 13 feet and they shall be of the horizontal swing, slide, or vertical lift, or pivot type (San Diego Fire Code D103.5)

6.1.3 Road Width, Surface, Grade, and Clearance

Internal circulation of the Peninsula portion of the Proposed Project would consist of a network of 26-foot-wide fire access roads that would include a looping perimeter road(complying with the secondary access road requirements within Section 503.1.6 of the 2022 CFC) and a road through the interior portion of the Peninsula. The sole internal roadway of the University Towers component of the Proposed Project would be a 26-foot-wide fire access lane between Montezuma Road and the alley between it and Mary Lane Drive to the south. The fire access lane would be between the existing tower and the planned tower. This road width would be code exceeding since aerial fire apparatus access roads are not required since the structured would be of Type IB construction, equipped with an automatic sprinkler system designed to NFPA and CFC standards, and fire fighter access through an enclosed stairway with a Class I standpipe from the lowest level of fire department vehicle access to all roof surfaces (CFC D105.1).

On-site roads shall be constructed to meet the requirements of the 2022 CFC, including all amendments made by the San Diego Fire Code. All Proposed Project fire access roads shall comply with the following requirements:

- The required turning radius of a fire apparatus access road shall be determined by the fire code official. A minimum 50-foot-wide turning radius is required and shall be in accordance with the semi-trailer template from the current adopted fire code. Inside measurement shall be according to California Truck Semi-Trailer

Wheel Tracks. An additional two feet of width shall be provided to allow for clearance of apparatus bumper overhang. (CFC 503.2.4, SDFRD Policy A-14-1)

Width

- Fire apparatus access roadways shall be not less than 20 feet of unobstructed width (CFC 503.2, SDFRD Policy A-14-1)
- Where the vertical distance between the grade plane and the highest roof surface exceeds 30 feet, approved aerial fire apparatus access roads shall be provided. For purposes of this section, the highest roof surface shall be determined by measurement to the eave of a pitched roof, the intersection of the roof to the exterior wall, or the top of parapet walls, whichever is greater. (CFC D105.1)
  - **Except:** Where approved by the fire code official, buildings of Type IA, Type IB or Type IIA construction equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and having fire fighter access through an enclosed stairway with a Class I standpipe from the lowest level of fire department vehicle access to all roof surfaces.

Surface

- Facilities, buildings or portions of buildings hereafter constructed shall be accessible to fire department apparatus by way of an approved fire apparatus access road with an asphalt, concrete or other approved driving surface capable of supporting the imposed load of fire apparatus weighing up to 75,000 pounds. (CFC D102.1)

Grade

- Fire apparatus access roads shall not exceed 15% percent in grade for concrete and 12% for asphalt. (CFC D103.2, SDFRD Policy A-14-1)
- The angles of approach and departure for fire apparatus access roads shall be within the limits established by the fire code official based on the fire department's apparatus. (CFC 503.2.8)

Clearance

- Overhead utility and power lines shall not be located over the aerial fire apparatus access road or between the aerial fire apparatus road and the building. Other obstructions shall be permitted to be placed with the approval of the fire code official. (CFC D105.4)
- Fire apparatus access 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 of not less than 13 feet 6 inches. (CFC 503.2.1)

6.1.4 Dead-End Roads

There are no dead-end roads associated with either component of the Proposed Project. The Peninsula component has a looping perimeter road and a road within the site that connects to the looping perimeter road to the north and to the entrance to the south. Despite the perimeter fire access lane designed as a loop, four hammerhead turnarounds are provided so that fire engines would not need to complete the loop or drive to the northern extent and use or take the interior road to turn around. The University Towers component would only have a short, approximately 150-foot-long fire access lane connecting Montezuma Road to the alley to the south. While there are no dead-end roads associated with the Proposed Project, applicable codes related to dead-end roads are provided below for reference:

- Dead-end fire apparatus access roads in excess of 150 feet shall be provided with width and turnaround provisions in accordance with CFC Table D103.4. Special approval must be received for any fire apparatus access road over 750 feet (CFC D103.4)

6.1.5 Premise Identification

Identification of roads and structures will comply with the 2022 CFC and SDFRD Policy I-08-06 as follows:

- New and existing buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be not less than 4 inches high with a minimum stroke width of 1/ 2 inch. Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained. (CFC 505.1)
- Streets and roads shall be identified with approved signs. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicles. Signs shall be of an approved size, weather resistant and be maintained until replaced by permanent signs. (CFC 505.2)
- An illuminated directory would be installed for every building that includes the name of the complex, all access roads and any gates, fire hydrant locations, a plot plan showing private roads, building locations with addresses and unit numbers, a “you are here” reference point, and a north direction indicator. (SDFRD Policy I-08-06)

6.2 Ignition Resistant Construction

The proposed structures will be built utilizing the most current construction methods intended to mitigate wildfire exposure required by the State of California at the time of construction. Construction methods intended to mitigate wildfire exposure will comply with the wildfire protection building construction requirements contained in the California Building Code. Construction practices shall meet the requirements of the California Building Code, Chapter 7A, “Construction Methods for Exterior Wildfire Exposure”. While these standards will provide a high level of protection to structures in the development and should reduce or eliminate the need to order evacuations, there is no guarantee of assurance that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

There are two primary concerns for structure ignition: 1) radiant and/or convective heat and 2) burning embers (NFPA 1144 2008, Ventura County Fire Protection District 2011, IBHS 2008, and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the Wildland Urban Interface (WUI) built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through Chapter 7A exterior fire ratings for walls, windows, and doors.

Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided by the Proposed Project are required by the California Building and Fire Codes, but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2022 Building/Fire Code update), of extinguishing interior fires, should embers succeed in entering a structure. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well that they were adopted into the code.

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

1. Chapter 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 the wildland-urban interface and fire hazard severity zones:
    a. Roofing Assemblies (covering, valleys and gutters)
    b. Vents and Openings
    c. Exterior wall covering
    d. Open Roof Eaves
    e. Closed Roof Eaves and Soffits
    f. Exterior Porch Ceilings
    g. Floor projections and underfloor protection
    h. Underfloor appendices
    i. Windows, Skylights, and Doors
    j. Decking
    k. Accessory structures
2. New Class-A fire-rated roof and associated assembly. With the proposed Class-A fire-rated roof, areas where there will be attic or void spaces requiring ventilation to the outside environment, the attic spaces will require either ember-resistant roof vents or a minimum 1/16-inch mesh (smaller sizes restrict airflow) and shall not exceed 1/8-inch mesh for side ventilation (recommend BrandGuard, O'Hagin or similar vents). All vents used for the Project will be approved by OSFM.
3. Multi-pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 (such as SaftiFirst, SuperLite 20-minute rated glass product), or be tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2
4. Automatic, Interior Fire Sprinkler System to code by occupancy type for all habitable, university/apartment residential dwellings.
5. Modern infrastructure, access roads, and fire water delivery system.

6.3 Fire Protection Systems

The following infrastructure components would be included in the Proposed Project in order to comply with the State Requirements, including the 2022 California Fire Code, and nationally accepted fire protection standards, as well as additional requirements to assist in providing reasonable on-site fire protection.

6.3.1 Water Supply

The Proposed Project would be consistent with CFC Section 507, and Appendices B and C for fire flow and fire hydrant requirements. The Proposed Project would include the necessary utilities, including water supply lines to provide the main water supply to domestic service to each structure and common landscape area. These internal waterlines will also supply sufficient fire flows and pressure to meet the demands for required onsite fire hydrants and interior fire sprinkler systems for all structures as described below.

Peninsula Component

There are two fire hydrants located within the Project site, and two additional fire hydrants along Remington Road. The water main along 55th Street was recently increased to a 12-inch PVC pipeline and will be remaining or re-routed as conflicts exist. This existing water line functions as a combined, public fire water and domestic water main. To support the Proposed Project, the water main would be adjusted to allow for the improvements and looped to provide a redundant supply to the high-rise buildings. Size of the main will be verified based on available water pressure and will be determined as part of the design process. Additional hydrants would be placed throughout the Peninsula Component site as required.

Water service laterals for the proposed buildings would be based on the new, looped, water main system around the Peninsula Component site. To install the looped water line around the site, easements would be obtained from the City of San Diego to access the public infrastructure. Additionally, fire water and domestic water laterals to each proposed building would require backflow prevention device and isolation valves for maintenance purposes.

University Towers East Component

A 12-inch polyvinyl chloride (PVC) water main is located along the site frontage, on Montezuma Road. Infrastructure along Montezuma Road is regional and is a public system with capacity for the planned development based on current zoning regulations. This water line is a combined domestic water and fire water main. Additionally, there are three fire hydrants in front of the site, along Montezuma Road with the two nearest being approximately 90 feet from the eastern Project Site boundary and approximately 85 feet west of the eastern side of the existing building, respectively. Fire water and domestic water laterals to the proposed building would require backflow prevention device and isolation valves for each lateral for maintenance purposes.

The following water supply code requirements are included for reference:

- The fire code official is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical (CFC B103.1)

- The fire code official is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration. (CFC B103.2)
- Portions of buildings that are separated by fire walls without openings, constructed in accordance with the California Building Code, are allowed to be considered as separate fire-flow calculation areas. (CFC B104.2)
- The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors. (CFC B104.3)
  - **Except:** Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

6.3.2 Fire Hydrants, Standpipe Systems, Fire Pump

Fire hydrants shall be located along fire access roadways as determined by the State Fire Marshal and current fire code requirements including those of the SDFRD and their 0-22-2 policy to meet operational needs. Vehicular access to hydrants will be provided and maintained throughout construction. All new fire hydrants shall be installed, tested, and accepted prior to construction and any existing fire hydrants that are to remain will remain accessible throughout the construction process.

Fire hydrants will be consistent with applicable Design Standards. Reflective blue dot hydrant markers shall be installed in the street to indicate the location of the hydrant. Crash posts will be provided where needed in on-site areas where vehicles could strike fire hydrants or fire department connections. Prior to the issuance of building permits, the appropriate number of fire hydrants and their specific locations will be approved by OSFM. All fire hydrants within the Proposed Project would conform with all applicable codes including the following:

Spacing

- The number of fire hydrants available to a building shall be not less than the minimum specified in Table C102.1. (CFC C102.1)
- Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is required, the distance between required fire hydrants shall be in accordance with Sections C103.2 and C103.3. (CFC C103.1)
- The average spacing between fire hydrants shall be in accordance with Table C102.1. (CFC C103.2)
  - **Except:** The average spacing shall be permitted to be increased by 10 percent where existing fire hydrants provide all or a portion of the required number of fire hydrants.
- The maximum spacing between fire hydrants shall be in accordance with CFC Table C102.1.

Protection & Access

- Where fire hydrants are subject to impact by a motor vehicle, guard posts or other approved means shall comply with Section 312. (CFC 507.5.6)
- Unobstructed access to fire hydrants shall be maintained at all times. The fire department shall not be deterred or hindered from gaining immediate access to fire protection equipment or fire hydrants. (CFC 507.5.4)

- A 3-foot clear space shall be maintained around the circumference of fire hydrants, except as otherwise required or approved. (CFC 507.5.5)
- Hydrants shall be located so that a hose line running between the hydrant and fire department connection (FDC) served by that hydrant does not cross driveways, obstruct roads or fire lanes, or otherwise interfere with emergency vehicle response and evacuation of a site. (SDFRD Policy O-22-2)
- Hydrants shall be located at least 40 feet from any building or portion of a building. Hydrants may be located closer, as approved by the fire code official, provided that nearby walls do not contain openings and the hydrant is not otherwise located where it can be rendered inoperable due to damage from collapsed walls, debris or excessive heat. (SDFRD Policy O-22-2)

Testing

- Fire hydrant systems shall be subject to periodic tests as required by the fire code official. Fire hydrant systems shall be maintained in an operative condition at all times and shall be repaired where defective. Additions, repairs, alterations and servicing shall comply with approved standards. Records of tests and required maintenance shall be maintained. (CFC 507.5.2)
  - Private fire hydrants of all types: Inspection annually and after each operation; flow test and maintenance annually.
  - Fire service main piping: Inspection of exposed, annually; flow test every 5 years.
  - Fire service main piping strainers: Inspection and maintenance after each use.
  - Records of inspections, testing and maintenance shall be maintained.

Marking

- Hydrant locations shall be identified by the installation of reflective blue colored markers in accordance with standard drawing SDW-104 and the following:
  - On unstriped roadways, blue markers shall be set six inches from the approximate center of the roadway, perpendicular to the hydrant.
  - On undivided striped roadways, blue markers shall be set six inches to the hydrant side of the center stripe.
  - On divided roadways, the blue marker shall be set six inches to the side of the median or lane striping, which is closest to the hydrant.
  - In locations where hydrants are situated on corners, blue markers shall be installed on both approaches fronting the hydrant.

Standpipes

- Buildings equipped with a standpipe system installed in accordance with Section 905 shall have a fire hydrant within 100 feet of the fire department connections. (CFC 507.5.1.1)
- The OSFM/SDFRD may require a Knox locking cap for standpipes. (SDFRD Policy K-21-3)

Fire Pump

- As deemed necessary by hydraulic calculations, fire pumps will be provided in accordance with NFPA 20 to provide adequate pressure for fire sprinklers and firefighting. (CFC 913)
- Dedicated pump rooms will be required and constructed to limit interruptions to service. (CFC 913.2)

6.3.3 Automatic Fire Sprinklers

All structures, of any occupancy type, will be protected by an automatic, interior fire sprinkler system. All automatic internal fire sprinklers would comply with National Fire Protection Association (NFPA) 13 and OSFM installation requirements as required based on structure type, use, and size. The actual system design is subject to the final building design and the specific requirements for residential occupancy. Fire sprinkler plans for each structure will be submitted and reviewed by OSFM for compliance with the applicable fire and life safety regulations, codes, and ordinances.

6.4 Defensible Space and Vegetation Management

The following sections outline the defensible space requirements for the Proposed Project as well as the Project-specific FMZ characteristics. Since the Peninsula Component is adjacent to wildland vegetation and is within a VHFHSZ, FMZs are required between planned structures and adjacent fuels. Since the University Towers East Component is surrounded by development and not within a FHSZ, no FMZs are required. Thus, all discussions of fuel modification zones are in regard to those surrounding the Peninsula Component of the Proposed Project.

6.4.1 Defensible Space and Fuel Modification Zone (FMZ) Requirements

An important component of a fire protection system for the Proposed Project is the provision for 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 by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI exposed structures.

The Proposed Project will be exposed to naturally-vegetated open space areas surrounding the site. Based on the modeled extreme weather flame lengths for the Project Site, wildfire flame lengths in areas of Development Footprint-adjacent coastal scrub and grassland fuels are projected to be approximately 10 to 20 feet high during sustained winds and to approximately 40 feet during 50 mph gusts. The fire behavior modeling system used to predict these flame lengths was not intended to determine sufficient FMZ widths, but it does provide the average predicted length of the flames, which is a key element for determining “defensible space” distances for providing firefighters with room to work and minimizing structure ignition. For the SDSU Evolve Student Housing Project Site, the FMZ widths between the naturally vegetated open space areas and the property lot lines are proposed to be 100 feet in nearly all areas, approximately two and a half to ten times the modeled flame lengths based on the fuel type represented adjacent to the development footprint. The FMZs will be constructed from the structure outward toward undeveloped areas. Figure 8 illustrates the conceptual FMZ Plan proposed for the Proposed Project, including a code-exceeding irrigated Zone A that varies between 27 feet and over 100 feet in width as well as a thinned Zone B that extends from the edge of Zone A up to 100 feet out from all structures in nearly all areas. It should be noted, if there are Biological constraints that prevent the implementation of FMZs in certain areas, an application for Alternative Materials and Methods (AM&Ms) of construction shall be submitted in order to implement another method of fire hardening that meets or exceeds the intent of a full 100 feet of fuel modification, such as a concrete masonry unit (CMU) fire wall or other code exceeding measures.

A 5-foot-wide ember-resistant Zone 0 would also be included around all structures. Further, fuel modification will also be included for all fire apparatus access roads consisting of at least 13 feet and 6 inches of vertical clearance. It should be noted that the provided plan is conceptual and a final fuel modification plan would be provided to the OSFM at a later date that includes all FMZ boundaries, identification of vegetation to remain and proposed new vegetation, identification of irrigated areas, a plant legend with both botanical and common names with identification of all plant material symbols, and identification of all ground coverings within the 30-foot zone.

Although FMZs are very important for setting back structures from adjacent unmaintained fuels, the highest concern is considered to be from firebrands, or embers, as a principal ignition factor. To that end, the 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 OSFM and California's Fire and Building Codes (e.g., Chapter 7A).

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Table 3: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	GR4, SH5, SH7	GR1, GR4, SH5, SH7, TU5
1 h fuel moisture	9%	2%
10 h fuel moisture	10%	3%
100 h fuel moisture	15%	8%
Live herbaceous moisture	48%	30%
Live woody moisture	96%	60%
20 ft. wind speed	7 mph (sustained winds)	10 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	270	0 to 60
Wind adjustment factor	0.4	0.4
Slope	45 to 50%	45 to 50%

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

Fuel Models	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance [1] (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet /second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site ([2])							
Very High-load Timber-Shrub (TU5)	11.5 (22.2)	1,149 (4,816)	0.2 (1.0)	0.3 (1.5)	53.3 (228.5)	4,345 (38, 626)	0.3 (0.9)
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site ([2])							
High-load Shrub (SH5)	19.9 (42.1)	3,769 (19,290)	1.3 (6.5)	0.5 (2.3)	N/A	N/A	N/A
Moderate-load Grass (GR4)	13.5 (33.9)	1,638 (12,036)	2.0 (14.5)	0.4 (2.0)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site ([2])							
High-load Shrub (SH5)	20.4 (42.3)	3,991 (19,511)	1.3 (6.6)	0.5 (2.3)	N/A	N/A	N/A
Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
High-load Shrub (SH5)	11.5	1,153	0.5	0.3	N/A	N/A	N/A
Moderate-load Grass (GR4)	8.0	514	0.8	0.2	N/A	N/A	N/A
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Very High-load Shrubs (SH7)	10.6	969	0.3	0.2	N/A	N/A	N/A

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

Fuel Models	Flame Length [1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance [1] (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet/ second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site ([2])							
Zone 1 & 2: Low-load Broadleaf Litter (TL2)	1.3 (1.9)	11 (22)	0.0 (0.1)	0.1 (0.3)	N/A[3]	N/A[3]	N/A[3]
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site ([2])							
Zone 1: Short, Sparse Grasses (GR1)	3.0 (3.1)	63 (67)	0.4 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	6.7 (15.5)	353 (2,181)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site ([2])							
Zone 1: Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	6.9 (15.5)	378 (2,207)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
Zone 1: Short, Sparse Grasses (GR1)	1.7	19	0.2	<0.1	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	1.4	12	<0.1	<0.1	N/A	N/A	N/A
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Zone 1: Short, Sparse Grasses (GR1)	1.7	18	0.2	<0.1	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	1.3	11	<0.1	<0.1	N/A	N/A	N/A

Note:
1. Wind-driven surface fire.
2. Values in parentheses represent the respective output in the presence of 50 mph gusts.
3. Due to prescribed pruning and reduced understory fuels, a surface fire is not anticipated to transition to a crown fire.

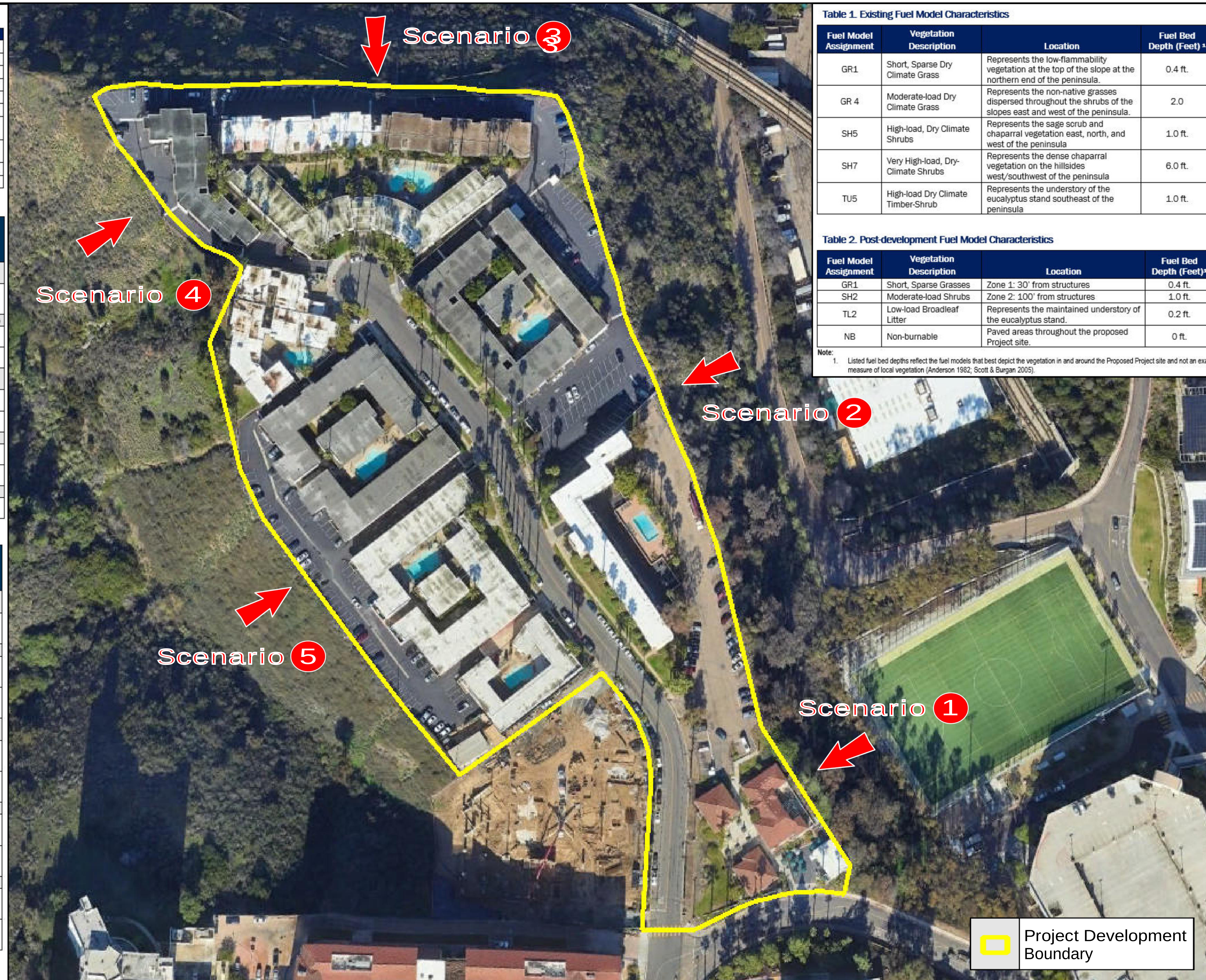

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)[1]
GR1	Short, Sparse Dry Climate Grass	Represents the low-flammability vegetation at the top of the slope at the northern end of the peninsula.	0.4 ft.
GR 4	Moderate-load Dry Climate Grass	Represents the non-native grasses dispersed throughout the shrubs of the slopes east and west of the peninsula.	2.0
SH5	High-load, Dry Climate Shrubs	Represents the sage scrub and chaparral vegetation east, north, and west of the peninsula	1.0 ft.
SH7	Very High-load, Dry-Climate Shrubs	Represents the dense chaparral vegetation on the hillsides west/southwest of the peninsula	6.0 ft.
TU5	High-load Dry Climate Timber-Shrub	Represents the understory of the eucalyptus stand southeast of the peninsula	1.0 ft.

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)[1]
GR1	Short, Sparse Grasses	Zone 1: 30' from structures	0.4 ft.
SH2	Moderate-load Shrubs	Zone 2: 100' from structures	1.0 ft.
TL2	Low-load Broadleaf Litter	Represents the maintained understory of the eucalyptus stand.	0.2 ft.
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft.

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

SOURCE: GOOGLE EARTH AERIAL IMAGERY SERVICE

DUDEK

FIGURE 8
BehavePlus Analysis Map
SDSU EVOLVE Student Housing Project

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6.4.1.1 California VHFHSZ Fuel Modification Zone Standards

The following subsections break down the typical fuel modification zone requirements, which are based on distance from the structure, as designated Zone 0, Zone A, and Zone B, and are based on applicable state codes.

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 combustible structures such as 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 structures to reduce the likelihood of ember-based structure ignition. However, the requirement for an ERZ under PRC 4291 will not take effect for new structures until the Board of Forestry releases updated regulations and guidance documents. 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 Proposed 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. Combustible items within this zone, including on decks, should be limited.
5. Any lumber should be relocated within Zone B.
6. Fencing, gates, and arbors attached to homes or structures should be made with non-combustible materials.
7. Garbage and recycling containers should not be kept within this zone.
8. Create separation between trees, shrubs, and items that could catch fire, such as patio furniture, wood piles, swing sets, etc.
9. Maintain the exterior/roof of a structure free of leaves, needles, or other vegetative materials. (PRC 4291)

Zone A: Irrigated Zone – from structure outward to a minimum of 30 feet

Zone A extends 30 feet beyond the edge of any combustible structure, accessory structure, appendage, or projection. Irrigation by automatic or manual systems shall be provided for landscaping to maintain healthy vegetation.

1. Irrigated by the automatic or manual system to maintain healthy vegetation and fire resistance
2. New trees shall be planted and maintained so that the tree's drip line at maturity is a minimum of 10 feet from any combustible structure. (CFC 4906.4.2)
3. Existing trees shall be trimmed to provide a minimum separation of 10 feet away from chimney and stovepipe outlets per Title 14, Section 1299.03 (CFC 4906.4.2)

4. New trees not classified as fire-resistant vegetation, such as conifers, palms, pepper trees and eucalyptus species, shall be permitted provided the tree is planted and maintained so that the tree's drip line at maturity is a minimum 30 feet from any combustible structure. (CFC 4906.4.2.1)

Zone B: Thinning Zone – Zone A outward up to 100 feet from any structure

Zone B extends up to 100 feet beyond the edge of any combustible structure, accessory structure, appendage, or projection and typically consists of thinned natural vegetation.

1. In this zone create horizontal and vertical spacing among shrubs and trees using the "Fuel Separation" method, the "Continuous Tree Canopy" method or a combination of both to achieve defensible space clearance requirements. Further guidance regarding these methods is contained in the State Board of Forestry and Fire Protection's, "General Guidelines for Creating Defensible Space, February 8, 2006," incorporated herein by reference, and the "Property Inspection Guide" referenced elsewhere in this regulation.
2. In both the Fuel Separation and Continuous Tree Canopy methods the following standards apply:
   a. Dead and dying woody surface fuels and aerial fuels shall be removed. Loose surface litter, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches, shall be permitted to a maximum depth of three inches (3 in.). (CCR Title 14 Section 1299.03)
   b. Cut annual grasses and forbs down to a maximum height of four inches (4 in.). (CCR Title 14 Section 1299.03)

General Requirements

1. Planting of vegetation for new landscaping shall be selected to reduce non-fire-resistant vegetation in proximity to a structure and to maintain vegetation as it matures. (CFC 4906.1)
2. Protect water quality. Do not clear vegetation to bare mineral soil and avoid the use of heavy equipment in and around streams and seasonal drainages. Vegetation removal can cause soil erosion, especially on steep slopes. Keep soil disturbance to a minimum on steep slopes. (CCR Title 14 Section 1299.03)

Shrub Code Standards

1. Shrubs shall not exceed 6 feet in height. (CFC 4906.4.1)
2. Groupings of shrubs are limited to a maximum aggregate diameter of 10 feet. (CFC 4906.4.1)
3. Shrub groupings shall be separated from other groupings a minimum of 15 feet. (CFC 4906.4.1)
4. Shrub groupings shall be separated from structures a minimum of 30 feet. (CFC 4906.4.1)

Tree Code Standards

1. Where shrubs are located below or within a tree's drip line, the lowest tree branch shall be a minimum of three times the height of the understory shrubs or 10 feet, whichever is greater. (CFC 4906.4.1)
2. New trees shall be planted and maintained so that the tree's drip line at maturity is a minimum of 10 feet from any combustible structure. (CFC 4906.4.2)
3. Existing trees shall be trimmed to provide a minimum separation of 10 feet away from chimney and stovepipe outlets per Title 14, Section 1299.03

4. New trees not classified as fire-resistant vegetation, such as conifers, palms, pepper trees and eucalyptus species, shall be permitted provided the tree is planted and maintained so that the tree's drip line at maturity is a minimum 30 feet from any combustible structure. (CFC 4906.4.2.1)

6.4.1.2 Project Fuel Modification Zone Treatments

The Proposed Project would include Fuel Modification Zones (FMZs) that comply to the 100-foot total width code requirement in nearly all areas and also include a code-exceeding Zone A (see Figure 8, *Conceptual Fuel Modification Plan*). Overall, the Peninsula Component of the Proposed Project would include code-exceeding irrigated Zone A widths that exceed the overall 100 feet of FMZ requirement in places, a thinned Zone B that extends from the edge of Zone A out to 100 feet from all structures in nearly all areas, and 5 feet of ember-resistant Zone 0 around all structures. More specifically, on-site FMZ Zone A widths vary between approximately 27 feet by the Dining Hall and up to 78 feet near Buildings 4 and 6. Furthermore, off-site FMZ Zone B widths vary between approximately 22 feet and up to 73 feet, totaling up to 100 feet of 100 feet of on- and- off-site combined FMZ. It should be noted that a total of 81 feet of combined on- and- off-site FMZ is achieved along the northern side of Building 3. As mentioned above, should there be Biological constraints that prevent the implementation of FMZs in certain areas, an application for AM&Ms of construction shall be submitted in order to implement another method of fire hardening that meets or exceeds the intent of a full 100 feet of fuel modification, such as a concrete masonry unit (CMU) fire wall or other code exceeding measures.

The increased irrigated Zone A widths, which reduce fire behavior more than Zone B, would contribute to greater reduction in fire behavior than a traditional code complying fuel modification zone. Additionally, the looping, non-combustible, perimeter fire road within Zone A would act as a fuel break and position for fire suppression personnel to stage structure defense and fire suppression from. Lastly, the new structures would be of a Type I-B concrete construction that includes two-hour-rated exterior bearing walls, interior bearing walls, floor construction, and primary frame construction, along with a 1-hour rated roof construction and all requirements of California Building Code Chapter 7A to reduce structure ignitability and ember penetration.

6.4.1.2.1 Undesirable Plants

Certain plants are considered to be undesirable in the landscape due to characteristics that make them highly flammable. These characteristics can be physical (structures promote ignition or combustible) or chemical (volatile chemicals increase flammability or combustion characteristics). Plants that exhibit characteristics of increased flammability such as low moisture content, flammable waxes and oils, open growth structure, high growth speed, high height potential, and frequent bark or lead shedding are unacceptable from a fire safety standpoint and shall not be planted or allowed to establish opportunistically within the Project's FMZs or landscape areas.

6.4.2 Annual Fuel Modification Zone Compliance Inspection

To confirm that the Proposed Project's FMZs and landscape areas are being maintained according to the FPP and the OSFM fuel modification guidelines, the Proposed Project's managing entity would obtain an FMZ inspection and report from Dudek or a qualified OSFM-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 Proposed Project's managing entity will have a specified period to correct any noted issues so that a re-inspection can occur and certification can be achieved.

6.4.3 Construction Phase Vegetation Management

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

7 Alternative Materials & Methods

7.1 Purpose

This FPP incorporates alternative measures and methods that will be implemented to compensate for potential fire related threats due to certain elements of the Proposed Project not complying with prescribed code requirements as allowed by CFC Sections 104.9 - 104.10. These measures are customized for the Proposed Project based on the analysis results and focus on providing functional equivalency to the identified deficiency.

7.2 Identified Deficiencies

7.2.1 Fuel Modification Zones

The specific area that is affected by this analysis is the total defensible space width north of Building 3 of the Peninsula Component of the Proposed Project. Standard fuel modification zones are 100 feet (or to property line — PRC 4291). The proximity of the planned structure to the property line abutting the adjacent California Department of Transportation (Caltrans) parcel does not allow for the full 100 feet of defensible space. As a result, at the narrowest point, there is approximately 81 feet of defensible space, or, 19 feet less than the code requirement. It should be noted, should there be other areas of the development where Biological constraints prevent the implementation of FMZs in certain areas, an application for Alternative Materials and Methods (AM&Ms) of construction shall be submitted in order to implement another method of fire hardening that meets or exceeds the intent of a full 100 feet of fuel modification, such as a concrete masonry unit (CMU) fire wall or other code exceeding measures

7.3 Justifications

7.3.1 Distance Between Structures and Fire

As experienced in numerous wildfires, including the historically large and destructive fire storms in San Diego County (2003 and 2007), structures in the WUI are potential fuel. The distance between the wildland fire that is consuming wildland fuel and the structure ("urban fuel") is the primary factor for structure ignition (not including burning embers). The closer a fire is to a structure, the higher the level of heat exposure (Cohen 2000). However, studies indicate that given certain assumptions (e.g., 10 meters of low fuel landscape, no open windows), wildfire does not spread to structures unless the fuel and heat requirements (of the home) are sufficient for ignition and continued combustion (Cohen 1995, Alexander et al. 1998).

7.3.2 Construction materials and methods

Construction materials and methods can prevent or minimize ignitions. Similar case studies indicate that with nonflammable roofs and vegetation modification from 10–18 meters (roughly 32–60 feet) in southern California fires, 85–95% of the homes survived (Howard et al. 1973, Foote and Gilless 1996). Similarly, San Diego County after fire assessments strongly indicate that the building codes are working in preventing structure loss: of 15,000 structures within the 2003 fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 fire perimeter, 17% were damaged or destroyed. A much smaller percentage (3%) of the 789 homes that were built to 2001 codes were impacted and an even smaller percentage (2%) of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008).

These results support Cohen's (2000) findings that if a development's structures have a sufficiently low structure ignitability, the development can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to structures at the residential location without extensive wildland fuel reduction. Cohen's (1995) studies suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid Structure Ignition Assessment Model (SIAM) results indicate that a 20-foot-high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas, a 70-foot high flame may require about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). This study utilized bare wood, which is more combustible than the Type I-B construction to be utilized in the Proposed Project's structures. Fire behavior modeling conducted for the Proposed Project indicates that fires in the irrigated landscaping of Zone A would result in roughly three-foot flame lengths, even under gusty, extreme conditions, while there would be less than two-foot flame lengths under average conditions. The natural vegetation adjacent to the fuel modification zones, approximately 85 feet from the structure at this location, would have flame lengths of approximately 20 feet under extreme conditions and sustained winds or up to 40 feet during 50 mph gusts. In other words, the fuel modification zone, at its narrowest point, is approximately two to four times as wide as the longest flame lengths produced by the adjacent natural vegetation during extreme conditions.

As indicated in this report, the Proposed Project design (FMZs, structure hardening, and other fire protection measures) are intended to provide equivalent wildfire protection due to the limitation of not meeting the strict code definition. Rather, they are based on a variety of analysis criteria including predicted flame length, fire intensity, site topography and vegetation, extreme and typical weather, position of structures on pads, position of roadways, adjacent fuels, fire history, current vs. proposed land use, and type of construction. The fire intensity research conducted by Cohen (1995), Cohen and Butler (1996), Cohen and Saveland (1997), and Tran et al. (1992) supports the fuel modification alternatives proposed for the Proposed Project.

7.4 Specific Project Fire Protection Measures

All structures that would be part of the Peninsula component of the Proposed Project would comply with all OSFM requirements and the requirements of the 2022 California Fire and Building Codes. Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. Further, a structure located near or within a VHFHSZ area that is built to these specifications can be at lower risk than an older structure in a non-fire hazard severity zone. While the following facets of the proposed Project's overall fire protection features have been previously mentioned and are code required, they are provided below to highlight the factors contributing to the overall reduced fire risk associated with the proposed Project.

- Application of the 2022 CBC, Chapter 7A, ignition resistant building requirements.
- Exterior walls of all structures and garages to be constructed with approved non-combustible (stucco, masonry, or approved cement fiber board) or ignition-resistant material from grade to underside of roof system. Wood shingle and shake wall covering is prohibited.

- Exposed wood, including fascia and architectural trim boards, will not be allowed on the side of structures facing the wildland fuels unless considered “heavy timber” or beams with a minimum nominal dimension of four inches.
- There would be no use of plastic, vinyl (with the exception of vinyl windows with metal reinforcement and welded corners), or light wood on the exterior,
- Multi- pane glazing with a minimum of one tempered pane, fire-resistance rating of not less than 20 minutes for floors above the fourth floor. The first floors will have code-exceeding windows (see below).
- NFPA 13 automatic, interior fire sprinkler system to code for the entire structure.
- All structures would have between 27 and over 100 feet of Zone A fuel modification width (**code-exceeding**), including a 5-foot-wide ember-resistant Zone 0, and up to 65 feet of Zone B fuel modification width where possible.
- A looping perimeter 26-feet-wide fire access road with hammerhead turnarounds and an interior 26-feet-wide fire access road with no dead-end roads within the entire Proposed Project’s road system. The perimeter looped fire access road that connect with an interior fire access road way makes the project’s road system compliant with the secondary access requirements (Section 503.1.6 of the 2022 CFC).
- Modern infrastructure, access roads, and water delivery system. All roadways will be code complying in all characteristics including width, grade, and surface and would have vertical clearances of at least 13 feet and 6 inches.
- Designated Fuel Modification Zones would be inspected annually by OSFM, or by a OSFM approved third party FMZ inspection consultant, such as Dudek, for conformance with the requirements provided in the Proposed Project's Fire Protection Plan.
- No combustible fences will be allowed. Fences using fire retardant treated wood products will be subject to approval of the OSFM.

The following **code exceeding mitigation measures** are being provided for the sides of Proposed Project structures within the Peninsula component that face the naturally vegetated areas adjacent to the Peninsula to the west, north, and east in order to, in conjunction with the previously mentioned code-complying measures, provide functional equivalency to the 100-foot-wide fuel modification code requirement. These code exceeding mitigations were found to meet or exceed the code required 100 feet fuel modification zones through science and application and were accepted by numerous fire agencies throughout California:

1. The Proposed Project structures are Type IB construction which offers superior fire-resistance compared to other construction types due to being constructed of noncombustible materials and exterior and interior load bearing walls with at least a 2 hour fire-resistance rating. Most research conducted on the impacts to structures from wildfires is related to Type V residential construction which have reduced fire-resistance requirements and performance. The construction materials and methods of the Proposed Project structures would be anticipated to, in combination with established fuel modification zones and related fire protection system components, enable the structures to resist ignition or component failure during the short duration exposure that would be expected from a wildfire in the small area of highly-combustible natural vegetation adjacent to the Project site. The construction type of the Proposed Project structures, while required due to aspects of the Proposed Project unrelated to the scope of this document, exceed the standards established by Chapter 7A of the CBC and thus are considered to be a **(CODE EXCEEDING MITIGATION MEASURE);**

2. The Proposed Project would require exterior glazing in windows (and sliding glass doors, garage doors, or decorative or leaded glass doors) on the first 4 floors starting from ground level of the portion of Building 4 which is within less than 100 feet of natural fuels beyond the fuel modification zone to be dual pane with both panes tempered glass to mitigate for reduced FMZ. Since the first four stories are closer in proximity to adjacent surface fire, the radiant and convective heat these windows would be exposed to would be higher than the above floors. Dual pane, one pane tempered glass has been shown during testing and in after fire assessments to significantly decrease the risk of breakage and ember entry into structures. Therefore, requiring code-exceeding dual pane, both panes tempered is anticipated to be an important safety measure that provides enhanced structure protection and provides mitigation for the small reduction fuel modification zones caused by the proximity to the adjacent Caltrans parcel. *The window upgrade also exceeds the requirements of Chapter 7A of the CBC and provides additional protection for the structure's most vulnerable, exterior side* **(CODE EXCEEDING MITIGATION MEASURE);**
3. In addition to the code-exceeding dual pane dual tempered windows, the widths of the irrigated Zone A are proposed to be extended beyond the 30-foot-wide requirement. The Zone A fuel modification zone for the Proposed Project would be at least 27 feet wide near the Dinning Hall structure and would extend to over 100 feet in width in other areas of the project site, with most areas where Zone B is not present being 78 feet in width. The Proposed Project's Zone A would consist of irrigated landscaping of fire-resistant, frequently maintained vegetation as well as non-combustible roads and walkways including the 26-foot-wide looping fire road that connects with a minimum 26-foot-wide interior emergency access road, allowing the project to conform to the secondary access roadway requirements. Zone A conditions result in a greater reduction in fire behavior than Zone B conditions. This means that the greater reduction in fire behavior per foot of fuel modification provided would aid in compensating for the reduced total fuel modification area width. **(CODE EXCEEDING MITIGATION MEASURE)**

The code-exceeding dual pane dual tempered windows and expansion of the irrigated Zone A would, in combination with the other fire protection features of the SDSU Evolve Student Housing Project, meet or exceed the intent of the defensible space requirements of the OSFM. Fuel modification zones' primary purpose is to protect structures from radiant and convective heat while also minimizing firebrand propagation within close proximity to structures. The upgraded windows would increase the resistance of the structure from radiant and convective heat with a dual benefit of decreasing the likelihood of ember intrusion. The expanded, irrigated Zone A would reduce fire behavior adjacent to structures and thus reduce the heat exposure to all structure components.

8 Ready, Set, Go!

An Evacuation Study has been prepared for the Proposed Project that further details the existing policies, anticipated evacuation time, and more. Early evacuation for any type of wildfire emergency at the Project Site is the preferred method of providing for resident safety, consistent with the SDFRD's current approach within San Diego. As such, the University Public Safety/Emergency Operations would formally adopt, practice, and implement a "Ready, Set, Go!" approach to evacuation[3]. The "Ready, Set, Go!" concept is widely known and encouraged by the State of California and most fire agencies. Pre-planning for emergencies, including wildfire emergencies, focuses on being prepared, having a well-defined plan, minimizing 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.

Proposed Project residents, employees, and occupants would be provided ongoing education regarding wildfires and the FPP's requirements. Informational handouts, community website pages, mailers, and seasonal reminders are some methods that would be used to disseminate wildfire and relocation awareness information. SDFRD or the OSFM would review and approve all wildfire educational material/programs before printing and distribution.

3 https://www.readyforwildfire.org/

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9 Summary of Primary Code-Required Features, Primary Code-Exceeding Features, and Recommended Project Design Features

Table 10. Primary Code Required Fire Safety Features

Feature No.	Description
1	**Ignition Resistant Construction.** All Proposed Project structures within the Peninsula Component would be built to at least the ignition resistant construction requirements per the CBC Chapter 7A and the San Diego Building Code.
2	**Interior Fire Sprinklers.** All structures will be protected by an automatic, interior fire sprinkler system per CFC. All structure's Automatic internal fire sprinklers would be in accordance with National Fire Protection Association (NFPA) 13 and installation requirements as required based on structure type, use, and size.
3	**Fuel Modification Zones.** The conceptual FMZ plan for the SDSU Evolve Student Housing Peninsula Component Project Site includes a minimum 30-foot wide irrigated, setback area Zone A, a minimum 70-foot wide irrigated area Zone B, and a minimum 100-foot wide thinning area Zone C in compliance with Los Angeles County Fire Code (Title 32, Fire, Section 4908) and consistent with the 2022 California Fire Code (Section 4907 — Defensible Space), Government Code 51175 – 51189, and Public Resources Code 4291. (Section 5.4 Defensible Space and Vegetation Management). It should be noted, if there are Biological constraints that prevent the implementation of FMZs in certain areas, an application for Alternative Materials and Methods (AM&Ms) of construction shall be submitted in order to implement another method of fire hardening that meets or exceeds the intent of a full 100 feet of fuel modification, such as a concrete masonry unit (CMU) fire wall or other code exceeding measures.
4	**Fire Apparatus Access.** Provided throughout the community and will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances. Project Site access, including road widths and connectivity, will be consistent with the 2022 CFC Section 503.
5	**Water Availability.** The Proposed Project will provide water and fire flow in accordance with 2022 CFC Appendix B. Fire Hydrants shall be located along fire access roadways as determined by the OSFM and current fire code requirements, including 2022 CFC Appendix C, to meet operational needs.
6	**Fuel Modification Maintenance Agreement.** The Proposed Project is required to maintain fuel medication zones on an annual basis minimum as well as long term. All fuel modification area vegetation management within the FMZs shall be completed annually prior to the start of fire season and more often as needed for fire safety, as determined by the OSFM or SDFRD.

Table 11. Primary Code Exceeding or Alternative Fire Safety Materials and Methods

Feature No.	Description
1	**Evacuation Plan.** The Proposed Project includes a Wildfire Evacuation Study (WES). The WES provides Project occupants with potential pedestrian and vehicular evacuation route information and instructions for following CALFIRE's "Ready, Set, Go!" model. The WES is prepared with consideration for the framework established in the San Diego State Emergency Operations Plan Synopsis, City of San Diego Emergency Operations Procedures, and the County of San Diego Operational Area Emergency Operations Plan, all of which use the concepts established in the California State Emergency Plan. Among the important concepts that are included in the WES are a description of the Project area's fire environment, applicable regulations, evacuation objectives and response operations , evacuation routes and time analysis, specific procedures for early relocation and contingency planning for situations where evacuation is considered unsafe, and resident education materials, including information on creating and maintaining defensible space, preparedness checklist, and tools to create an individual or family evacuation plan.
2	**Dual Glazed Windows.** The first 4 floors starting from ground level of the portion of Building 4 which is within less than 100 feet of natural fuels beyond the fuel modification zone to be dual pane with both panes tempered glass to mitigate for reduced FMZ. Since the first four stories are closer in proximity to adjacent surface fire, the radiant and convective heat these windows would be exposed to would be higher than the above floors. By upgrading these select windows to dual-pane, both panes tempered, the risk of complete window assembly failure and ember intrusion would be reduced and overall building ignition resistance would be increased.
3	**Extended Zone A.** the widths of the irrigated Zone A are proposed to be extended beyond the 30-foot-wide requirement. The Zone A fuel modification zone for the Proposed Project would be at least 27 feet wide and would be up to over 100 feet in width. The Proposed Project's Zone A would consist of irrigated landscaping of fire-resistant, frequently maintained vegetation as well as non-combustible roads and walkways including the 26-foot-wide looping fire road. Zone A conditions result in a greater reduction in fire behavior than Zone B conditions, which means that there would be greater reduction in fire behavior per foot of fuel modification compared to a traditional FMZ.
4	**Type IB Construction.** provides Proposed Project structures with increased ignition resistance due to being constructed of noncombustible materials and exterior and interior load bearing walls with at least a 2 hour fire-resistance rating. Most research conducted on the impacts to structures from wildfires is related to Type V residential construction which have reduced fire-resistance requirements and performance. The construction materials and methods of the Proposed Project structures would be anticipated to, in combination with established fuel modification zones and related fire protection system components, enable the structures to resist ignition or component failure during the short duration exposure that would be expected from a wildfire in the small area of highly-combustible natural vegetation adjacent to the Project site. The construction type of the Proposed Project structures, while required due to aspects of the Proposed Project unrelated to the scope of this document, exceed the standards established by Chapter 7A of the CBC.

Table 12. Recommended Fire Safety Features

Feature No.	Description
1	**Recommended Access Gate Emergency Operation System.** The Proposed Project would include gates separation internal roads from external, public roadways. To comply with requirements for unobstructed access, the Proposed Project will equip the gate with code-required fire department access features (i.e., Knox remote opening system) and is recommended to include a remote operating system of the latest technology to the approval of SDFRD that will enable the gate to be monitored and opened via internet protocol or cellular access during an emergency or wildfire situation.
2	**Recommended Fuel Modification Zone 3rd Party Inspections.** To confirm that the Project's FMZs and landscape areas are being maintained according to the FPP and the OSFM's fuel modification guidelines, the Proposed Project's managing entity would obtain an FMZ inspection and report from a qualified OSFM-approved 3rd party inspector, such as Dudek, by May 31 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 managing entity will have a specified period to correct any noted issues so that a re-inspection can occur and certification can be achieved.
3	**Recommended Pre-Construction Vegetation Management.** Vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for the Project area shall be performed pursuant to the FPP and OSFM requirements on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible materials will not be brought on-site without prior OSFM or SDFRD approval.
4	**Recommended Wildfire Education Program PDF.** The SDSU Evolve Student Housing Wildfire Education Program would provide targeted outreach to residents 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, activities in a fire risk area, and more, all provided in easy-to-understand, graphically based materials. The educational program would be based on a layered approach to wildfire awareness that includes both passive and active features. The program would be ongoing in order to maintain high wildfire awareness even as the community grows and evolves. The program would feature bi-annual email and/or mailers, a custom website, webinars, and a new resident packet.

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10 Analysis of the Proposed Project's Potential Wildfire Impacts

This section describes mirrors the wildfire analysis provided in the Environmental Impact Report for the SDSU Evolve Student Housing Project and evaluates potential impacts related to implementation of the Proposed Project based on the criterion provided in CEQA Guidelines Appendix G, Wildfire, and, as applicable, identifies mitigation measures to reduce identified potentially significant impacts to less than significant.

The section is based on a Wildfire Evacuation Study (WES)[4] and this Fire Protection Plan (FPP) prepared for the Proposed Project. The University Towers East Component site was minimally included in the WES and FPP because there is no wildland exposure to this element of the Proposed Project, as it is entirely surrounded by development with over 500 feet of distance to the nearest, isolated pocket of natural vegetation. As such, references to the "Proposed Project" or "Project Site" throughout this analysis are in reference to the Peninsula Component site unless stated otherwise.

10.1 Significance Criteria

The significance criteria used to evaluate the project impacts to wildfire are based on Appendix G of the CEQA Guidelines. According to Appendix G of the CEQA Guidelines, a significant impact related to wildfire would occur if the project would:

4. Substantially impair an adopted emergency response plan or emergency evacuation plan.
1. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.
2. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.
3. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

10.2 Impact Analysis

1. Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

As described under this impact, the Project would not remove or impair any evacuation routes that would be used by SDSU students or by occupants of any nearby land uses. For the purposes of evaluating this very similar threshold in this section, the focus is related to impairment of emergency response or evacuation as it specifically relates to wildfire hazards.

[4] The WES can be viewed as Appendix J-2 of the EIR.

Depending on the scale of the emergency, response and recovery operations (e.g., mass care, evacuation, etc.) are conducted in accordance with the policies and procedures outlined in the SDSU Emergency Operations Plan (EOP) (SDSU 2019), City of San Diego Emergency Operations Procedures (City of San Diego), and the County of San Diego Operations Area (OA) EOP (2022). These various emergency operations plans are all prepared in accordance with the State Emergency Plan, the State of California's Standardized Emergency Management System and the National Incident Command System, which ensures as an emergency scales, there is an established framework for interagency coordination. The Wildfire Evacuation Study (WES), Appendix J-2 of the EIR, was prepared for the Proposed Project based on the procedures and policies of the SDSU EOP, City of San Diego Emergency Operations Procedures, and San Diego County Emergency Operations Plan including Annex Q – Evacuation.

Evacuations in the County are primarily a result of wildfire events. The Peninsula Component site is designated a VHFHSZ in a LRA, which are areas considered to have a high fire potential based on available fuels, topography and climate. As seen in both the 2019 Fairmount Fire and 2024 Montezuma Fire, the time between ignition and spread to developed areas would be short; however, SDF&R was able to capitalize on its mutual aid resources, ultimately preventing either fire from progressing into the adjacent neighborhoods and with minimal damage to structures. As required for all development within a VHFHSZ, the Proposed Project would implement a comprehensive layered fire protection system, as detailed throughout this document, to reduce flame lengths and fire spread adjacent to Project structures and allow for SDSU Campus Police and/or SDPD the contingency option to shelter student onsite.

The analysis included in the WES determined how long it would take for occupants of the Project to evacuate on foot to the designated evacuation assembly point, and for the surrounding communities to evacuate in vehicles to nearby urban areas/freeway access in case of a wildfire emergency for both mass evacuation and phased scenarios. While current evacuation practice typically targets the scope of the evacuation only to the area in immediate danger while placing a larger area on standby for evacuation, to be conservative the WES also considers mass evacuation scenarios.

An evacuation of the Peninsula Component site resulting from a fire that starts in the unmaintained fuels to the east and driven by Santa Ana winds (i.e., from the northeast) or a fire in the unmaintained fuels in the canyon to the west from a fire driven by onshore wind (i.e., from the west) is possible. In the event of an evacuation the Proposed Project would implement the procedures outlined in Appendix J-2, WES, of the EIR, which are consistent with the SDSU EOP, City of San Diego Evacuation Procedures and the County of San Diego OA EOP; therefore, the Proposed Project would not conflict with an adopted emergency response plan or evacuation plan.

Additionally, the WES considers the impact to existing evacuation times for the Proposed Project site and adjacent canyon neighborhoods. Overall, as described in the WES, the Proposed Project would reduce the number of evacuating vehicles compared to existing conditions. Specifically, the Proposed Project would redevelop the existing uses on the Peninsula Component site, which includes 209 parking stalls, with six multi-story structures to accommodate 4,450 student beds and only 15 parking stalls. The reduction of the number of available parking spaces in the area would reduce the potential number of vehicles expected to evacuate from the study area that could contribute to travel time impacts during an evacuation event.

Although the Proposed Project would accommodate up to 15 parking spaces, occupants of the Peninsula Component could potentially have a vehicle parked in one of the Campus parking structures. However, as described in Appendix J-2 of the EIR, all student residents would be required to check in at the designated assembly point and would be escorted to parking structures if instructed to evacuate. Occupants of the University Towers East Component would be first year students, as such, per SDSU policy would not be permitted to obtain a Campus parking permit. Additionally, surrounding neighborhood parking is only available to residents with a valid City parking permit and is enforced by the San Diego Police Department, this is also true for the residential neighborhoods adjacent to the Peninsula Component. Assumptions for the total number of evacuating vehicles associated with each land use is described in detail in Table 3 of the WES (Appendix J-2 of the EIR).

As evidenced by mass evacuations in the County and elsewhere, even with roadways that are designed to meet code requirements, it may not be possible to move large numbers of persons at the same time. Road infrastructure throughout the United States, and including in San Diego, is not designed to accommodate a short-notice, mass evacuation (FEMA 2008). As such, a mass evacuation from the SDSU campus and including the Project sites has the potential to substantially impair an adopted emergency response plan or emergency evacuation plan.

There is no universal or established evacuation timeframe threshold that Projects must meet to be consistent with codes, regulations or policies. However, for the purposes of understanding the potential evacuation times for the Project area, a comprehensive WES has been prepared for the Project, as discussed above (Appendix J-2 of the EIR).

Law Enforcement (e.g., University Police Department, San Diego Police Department, and San Diego Sheriff's Department) and EOC are responsible for appropriately phasing evacuations and to consider the vulnerability of communities when making decisions. The need for evacuation plans, pre-planning, and tiered or targeted and staggered evacuations becomes very important for improving evacuation effectiveness. The practice of phased evacuations allows for better evacuation operations, reduces gridlock, and reserves sufficient travel way for emergency vehicles. It is assumed that first responders or law enforcement would direct traffic at all major downstream intersections during the evacuation process. To analyze the evacuation events, the WES conducted evacuation travel time analyses for multiple evacuation scenarios. Refer to Appendix J-2 of the EIR for a detailed description of the evacuation scenarios analyzed and assumptions. The results of the evacuation analysis are presented in Table 13.

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Table 13 Estimated Vehicular Evacuation Times

Evacuation Route Scenario	Existing Conditions (Scenario 1)	Project Only (Scenario 2)	Existing Conditions + Project (Scenario 3)	Existing Conditions + Cumulative (Scenario 4)	Existing Conditions + Project + Cumulative (Scenario 5)	Minimum Roadway Capacity (Vehicles per Hour)	Existing Conditions Estimated Evac Travel Timeframe ** (Scenario 1)	Existing Conditions + Project Estimated Evacuation Travel Timeframe (Scenario 3)	Existing Conditions + Project +Cumulative Evacuation Travel Timeframe *** (Scenario 5)	Worst Case Travel Time Scenario 1 vs. Scenario 3
Most Likely Evacuation Scenario										
Montezuma Rd to Fairmont Drive to I-8	SDSU 209 SDC 1902 707	11	SDC 1902 707 Project 11	SDSU 209 SDC 1902 707 Cumulative 36	SDC 1902 707 Project 11 Cumulative 36	1,900	28.93 minutes (0.48 hours)	22.67 minutes (0.38 hours)	23.81 minutes (0.40 hours)	-6.26 minutes
Collwood Blvd to El Cajon Blvd to I-15	SDSU 69 SDC 1902 235	4	SDC 1902 235 Project 4	SDSU 69 SDC 1902 235 Cumulative 12	SDC 1902 235 Project 4 Cumulative 12	1,900	9.60 minutes (0.16 hours)	7.55 minutes (0.13 hours)	7.93 minutes (0.13 hours)	-2.05 minutes
Total Vehicles	**1,220**	**15**	**957**	**1,268**	**1,005**		**N/A**	**N/A**	**N/A**	**N/A**
Worst Case One Evacuation Route										
Montezuma Rd to Fairmount Dr to I-8 Or Collwood Blvd to El Cajon Blvd to I-15	1,220	15	957	1,268	1,005	1,900	38.53 minutes (0.64 hours)	30.00 minutes (0.50 hours)	31.74 minutes (0.53 hours)	-8.53 minutes

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As shown by the evacuation times reported shown in Table 13, evacuation of residential households west of the Project site in the SDC-1905 evacuation zone as well as the existing structures on the Peninsula Component site and University Towers East Component site, and associated vehicles under existing conditions would take up to 28 minutes (see Scenario 1). Evacuation of the existing conditions + Project conditions would take up to 22 minutes (Scenario 3). Evacuation of the existing conditions + Project conditions + cumulative projects would take up to 23 minutes (Scenario 5). The reduction of 6 minutes in time to evacuate from Scenario 1 to Scenario 3 is a result of the reduction in parking spaces that presently exist on the Peninsula Component site (278 existing to 15 proposed parking spaces). A worst-case scenario was modeled in which a mass evacuation would occur, and evacuees would only be able to use one evacuation route. This scenario is highly unlikely and was modeled as a conservative analysis. Under the worst-case scenario, evacuation of the existing conditions (Scenario 1) would take up to 38 minutes, existing conditions + Project conditions (Scenario 3) would take up to 30 minutes, and existing conditions + Project conditions + cumulative projects (Scenario 5) would take up to 31 minutes. Evacuation during a worst-case evacuation scenario would take approximately 8 minutes less with the Proposed Project than the existing conditions of the Project Site.

Pedestrian evacuation was also modeled for students of the Proposed Project sites to evacuate to the designated evacuation assembly point. A pedestrian evacuation from the Peninsula Component Site to the designated evacuation assembly point would take up to 10 minutes, and a pedestrian evacuation from the University Towers East Component site would take up to 7 minutes.

The methodology and assumptions of the evacuation time analysis is explained in more detail in the WES, Appendix J-2 of the EIR. The Project evacuation routes for both a vehicular evacuation and a pedestrian evacuation are shown in Figure 5 of Appendix J-2 of the EIR.

The Project includes adequate circulation and emergency access roads to allow for adequate evacuation of the Project sites as well as access to the Project sites by emergency response vehicles. All roadway improvements would be constructed in accordance with applicable code requirements regarding egress and ingress. Additionally, once the Project is built out, the fire safety features (e.g., ignition resistant construction, fuel modification, etc.) would allow people to shelter-in-place or take temporary refuge within the Project buildings, which could reduce evacuating traffic from the site.

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 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.

A recent study titled "Review of California Wildfire Evacuation from 2017 to 2019 " 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, the average evacuation time for the Creek Fire was found to be 3 hours and 40 minutes, involving 115,000 people. For the Thomas Fire, the average time was 4 hours and 25 minutes, impacting 104,607 individuals.

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 the Specific Plan 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 6-hour evacuation for another community as unsafe. The 6-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, the City/County have safely managed both mass and targeted evacuations successfully. For example, the 2017 Lilac Fire resulted in evacuation of several neighborhoods and resulted in zero fatalities. 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. Such decisions could delay their evacuation to a point where it becomes too late to leave safely.

Technological advancements and improved evacuation strategies learned from prior wildfire evacuation events have resulted in a system that is many times more capable of managing evacuations. With the technology 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. While mass evacuation scenarios are avoided with the technology in use today, the evacuation traffic time analysis conducted in this report are based on mass evacuation scenarios to provide a worst-case scenario, as described previously.

The evacuation travel time analysis scenarios conducted herein represent mass evacuations in the Project vicinity to provide worst-case scenarios. In a probable evacuation scenario, individuals in the existing surrounding land uses would have the opportunity to evacuate before the users of the Project start evacuating, thereby giving priority to the existing land uses, providing for a natural phased evacuation. The Incident Commander would direct a focused evacuation of homes situated near the wild urban interface, which are at higher risk. Areas that are not in immediate danger would likely not be provided with an evacuation notice initially and may be instructed to remain in place to prioritize the evacuation of vehicles from areas under direct threat. This would result in phasing evacuation traffic so that it flows more evenly and minimizes the surges that may slow an evacuation. Therefore, evacuation flow would be able to be effectively managed and would not likely lead to mass evacuations, as simulated in the WES. Nonetheless, because human behavior during an evacuation scenario is unpredictable, a community that is uninformed about evacuation could lead to an evacuation scenario that is disorganized, resulting in delayed evacuation times. Therefore, the Proposed Project would implement MM-WLD-FIRE-1, SDSU Evolve Student Housing Wildfire Education Program, which would educate students on the fire risk and evacuation procedures described in the SDSU EOP, City of San Diego Emergency Procedures and County OA EOP to help reduce confusion and support an orderly evacuation. Additionally, the presence of the SDSU Police Department located near the Peninsula Component of the Project Site would facilitate orderly evacuations.

Overall, once a student has exited a building, they would be able to evacuate to the designated assembly point in approximately 10 minutes from the Peninsula Component site and 7 minutes from the University Towers East Component site. Additionally, the Project would not eliminate any existing evacuation routes and would provide a shelter in place alternative for Project residents due to compliance with fire safety features that meet or exceed the requirements of Chapter 7A of the CBC (e.g., ignition resistant construction, fuel modification). Further, the Proposed Project would implement MM-WLD-1 to educate students and support orderly evacuations. Considering these facts and others discussed herein, the Project would not substantially impair an adopted emergency response plan or emergency evacuation plan and would not interfere with evacuation response planning or result in inadequate emergency access. The impact is less than significant with mitigation.

2. Due to slope, prevailing winds, and other factors, would the project exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Construction

Development of the Peninsula Component site would include demolition of all 13 existing buildings and the phased development of one 9-story student housing building and five 13 story student housing buildings in their place. The existing parking lot at the University Towers East Component site would be demolished to allow for redevelopment of the site to include a new 9-story student housing building that would accommodate approximately 720 students. Project construction would introduce potential ignition sources to the project site, including the use of heavy machinery and the potential for sparks during welding activities or other hot work. As such, impacts during construction would be potentially significant. However, the Project would be required to comply with SDFRD, State and Office of the State Fire Marshal (OSFM) requirements for construction activities in hazardous fire areas, including fire safety practices, to reduce the possibility of fires during construction activities. Additionally, as outlined in **MM-WLD-2**, vegetation management requirements shall be implemented at commencement and throughout the construction phase. Vegetation management for the Project area shall be performed pursuant to the FPP and OSFM requirements on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible construction materials would not be brought on-site without prior OSFM approval, or SDFRD approval should the OSFRM decide to delegate the responsibility. Also, ignition risk would be further reduced since all powerlines would be buried. The pre-construction requirements outlined in **MM-WLD-2** would reduce the risk of wildfire ignition and spread during construction activities. Vegetation management would also reduce the risk of wildfire spreading from within the active construction areas to offsite fuel beds. Provided site improvements and vegetation management requirements are appropriately implemented and approved by OSFM, construction activities are not anticipated to exacerbate wildfire risk such that temporary construction workers or surrounding developed areas would be exposed to the uncontrolled spread of a wildfire or pollutant concentrations from a wildfire. Therefore, with implementation of **MM-WLD-2**, construction impacts would be **less-than-significant with mitigation incorporated.**

Operation

The Peninsula Component site is considered a VHFHSZ within an LRA (see Figure 4.19-1). The Peninsula Component site presently has established vegetation on the west, north, and east sides with no maintained fuel modification. Existing potential ignition sources include I-8 to the north and the adjacent trolley tracks or from trespassers in the vegetated areas. It should be noted that there is a large, approximately 25-foot-tall, retaining wall supporting the trolley tracks south of I-8.

While the Proposed Project would redevelop previously developed areas, research indicates that the type of dense developments, like the Project, are not associated with increased vegetation ignitions. Housing density directly influences susceptibility to fire because in higher density developments, there is one interface (the community perimeter) with the wildlands whereas lower density development creates more structural exposure to wildlands, due to less or no ongoing maintained landscapes (an intermix rather than interface), and consequently more difficulty for fire resources to protect structures. A study by Syphard et. al. (2013) states that “The WUI [wildland urban interface], where housing density is low to intermediate is an apparent influence in most ignition maps” further enforcing the conclusion that lower density housing poses a higher ignition risk than higher density communities. They also state that “Development of low-density, exurban housing may also lead to more homes being destroyed by fire” (Syphard et al. 2013).

Slope/Prevailing Winds

Slope can have a strong influence on fire behavior in the absence of wind. Without the influence of wind, fire will travel up-slope quickly as convective and radiant heat from the flames and smoke heat, cure, and ignite the vegetation up-slope from it. A fire burning downhill will have a slower rate of spread since the heat transfer to unburned vegetation is more reliant on radiant and conductive heating without as much heat transfer via convection. Topographical features such as box canyons and saddles can also amplify wind speeds. Prevailing winds in the Study Area can also influence wildfire behavior, in addition to the possibility of Santa Ana wind conditions that can result in extreme wildfire behavior.

The Peninsula Component site sits atop a landmass with hillsides descending to the west, north, and east with fully vegetated canyons to the west. These canyons could funnel winds and amplify local wind speeds and should winds align with slopes to drive a fire upslope, rate of spread and intensity would be amplified. However, the proposed fuel modification zones would reduce fire behavior as it reaches the top of the slope, where fuel modification would shift. Explicit examples of changes in fire behavior, from the natural fuel beds to Zone B, and ultimately to Zone A, are shown in the results of fire behavior modeling prepared for the Proposed Project included within the FPP in Appendix C. Also, the Project includes a 26-foot-wide non-combustible fire road that would both heighten the effectiveness of the fuel management zones as well as provide access to fire suppression personnel.

Vegetation Management and Setbacks

As shown in Table 13, while the Project sites are developed, there is Diegan Coastal Sage Scrub, ornamental plantings, and eucalyptus woodland adjacent to the site. The dominant vegetation, Diegan Coastal Sage Scrub, can produce higher heat intensity and higher flame lengths under strong, dry wind patterns, but does not typically ignite or spread as quickly as light, flashy grass fuels.

As required by the California Fire Code, a fuel management zone 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. In accordance with the 2022 California Fire Code (Section 4907 — Defensible Space), Government Code Section 51175 – 51189, and PRC Section 4291, a fuel management zone is required around every building that is designed primarily for human habitation or use within a VHFHSZ. A typical landscape/fuel modification installation per the California Fire Code consists of a 30-foot-wide irrigated zone (Zone A) and a 70-foot-wide irrigated zone (Zone B) for a total of 100 feet in width on the periphery of a site, beginning at the structure.

The Proposed Project, specifically as part of the Peninsula Component and as shown in Figure 9, Conceptual Fuel Modification Plan, would include fuel modification zones first consisting of Zone 0, which is a 5-foot-wide ember resistant zone, Zone A, which would extend at least 35-foot and up to over 100 feet from structures and would consist of permanently irrigated, maintained landscaping around and in between structures. The next closest zone to the structures would be Zone B that would consist of thinned natural vegetation on the Project site-adjacent slopes extending 100 feet from structures in nearly all areas except for a small portion north of Building 4. Altogether, the planned fuel modification would provide the full 100 feet from the structures required by the Fire Code in nearly all areas, except north of Building 4. As outlined in MM-WLD-3, the fuel modification zones would be inspected annually to ensure they are being maintained to the prescribed standards. Also, as mentioned previously, and outlined in **MM-WLD-4**, Zone A would extend beyond the typical 30-feet requirement. Zone A conditions result in a greater reduction in fire behavior than Zone B conditions, which means that there would be greater reduction in fire behavior per foot of fuel modification compared to a traditional fuel modification zone (FMZ). This would aid in offsetting the area north of Building 4 where the FMZ would be deficient by approximately 15 feet. To compensate for this deficiency, as outlined in **MM-WLD-5**, the first 4 floors starting from ground level of the portion of Building 4 of the Peninsula Component, which is within less than 100 feet of natural fuels beyond the fuel modification zone, to be dual pane with both panes tempered glass to mitigate for the reduced FMZ.

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SOURCE: AERIAL-SANGIS IMAGERY 2023; PARCELS - SANGIS; DEVELOPMENT - GENSLER 2024

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FIGURE 9

Conceptual Fuel Modification Plan - Peninsula Component

Fire Protection Plan for the SDSU Evolve Student Housing Project

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Building Materials and Other Factors

The Proposed Project would be developed in accordance with the 2022 California Fire Code. These codes include provisions for building materials, infrastructure, and defensible space, site access, and fire protection systems (e.g., water, fire flow, fire hydrants, interior fire sprinklers). Each of the proposed buildings would, at minimum, comply with the enhanced ignition-resistant construction standards of the 2022 California Building Code (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires. Additionally, the Project would use Type I-B construction which would exceed the standards of Chapter 7A which has already been shown to vastly increase ignition resistance compared to older, more vulnerable structures. Further, infrastructure, such as project roads, water service, fire hydrants, and automatic fire sprinkler systems would be implemented in accordance OSFM standards, and nationally accepted fire protection standards.

Construction materials and methods can prevent or minimize ignitions. Similar case studies indicate that with nonflammable roofs and vegetation modification from roughly 32–60 feet in southern California fires, 85–95% of the homes survived (Howard et al. 1973, Foote and Gilless 1996). Similarly, in the County, post fire assessments indicate strongly that the building codes are working in preventing structure loss: of 15,000 structures within the 2003 fire perimeter, 17% (1,050) were damaged or destroyed. However, of the 400 structures built to the 2001 codes (the most recent at the time), only 4% (16) were damaged or destroyed. Further, of the 8,300 homes that were within the 2007 fire perimeter, 17% were damaged or destroyed. A much smaller percentage (3%) of the 789 homes that were built to 2001 codes were impacted and an even smaller percentage (2%) of the 1,218 structures built to the 2004 Codes were impacted (IBHS 2008).

A vast wildland urban interface already exists in the areas adjacent to the development site, with some older, more fire-vulnerable structures, constructed before stringent fire code requirements were imposed on residential development, with varying levels of maintained fuel modification buffers in the area. This also includes the structures presently located on the Project sites which were constructed prior to Building Code updates that increased requirements to make structures more ignition-resistant. Under existing conditions, the structures are more receptive to ignition and therefore put students at a greater risk than the proposed new buildings which would have superior ignition resistance due to construction to modern building codes and the requirements of Type I-B construction.

Finally, while 100 feet of fuel modification is required by multiple state regulations as described above, the same state regulations allow for the provision of alternative materials & methods (AM&M) to meet the intention of the code as outlined in CFC Sections 104.9 - 104.10. To compensate for the described deficiency, the Proposed Project would require exterior glazing in windows (and sliding glass doors, garage doors, or decorative or leaded glass doors) on the first 4 floors starting from ground level of the portion of Building 4 which is within less than 100 feet of natural fuels beyond the fuel modification zone to be dual pane with both panes tempered glass. When met by a fire, a single-pane glass window approximately deflects 70% of convective heat, transmits 10% and approximately absorbs 20% while reflecting 20% of radiant heat, transmitting 60%, and absorbing 20%. Dual-pane windows perform even better and last approximately twice as long as single-pane during fire exposure, but tempered glass is even more resistant to high heat and high impact (CSFS 2012). Quarles et al. (2010) provides strong endorsement for tempered glass performance. His research and tests conclude that multi-pane (2–3 panes) with at least one pane tempered is well suited for wildfire exposures. He indicates that tempered glass is at least four times stronger and much more resistant to thermal exposures than normal annealed glass. The use of dual pane, both panes tempered glass around the exterior of the structure provides several benefits, with thermal exposure performance the most important for this study. The characteristics of tempered glass make it an ideal use in this case due to the size of the windows on the exposed side of the structure. Larger windows, when not tempered, are more likely to drop cracked glass than smaller windows and allow convective heat and embers to enter the structure (CSFS 2012).

Summary

The lack of many fires having occurred near the Proposed Project during the historical record, as discussed in Section 2.2.4, Fire History, can be largely attributed to the presence of vast development that predates the dataset. Such development makes the spread of wildfire less likely due to the presence of infrastructure that is non-combustible or less likely to ignite than natural fuels. Further, the development would have also meant emergency response to any ignition would have likely been faster with greater access to water than in a wildland setting. Given the large amount of development in the area, a large wildfire advancing through a vast bed of natural fuels towards the Project site, specifically the Peninsula Component site is not a threat, as seen in the recent historical record. This leaves the adjacent canyons as the greatest threat to the Project from a wildland fire perspective. This area is limited in size and thus should any ignition occur, it would not have to spread very far to reach the Project at the top of the slope. However, while there is certain risk of wildland fire, available construction practice, including, but not limited to, fire-retardant materials and brush management requirements, that will be employed as part of the Proposed Project, would reduce the risk present to those residing in the area.

Given the anticipated growing population of the County's wildland urban interface areas, including in the City, and the region's fire history, it can be anticipated that periodic wildfires will occur in the open space areas, even in isolated canyons such as the vegetated areas west, north, and east of the Project site where there is little fire history. This was exemplified by the 2024 Montezuma Fire which burned approximately three quarters of a mile away from the Project site in vegetation and terrain similar to that found adjacent on the Project site. However, unlike most of the structures directly exposed to the Montezuma Fire, the Proposed Project would include a comprehensive, layered fire protection system. The Proposed Project would introduce construction and an increased population and therefore additional potential ignition sources to the site; however, all new structures would be constructed to, at minimum, 2022 CBC Chapter 7A, and 2022 CFC standards. Buildings on the Peninsula Component site would also implement a fire hardened landscape, highly ignition resistant structures of Type I-B construction that exceed the requirements of Chapter 7A, and a 100-foot wide FMZ separating structures from wildland fuels (except north of Building 4, which would include 85 feet of FMZ). Fires from off-site would not have continuous fuels across this site and would therefore be expected to burn around the site. The Proposed Project is not expected to result in the heightened fire hazard typically associated with the wildland urban interface, since the entirety of the Project is being converted to high density, ignition resistant structures and landscaping. As previously discussed, the fire hazard of wildland urban interface areas is more closely correlated to lower density residential areas that have combustible vegetation between homes that allow for fire spread. The ignition-resistant features of the Proposed Project would form a redundant system of protection to minimize the likelihood of exposing residents and visitors, as well as structures, to the uncontrolled spread of a wildfire. This same fire protection system would provide protections from an on-site fire spreading to off-site vegetation. As such, accidental fires within the maintained landscape or structures in the SDSU Evolve Student Housing Project would have limited ability to spread. It should be noted that while these standards would provide a high level of protection to structures for the Proposed Project, there is no guarantee that compliance with these standards would prevent damage or destruction of structures by fire in all cases.

The project, once developed, would not facilitate wildfire spread and would be expected to reduce fire intensity to levels that would be manageable by firefighting resources for protecting the site's structures, especially given the ignition resistance of the structures and the planned ongoing maintenance of the entire site landscape. Therefore, wildfire occurrence, frequency or size would not be expected to be significantly exacerbated by construction of the project. With adherence to all required building and fire codes, and with implementation of MM-WLD-3 through **MM-WLD-5**, the Proposed Project would not exacerbate wildfire risks, due to slope, prevailing winds, and other factors, and thereby expose Project residents to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire, and impacts would be **less-than-significant with mitigation incorporated.**

3. Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The Proposed Project would include modifications to existing onsite infrastructure including roadways, connections to service utilities (e.g., water, wastewater, stormwater drainage, electric power, natural gas, and telecommunications services), water drainage and water quality improvements, and fuel breaks (e.g., fuel modification zones). The potential for each type of improvement to exacerbate fire risk is described below.

Fuel Modification Zones

In accordance with the OSFM's defensible space and fuel management zone standards, FMZs would be provided for those portions of the proposed development that are adjacent to open space areas. Development of the Peninsula Component, as shown in Figure 9, would include a nearly complete 100-feet of fuel modification between the vegetated hillsides to the east, north, and west and on-site structures. The FMZ specifications would be in compliance with the requirements described in the Vegetation Management and Setbacks sub-section in response to Threshold WLD-2. FMZs would be maintained on at least an annual basis or more often as needed to maintain the fuel modification buffer function. FMZs are designed to provide vegetation buffers that gradually reduce fire intensity and flame lengths from advancing fire, and would reduce, rather than exacerbate, wildfire risk. Per **MM-WLD-2,** adequate defensible space must be created before bringing any combustible materials on to the Project site, and vegetation management activities would occur prior to the start of construction and throughout the life of the Project. Consequently, the associated vegetation management activities would not exacerbate fire risk, provided that fuel modification and other vegetation management activities are implemented and enforced according to State requirements. The proposed vegetation management activities would reduce the fire risk by thinning or removing combustible vegetation and implementing a landscape plan with low-fuel-volume plants in accordance with OSFM plant selection guidelines in order to provide a reasonable level of protection to structures from wildland fire.

Roads

The Proposed Project would involve construction of an internal circulation network of access roads, as well as connections to the existing circulation system. The presence of increased human activity introduces new potential ignition sources to the Project area, but vehicular ignitions would be less likely as there would be less vehicle traffic anticipated in the area compared to current conditions due to a reliance on alternative means of transportation as evidenced by the reduction in parking spaces from 403 (Table 2-1, Existing Uses Summary) to 15 (Table 2-2, Proposed Evolve Student Housing Summary). Further, vegetation management would be present along all roadways internal to the project site. Construction of project roadways, including a 26-foot-wide looping perimeter access road surrounding the Peninsula Component site, and connections to existing roadways would provide increased accessibility for SDFRD. Further, site access, including road widths and connectivity, would comply with applicable emergency access standards that result in roads that can facilitate emergency vehicle access during project construction and operation. Roadside fuel modification would consist of the fuel modification Zone A which would include irrigated, maintained fire-resistant plantings. Therefore, installation and maintenance of site access roads in accordance with all relevant development codes would not exacerbate wildfire risk.

Utilities

As discussed in Section 4.15, Utilities and Service Systems, new and existing electrical utility service lines would be relocated underground as part of the Proposed Project. There would be varying levels of change to utility service lines, including those for water, wastewater, stormwater drainage, electric power, natural gas, and telecommunications services, and exact extents are described in Section 4.15. Given that there would be some level of upgrades and work done to the existing utility infrastructure, they would require ground disturbance, and the use of heavy machinery associated with trenching. Thus, the installation of these utility service lines would introduce new potential sources of ignition to the site, such as the use of heavy machinery, welding, or other hot work. Water supply and fire hydrants would be consistent with applicable Design Standards. Installation of water service and fire hydrants would ensure water availability for firefighting resources. SDSU would be responsible for long term funding and maintenance of private roads and fire protection systems, including fire sprinklers and private fire hydrants. However, as previously discussed and outlined in MM-WLD-2, vegetation management requirements shall be implemented at commencement and throughout the construction phase. Since electrical lines will be placed underground and fuel modification would be in place prior to all utility-related work, the utility infrastructure associated with the Proposed Project would not exacerbate wildfire risk.

Summary

Given that the activities involved with installation or maintenance of associated infrastructure would require ground disturbance and the use of heavy machinery associated with trenching, grading, site work, and other construction and maintenance activities, the installation of related infrastructure could potentially result in temporary or ongoing impacts to the environment. However, the installation and maintenance of roads, service utilities, drainage and water quality improvements, and vegetation management activities are part of the Proposed Project and analyzed throughout this document. As such, any potential temporary or ongoing environmental impacts related to these components of the proposed project have been accounted for and analyzed in the EIR as part of the impact assessment conducted for the entirety of the Proposed Project. Additionally, the Proposed Project would be required to comply with all regulatory requirements and mitigation measures outlined within the EIR for the purposes of mitigating impacts associated with trenching, grading, site work, and the use of heavy machinery. No adverse physical effects beyond those already disclosed in the EIR would occur as a result of implementation of the Proposed Project's associated infrastructure.

Installation and maintenance of project roads, service utilities, fuel modification, drainage and water quality improvements, and other associated infrastructure would not exacerbate wildfire risks provided that the mitigation measures outlined in **MM-WLD-2** are implemented along with appropriate fire prevention, access, and vegetation management activities as required by the OSFM, and state requirements. Therefore, the installation and maintenance of associated infrastructure would not exacerbate wildfire risk or result in impacts to the environment beyond those already disclosed in the EIR, and impacts would be **less-than-significant with mitigation incorporated.**

4. Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Vegetation plays a vital role in maintaining existing drainage patterns and the stability of soils. Plant roots stabilize the soil, and leaves, stems and branches intercept and slow water, allowing it to more effectively percolate into the soil. Removal of surface vegetation reduces the ability of the soil surface to absorb rainwater and can allow for increased runoff that may include large amounts of debris or mud-flows. If hydrophobic conditions exist post-fire, the rate of surface water runoff is increased as water percolation into the soil is reduced (Moench and Fusaro 2012). The potential for surface runoff and debris flows therefore increases for areas recently burned by large wildfires (Moench and Fusaro 2012). However, as noted in Section 4.6, Geology and Soils, the formational soils on the site are dense and there is no regional groundwater within the upper 50 feet of the ground surface, which means the potential for liquefaction and associated secondary effects such as landslides is very low. Further, based on a review of all available data as well as borings drilled near the top of slopes, potential for overall slope instability was not observed. Additionally, as discussed in Section 4.9, Hydrology and Water Quality, the Proposed Project sites are not located within a 100- or 500-year floodplain. The Proposed Project would be developed adjacent to slopes that feed Alvarado Canyon Creek. According to fire history records, no fires have burned on the slopes adjacent to the project site since 1944, and conditions associated post-fire slope instability are not currently present. Under existing conditions, if a fire were to occur in the area, vegetation that stabilizes soils on the Project Site-adjacent slopes could be burned and lead to increased erosion. As part of the Proposed Project, fuel modification zones would be installed on these slopes. While the thinning associated with Zone B of the fuel modification plan in this area would reduce some of the vegetation on the slopes adjacent to the Proposed Project, only 50% of vegetation would be removed. A fire burning through the area of thinned vegetation would burn at a lower intensity due to the reduced fuels available. This would result in a higher likelihood that root systems survive and continue to provide slope stabilization. A fire burning through untreated fuels would burn at a higher intensity and possibly result in no vegetative matter remaining which would increase erosion potential. However, given the fire protection features of the Proposed Project such as the water supply system, fire sprinklers, ignition resistant construction, fire access, and fuel modification, it is unlikely that any fire would spread from the Proposed Project to this area. Additionally, the Proposed Project would involve the installation of non-flammable impervious surfaces such as roadways that would divert stormwater and would include irrigated maintained, landscaping throughout the interior of the site that would inhibit erosion.

In summary, while a fire occurring on a landscape can increase erosion potential, the Proposed Project would be stabilized during the construction phase, include infrastructure for diverting stormwater, and would include thinning of fuels on the most prominent slope which would reduce fire intensity, giving existing plants the best chance to survive and continue to provide slope stabilization. Due to those factors, the Proposed Project would not expose people or structures to downslope or downstream flooding or landslides as a result of runoff, post-fire slope instability, or drainage changes. Therefore, impacts would be **less than significant.**

10.3 Cumulative Impacts

The cumulative context considered for Proposed Project wildfire impacts in San Diego County, and more specifically, the City of San Diego since all nearby projects will have to conform to at least as stringent as standards as the Proposed Project. As previously discussed, CAL FIRE has mapped areas of fire hazards in the state based on fuels, terrain, weather, and other relevant factors. As described above, the Peninsula Component of the Project site is located in a Very High FHSZ. The project, combined with other projects in the region, would increase the population and/or activities and potential ignition sources in the area, which may increase the potential of a wildfire and increase the number of people and structures exposed to risk of loss, injury, or death from wildfires. However, as mentioned earlier, given the density of the development that is planned, the risk is lower than it would in a low-density wildland urban intermix. Individual projects located within SDFRD jurisdiction are required to comply with applicable City fire codes and their respective building codes, which have been increasingly strengthened as a result of severe wildfires that have occurred in the last two and a half decades. The fire and building codes include fire prevention and protection features that reduce the likelihood of a fire igniting on a construction project and spreading to off-site vegetated areas. These codes also protect projects from wildfires that may occur in the area through implementation of brush management and fuel management zones, ensuring adequate water supply, preparation of fire protection plans, and other measures. The effectiveness of these codes is proven by the statistics discussed in Threshold 2, which compare home losses during recent wildfires for homes built before and after recent code updates.

Suggestions that placing new residential projects in the County's wildland–urban interface would increase the risk of fire ignition are not consistent with available research. According to the available evidence, no large fires in Southern California since 1990 were determined to have been started within a high-density, ignition-resistant development. Syphard and Keeley (2015) summarized all wildfire ignitions included in the CAL FIRE FRAP database dating back over 100 years. They found that in San Diego County, equipment-caused fires were by far the most numerous, and these also accounted for most of the area burned; power-line fires were a close second. Ignitions classified as equipment-caused frequently resulted from exhaust or sparks from power saws or other equipment with gas or electrical motors, such as lawn mowers, trimmers, or tractors (Syphard and Keeley 2015). These ignition sources are typically associated with lower-density housing, not higher-density housing such as that proposed. In addition, electrical transmission lines would be undergrounded in the project area, nullifying the risk from electrical transmission line vegetation ignitions.

Data indicates that lower-density housing poses greater ignition risk. In the Southern California study, ignitions were more likely to occur close to roads and structures, and at intermediate structure densities (Syphard and Keeley 2015). This is likely because lower-density housing creates a wildland–urban intermix rather than an interface. The intermix places housing among unmaintained fuels, whereas higher-density housing, such as the project, converts all fuels within the footprint and provides a wide, managed fuel modification zone separating homes from unmaintained fuel. Syphard and Keeley (2015) determined that "[t]he WUI [wildland urban interface], where housing density is low to intermediate, is an apparent influence in most ignition maps." This further enforces the notion that lower-density housing is a larger ignition issue than higher-density communities. A different study found that "development of low-density, exurban housing may also lead to more homes being destroyed by fire" (Syphard et al. 2013). Neither of these studies considered the fire hazard and risk reduction associated with fire modification zones and ignition-resistant structures. In addition, another study found that frequent fires and lower-density housing growth may lead to the expansion of highly flammable exotic grasses that can further increase the probability of ignitions (Keeley et al. 2012). This is not the case with the Proposed Project, where the landscapes would be managed and maintained to remove exotic fuels that may become established over time. The plant palette restrictions in accordance with OSFM guidelines, combined with maintenance by the responsible parties, would minimize the establishment and expansion of exotic plants, including grasses. Based on research of the relevant literature and extensive conversations with active and retired fire operations and prevention officers, there is no substantial evidence that new high-density developments built to the requirements of the 2022 California Building Code and modern building codes increase the risk of wildfire ignition. Rather, the data indicate that roadways, electrical distribution lines, and lower-density residential projects are the primary causes of increased wildfire ignition. The Proposed Project would provide roadside fuel modification throughout the project site, and electrical lines would be subterranean.

Furthermore, other cumulatively considerable projects would be required to comply with San Diego Fire Code vegetation clearance requirements. The San Diego Fire Code, applicable building codes, and fire protection plan requirements, ensure that every project approved for construction includes adequate emergency access. The effectiveness of recent building code updates is evidenced by the statistics comparing home losses in recent fires for homes that were built before and after code updates provided in the impact analysis of Threshold 2. Roads for all proposed projects are required to meet minimum widths, have all-weather surface, and be capable of supporting the imposed loads of responding emergency apparatus. All other future development projects in the service area would be subject to discretionary review by the SDFRD and would be required to comply with the City Fire Code and other relevant code requirements and regulations related to fire safety, building construction, access, fire flow, and fuel modification. Therefore, because all projects are required to comply with these requirements, cumulative impacts related to increased wildfire hazards and emergency response and access would be **less than significant.**

10.4 Mitigation Measures

MM-WLD-1 The SDSU Evolve Student Housing Wildfire Education Program would provide targeted outreach to residents 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, activities in a fire risk area, and more, all provided in easy-to-understand, graphically based materials. The educational program would be based on a layered approach to wildfire awareness that includes both passive and active features. The program would be ongoing in order to maintain high wildfire awareness even as the community grows and evolves. The program would feature bi-annual email and/or mailers, a custom website, webinars, and a new resident packet.

As part of the Project, this WES should be accessible on the University's Office of Emergency Services website. It is also recommended that the University Office of Housing Administration identify a Fire Safety Coordinator that is responsible for:

1. Preparing and distributing the annual reminder notice that shall be provided to each occupant encouraging them to review this WES 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 WES and materials from the "Ready, Set, Go!" Program.

MM-WLD-2 Vegetation management requirements shall be implemented at commencement and throughout the construction phase for both the Peninsula Component and University Towers East Component. Vegetation management shall be performed pursuant to the Fire Protection Plan and Office of the State Fire Marshal's (OSFM) requirements on all building locations prior to the start of work and prior to any import of combustible construction materials. Adequate fuel breaks shall be created around all grading, site work, and other construction activities in areas where there is flammable vegetation. Combustible construction materials shall not be brought on-site without prior OSFM approval, or San Diego Fire Department approval should the OSFM decide to delegate the responsibility.

MM-WLD-3 To confirm that the Project's FMZs and landscape areas are being maintained according to the FPP and the OSFM's fuel modification guidelines, the Proposed Project's managing entity would obtain an FMZ inspection and report from a qualified OSFM-approved 3rd party inspector by May 31 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 managing entity will have a specified period to correct any noted issues so that a re-inspection can occur and certification can be achieved.

MM-WLD-4 The widths of the irrigated Zone A are proposed to be extended beyond the 30-foot-wide requirement. The Zone A fuel modification zone for the Proposed Project would be at least 35 feet wide and would be up to over 100 feet in width. The Proposed Project's Zone A would consist of irrigated landscaping of fire-resistant, frequently maintained vegetation as well as non-combustible roads and walkways including the 26-foot-wide looping fire road. Zone A conditions result in a greater reduction in fire behavior than Zone B conditions, which means that there would be greater reduction in fire behavior per foot of fuel modification compared to a traditional FMZ.

MM-WLD-5 The first 4 floors starting from ground level of the portion of Building 4 within the Peninsula Component, which is within less than 100 feet of natural fuels beyond the fuel modification zone, shall be dual pane with both panes tempered glass to mitigate for a reduced fuel modification zone. The risk of complete window assembly failure and ember intrusion shall be reduced and overall building ignition resistance shall be increased by installing dual-pane windows with both panes tempered glass.

11 Limitations

This is a conceptual plan intended to outline the generally accepted protocols into the final site-specific plan for the SDSU Evolve Student Housing.

As fire is a dynamic and often unpredictable occurrence, it cannot be guaranteed that, despite precautionary measures, a fire will not occur or that it will not result in injury, loss of life, or damage to or loss of property. No warranties, expressed or implied are made herein, notwithstanding that the goal remains to identify a suite of appropriate measures calculated, to the extent feasible under the circumstances, that would mitigate the potential for such injury or damage.

Although the OSFM may determine to recommend, or mandate, particular ameliorative measures in advance, such as the development and/or enforcement of vegetation management requirements, the responsibility to react to and implement suitable fire protection features required for the project site lies with the property owners (CSU/SDSU in this case). To this end, practices such as ongoing resident education and maintenance of the common areas, would further support the common mission to maximize fire safety and awareness to the maximum extent feasible.

It is common to plan for these contingencies by adopting a “Ready, Set, Go” stance on emergency response (whether fire, earthquakes, flooding, chemical spills, etc.) and on dislocation or evacuation, along with other components discussed below, where appropriate.

Experience garnered from other situations tends to support that “shelter-in-place” may be, but is not always, the preferred option. Fire and/or law enforcement officials may, during an emergency, determine that it is safer to temporarily refuge residents on-site. Again, where evacuation is ordered, ideally it will align with pre-established evacuation decision-tree points.

In some communities, community meetings and even drills are considered beneficial to augment the preparedness of owners, occupants, workers, and other potentially affected persons within the community for an incident that could occur with little or no warning.

Limitation On Reliance Or Dependence Upon Report

Any person or entity furnished with this report and/or who reviews it agrees that the advance written consent of Dudek be sought and furnished to such person or entity prior to the review, reliance or authorization as to any matters that are the subject of the reports by any person or entity (whether through act or omission as set forth in the report), other than Dudek’s direct client. In such case, obtaining Dudek’s consent shall not be subject to any fee or charge (other than reasonable copy costs, where applicable).

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

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12 Conclusion

The requirements and recommendations set forth in this wildland fire analysis and related FPP meet fire safety, building design elements, infrastructure, fuel management/modification, and landscaping recommendations of the applicable codes. The recommendations provided in the FPP have also been designed specifically for the proposed construction of structures within areas designated as VHFHSZ. When properly implemented on an ongoing basis, the fire protection strategies proposed in this FPP would reduce the potential fire threat from vegetation on the development and its structures, as well as assist SDFRD in responding to emergencies within the Project site. 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. Additionally, modern infrastructure would be provided, and all structures are required to include interior, automatic fire sprinklers consistent with the State's regulatory standards. Further, the proposed fuel modification on perimeter edges adjacent to the open space areas would provide a buffer between fuels in the open space and structures within the Project site.

Note that this is a conceptual plan, which provides enough detail for OSFM approval. Detailed plans, such as improvement plans and building permits, demonstrating compliance with the concepts in the FPP and with California Fire and Building Code requirements, would be submitted to OSFM at the time they are developed.

It will be extremely important for all property managers and occupants to comply with the recommendations and requirements described and required by the FPP within the development. The responsibility to maintain the fuel modification and fire protection features required for the Project site lies with the Proposed Project's managing entities. They would be responsible for ongoing education and maintenance of the common areas, and the OSFM would enforce the vegetation management requirements detailed in this FPP.

It is recommended that SDSU 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 Proposed Project is not to be considered a shelter-in-place development. However, the fire agencies and/or law enforcement officials may, during an emergency, as they would for any new development providing the layers of fire protection as the Proposed Project, determine that it is safer to temporarily refuge residents on-site. When an evacuation is ordered, it will occur according to pre-established evacuation decision points or as soon as notice to evacuate is received, which may vary depending on many environmental and other factors

The goal of the fire protection features, both required and those offered above and beyond the Codes, provided for the Proposed Project is to provide the structures with the ability to survive a wildland fire with little intervention from firefighting forces. Preventing ignition to structures results in a reduction of the exposure of firefighters and residents to hazards that threaten personal safety. It will also reduce property damage and losses. Mitigating ignition hazards and fire spread potential reduces the threat to structures and can help the fire department optimize the deployment of personnel and apparatus during a wildfire. With implementation of the Fire Protection Plan requirements and recommendations outlined in Sections 6 and 7 and summarized in Section 9, impacts relating to wildland fires would be less than significant.

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13 List of Preparers

Project Manager

Michael Huff
Discipline Director
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Fire Behavior Modeling and Plan Preparer

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Fire Protection Planner I
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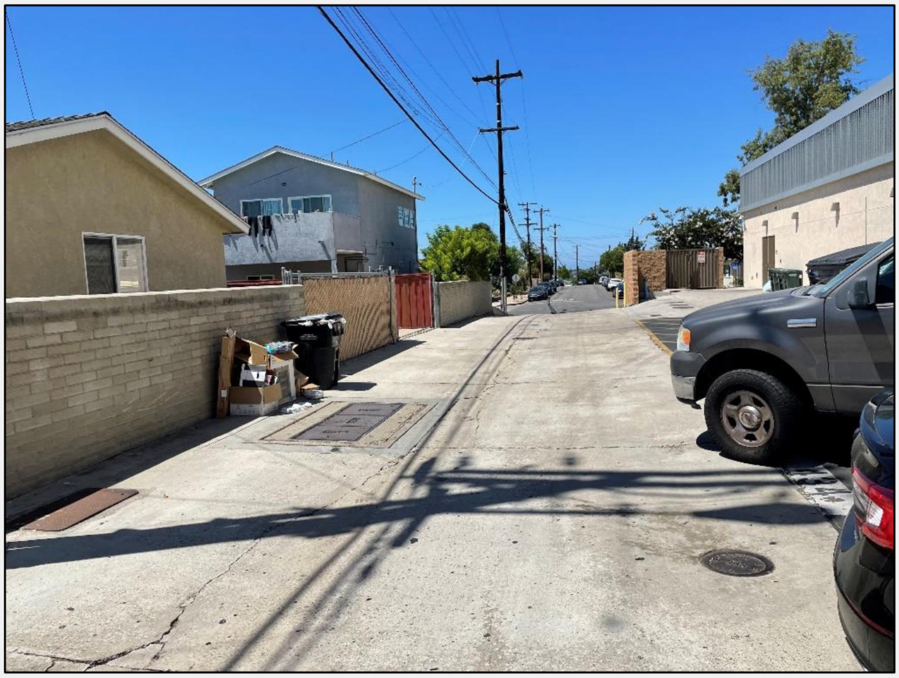
Appendix A
Representative Site Photograph Log



Photograph 1: Overview photograph of the existing southwestern entrance into the University Towers area. Photograph taken near the southwestern corner of the area looking west.

Photograph 2: Overview photograph of the alley at the southeastern corner of the University Towers area. Photograph taken near the southeastern corner of the area looking east.

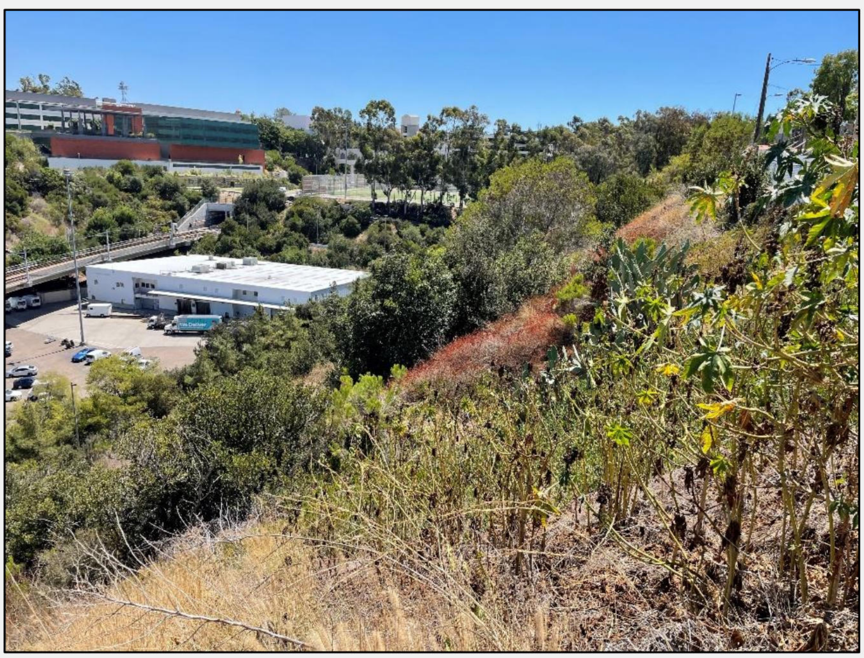
Photograph 3: Overview photograph of the eastern side of the University Towers area where the parking lot is currently located. Photograph taken from the northeastern corner of the area facing southwest.

Photograph 4: Overview photograph of Montezuma Road. Photograph taken from the northeastern corner of the University Towers area looking east.

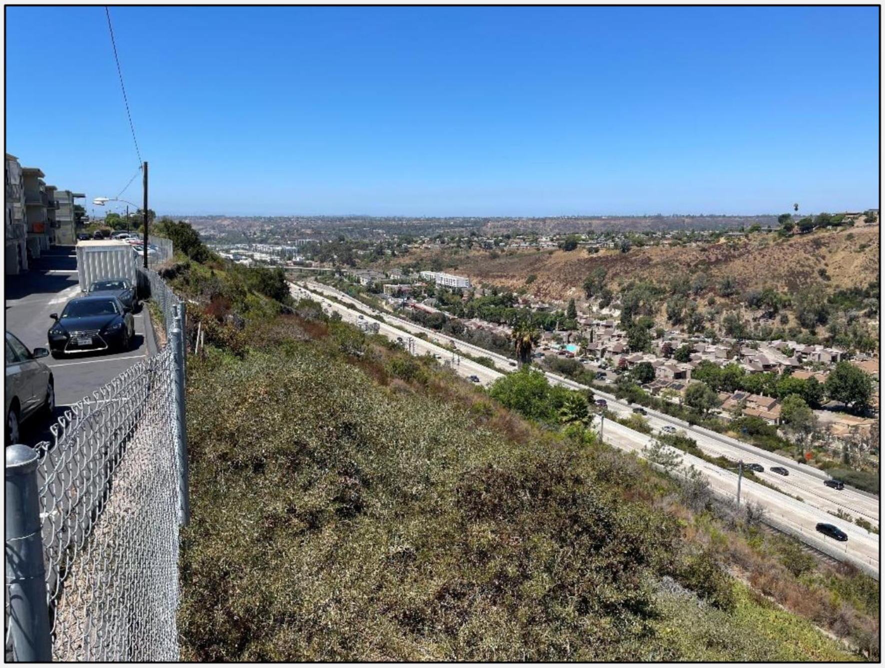
Photograph 5: Overview photograph of Montezuma Road. Photograph taken from the northeastern corner of the University Towers area looking west.

Photograph 6: Overview photograph of the vegetation along the hillside to the east of the Peninsula area. Photograph taken facing northeast.

Photograph 7: Overview photograph of the existing setback of structures from the top of slope at the northeastern portion of the Peninsula area. Photograph taken from the northeastern corner of the area facing south-southeast.



Photograph 8: Overview photograph of the vegetation along the hillside to the east of the Peninsula area. Photograph taken facing south-southeast.



Photograph 9: Overview photograph of the vegetation on the hillside to the north of the Peninsula area. Photograph taken from the northeastern corner of the area facing west.

Photograph 10: Overview photograph of the existing setback of structures from the top of slope at the northern portion of the Peninsula area. Photograph taken from the northeastern corner of the area facing west.

Photograph 11: Overview photograph of the vegetation on the hillside to the north of the Peninsula area. Photograph taken from the northern portion of the area facing west.

Photograph 12: Overview photograph of the vegetation of the hillside and valley northwest of the Peninsula area. Photograph taken from the northwestern portion of the area facing west.

Photograph 13: Overview photograph of the vegetation to the southwest of the Peninsula area. Photograph taken from the northwestern portion of the area looking south-southwest.

Photograph 14: Overview photograph of the existing setback of structures from the top of slope at the northwestern portion of the Peninsula area. Photograph taken from the northwestern corner of the area facing southeast.

Photograph 15: Overview photograph of the existing setback of structures from the top of slope at the southwestern portion of the Peninsula area. Photograph taken from the western portion of the area facing south-southeast.

Photograph 16: Overview photograph of the vegetation of the hillside and valley southwest of the Peninsula area. Photograph taken northwest of Huāxyacac Hall facing north.

Photograph 17: Overview photograph of the vegetation of the hillside and valley southwest of the Peninsula area as well as the fuel modification of College View Apartments. Photograph taken northwest of Huāxyacac Hall facing northeast.

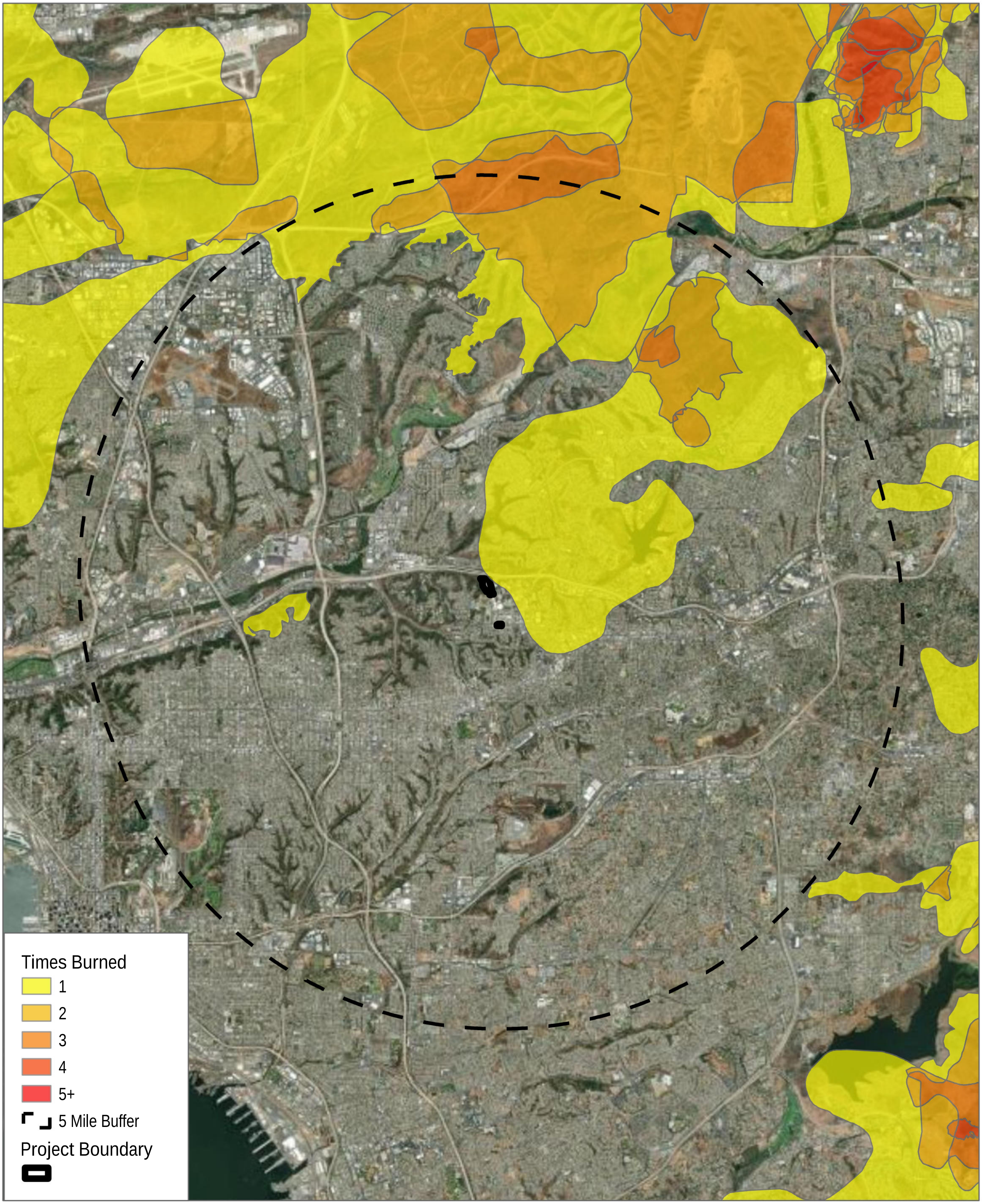
Photograph 18: Example photograph of the eucalyptus understory southeast of the Peninsula area and the proximity of the vegetation to existing structures. Photograph taken north of the SDSU Passport office looking south

Photograph 19: Overview photograph of understory of the eucalyptus stand southeast of the Peninsula area. Photograph taken west of SDSU Parking Structure 12 looking northwest.

Photograph 20: Overview photograph of the vegetation along the hillside to the east of the Peninsula area. Photograph taken southwest of SDSU Parking Structure 14 facing west-northwest.

Photograph 21: Overview photograph of the northern extent of the eucalyptus stand southeast of the Peninsula area. Photograph taken southwest of SDSU Parking Structure 14 facing west-southwest.

Appendix B
Fire History Map



SOURCE: CALFIRE 2023; ESRI WORLD IMAGERY

DUDEK

0 0.75 1.5 Miles

Appendix B

Fire History

Fire Protection Plan for the SDSU Evolve Student Housing Project

Appendix C
BehavePlus Fire Behavior Analysis

1 BehavePlus Fire Behavior Modeling History

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

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

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

the flames, which is a key element for determining “defensible space” distances for minimizing structure ignition.

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

2 Modeling Inputs

Dudek utilized the BehavePlus software package to analyze fire behavior potential for the proposed development site in the City of San Diego, California. Since only the Peninsula portion of the Proposed Project is exposed to natural fuel beds that pose a wildfire hazard, the University Towers portion was not included. For this analysis, five offsite scenarios were evaluated, including two summer, onshore weather condition (southeast, east and north of the Proposed Project site) and three extreme fall, offshore weather condition (northwest and southwest of the Proposed Project site). Additionally, five were run for post-project conditions (two average and three extreme weather condition). The Proposed Project site currently is developed with existing student housing, associated parking and roadways, and landscaping. It is generally flat but slopes towards the north-northwest with canyons to the west, north, and east. The hillsides adjacent to the peninsula contain disturbed coastal sage scrub, a eucalyptus woodland, ornamental vegetation, non-native riparian vegetation, and small areas of alternate vegetation or disturbed habitat. Fuels and terrain adjacent to the development area could produce flying embers that may affect the Proposed Project, but defenses will be built into the structures to prevent ember penetration and to extinguish fires that may result from ember penetration. It is the fuels directly adjacent to and within fuel modification zones that could have the potential to affect the Proposed Project’s structures from a radiant and convective heat perspective as well as from direct flame impingement, however, the ignition resistant structures would be surrounded by irrigated landscape, thinned fuel modification zones and hardscape areas. BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), rate of spread (feet/minute), fireline intensity (BTU/feet/second), and spotting distance (miles), crown fire flame length (feet), crown fire intensity (BTU/feet/second), crown fire spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus models for the Proposed Project site. In addition, data sources are cited and any assumptions made during the modeling process are described.

2.1 Vegetation (Fuels)

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

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

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

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

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

Table 1. Existing Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet) [1]
GR1	Short, Sparse Dry Climate Grass	Represents the low-flammability vegetation at the top of the slope at the northern end of the peninsula.	0.4 ft.
GR 4	Moderate-load Dry Climate Grass	Represents the non-native grasses dispersed throughout the shrubs of the slopes east and west of the peninsula.	2.0
SH5	High-load, Dry Climate Shrubs	Represents the sage scrub and chaparral vegetation east, north, and west of the peninsula	1.0 ft.
SH7	Very High-load, Dry-Climate Shrubs	Represents the dense chaparral vegetation on the hillsides east/southeast of the peninsula	6.0 ft.
TU5	High-load Dry Climate Timber-Shrub	Represents the understory of the eucalyptus stand southeast of the peninsula	1.0 ft.

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

Table 2. Post-development Fuel Model Characteristics

Fuel Model Assignment	Vegetation Description	Location	Fuel Bed Depth (Feet)[1]
GR1	Short, Sparse Grasses	Zone 1: 30' from structures	0.4 ft.
SH2	Moderate-load Shrubs	Zone 2: 100' from structures	1.0 ft.
NB	Non-burnable	Paved areas throughout the proposed Project site.	0 ft.

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

2.2 Topography

Topography influences fire risk by affecting fire spread rates. Typically, steep terrain results in faster fire spread up-slope and slower fire spread down-slope in the absence of wind. Flat terrain tends to have little effect on fire spread, resulting in fires that are driven by wind. The Proposed Project site is gently sloping from approximately 380 feet above mean sea level (amsl) in the northwestern corner to between 420 feet amsl at the intersection of Aztec Circle Drive and 55th Street. On the eastern, northern, and western sides of the Peninsula are naturally vegetated canyon slopes with average slopes of generally 40 to 50 percent ay. The Peninsula Component site is situated on a ridge of preserved terrace immediately south of Alvarado Canyon, between two relatively deep secondary canyons to the east and west.

2.3 Weather Analysis

Historical weather data for the San Bernardino County region was utilized in determining appropriate fire behavior modeling inputs for the proposed Project area. Average, on-shore (50th weather percentile and extreme off-shore (97th percentile) weather conditions were derived from Remote Automated Weather Stations (RAWS) and utilized in the fire behavior modeling efforts conducted in support of this report. A SIG (Special Interest Group) was created to find a weighted average between the three nearest RAWS stations to best represent the proposed Project site. The SIG included the Mission Valley, Camp Elliott, and San Miguel RAWS stations[1]. These stations range from approximately 4 to 8 miles away with the Mission Valley RAWS being the closest, but having a limited dataset. The weights for the stations was determined based upon the proximity to the proposed Project as well as similarity in terms of proximity to the Pacific Ocean, elevation, aspect, and proximity to any dominant or weather-altering geographic features. Data from fire seasons dating back to 2000 and up through 2023 were included in the analysis.

RAWS fuel moisture and wind speed data were processed utilizing the Fire Family Plus software package to determine atypical (97th percentile) and typical (50th percentile) weather conditions. Data from the RAWS was evaluated from August 1 through November 30 for each year between 2000 and 2023 for 97th percentile weather conditions and from June 1 through September 30 for each year between 2000 and 2023 for 50th percentile weather conditions.

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

Table 3: Variables Used for Fire Behavior Modeling

Model Variable	Summer Weather (50th Percentile)	Peak Weather (97th Percentile)
Fuel Models	GR4, SH5, SH7	GR1, GR2, SH5, SH7, TU5
1 h fuel moisture	9%	2%
10 h fuel moisture	10%	3%
100 h fuel moisture	15%	8%
Live herbaceous moisture	48%	30%
Live woody moisture	96%	60%
20 ft. wind speed	7 mph (sustained winds)	10 mph (sustained winds); wind gusts of 50 mph
Wind Directions from north (degrees)	270	0 to 60
Wind adjustment factor	0.4	0.4
Slope	45 to 50%	45 to 50%

[1] San Miguel RAWS ID: 045737, Camp Elliott RAWS ID: 045741, Mission Valley RAWS ID: 045747

3 Fire Behavior Modeling Efforts

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

Fire Scenario Locations and Descriptions:

- Scenario 1. This scenario depicts a fire within the eucalyptus woodland southeast of the Peninsula portion of the Proposed Project. Such a fire would likely be ignited from within the area or by a vehicle either on Aztec Circle Drive or Canyon Crest Drive. The fire would be fanned by extreme 10 mph winds and up to 50 mph gusts as it burns through the dense understory vegetation up slope to the Project site. The eucalyptus woodland has a canopy height of approximately 50 feet with a low canopy base height due to the presence of ladder fuels.
- Scenario 2. This scenario depicts a fire burning up from Canyon Crest Drive towards the western side of the Peninsula portion of the Proposed Project. Such a fire would most likely be ignited by a vehicle on Canyon Crest Drive, but it should be noted that there is an approximately 4- to 5-foot-tall retaining wall between the road and the vegetated slope. Under this scenario, the fire would be fanned by extreme 10 mph winds and up to 50 mph gusts as it burns through the patches of high-load shrubs and moderate-load grasses up slope to the Project site
- Scenario 3. This scenario depicts a fire burning up from Interstate-8 and/or the adjacent trolley tracks towards the northern end of the Peninsula portion of the Proposed Project. It should be noted that there is a large, approximately 25-feet tall, retaining wall supporting the trolley tracks south of Interstate-8. Under this scenario, the fire would be fanned by extreme 10 mph winds and up to 50 mph gusts as it burns through the high-load shrubs up towards the reduced combustibility landscaping at the top of the slope.
- Scenario 4 This scenario depicts a fire from within the canyon to the west of the Peninsula portion of the Proposed Project burning upslope towards the northwestern side of the site. Such a fire could ignite from Interstate-8, the adjacent trolley route, persons within the canyon, or the residential area to the west. Under

this scenario, the fire would be fanned by average 7 mph onshore winds as it burns through the patches of high-load shrubs and moderate-load grasses up slope to the Project site.

- Scenario 5. This scenario also depicts a fire burning from within the canyon to west of the Peninsula portion of the Proposed Project site, but further south than Scenario 4 as it would impact the southwestern portion of the site most directly. Under this scenario, the fire would be fanned by average 7 mph onshore winds as it burns through the patches of high-load shrubs ornamental vegetation up slope to the Project site.

4 Fire Behavior Modeling Results

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

The eucalyptus woodlands with dense understory southeast of the Peninsula Portion of the Proposed Project and high-load coastal sage scrub to the east, depicted in Scenarios 1 and 2 respectively, have the potential to present a serious fire hazard. Under the extreme weather conditions modeled in Scenario 1, a fire burning through the dense, understory vegetation would move at a moderate rate of spread (0.2 mph during sustained winds and 1.0 mph during 50 mph gusts), produce high flame lengths (11.5 feet during sustained winds and 22.2 feet during 50 mph gusts), and produce embers that could travel approximately a third of a mile during sustained winds and up to a mile and a half miles during 50 mph gusts. While the Proposed Project would be within range of the embers being produced during this scenario, the SDSU Evolve Student Housing Project would include structures with ignition resistant construction methods and materials as well as an ember-resistant Zone 0 around all structures. Given the dense understory and low canopy base height of the eucalyptus woodland, a surface fire would be anticipated to transition to a crown fire with flame lengths over 50 feet during sustained winds and similar spotting distances to the surface fire. North of the eucalyptus woodland is the dense coastal sage scrub vegetation of the eastern aspect hillside modeled in Scenario 2. This scenario modeled a fire burning through the high-load coastal sage scrub vegetation along with pockets of moderate-load grasses during extreme conditions. Such a fire would burn at a very high to extreme rate of spread (1.3 to 2.0 mph under sustained winds and up to 14.5 mph during 50 mph gusts), produce very high flame lengths (13.5 to 19.9 feet during sustained winds and up to over 40 feet during 50 mph gusts), and produce embers that could travel up to a half a mile under sustained winds and over two miles during 50 mph gusts. Scenario 3 would exhibit similar fire behavior as Scenario 2 on the lower portion of the slope, but fire behavior would decrease towards the top of the slope as there is presently reduced combustibility vegetation there. This vegetation would travel at a high rate of spread (0.5 mph), but only produce low flame lengths (3.1 feet) and produce embers that would travel a tenth of a mile under sustained winds and less than half a mile during 50 mph gusts.

The fires modeled in Scenarios 2 and 3 can be contrasted to Scenarios 4 and 5 where similar fuels on similar topography would burn under average weather conditions. In Scenario 4, a fire would burn through the disturbed coastal sage scrub and moderate-load grasses at a high to very high rate of speed (0.5 to 0.8 mph), produce high flame lengths (8.0 to 11.5 feet), and produce embers that would travel approximately a quarter of a mile. A fire burning upslope through the ornamental acacia under average conditions as modeled in Scenario 5 would exhibit a high rate of spread (0.3 mph), produce high flame lengths (10.6 feet) and produce embers that could travel up to approximately two tenths of a mile.

To show the effects of the planned fuel modification associated with the Proposed Project, the same five scenarios were modeled to show fire behavior within the irrigated Zone 1 and thinned Zone 2. Zone 1 would consist of the irrigated, fire-resistant landscaping throughout the peninsula, while Zone 2 would consist of native vegetation that has been thinned by approximately 50 percent. It is recommended that the fuel modification be extended throughout the extent of the eucalyptus woodland of Scenario 1 to ensure the canopy is separated from understory vegetation by a distance of at least three times the height of the understory vegetation. Fuel management efforts in this area would be aided by the allelopathic nature of eucalyptus leaves that restrict the growth of other vegetation. Under Scenario 1 with post-, Project there be low flame lengths (less than 2 feet for both sustained winds and 50 mph gusts) and a very low rate of spread (less than 0.1 mph during sustained winds and 0.1 mph during 50 mph gusts), and the surface fire would not be anticipated to transition to a crown fire thanks to the reduced understory vegetation and increased canopy base height. Fire behavior during the extreme conditions of Scenarios 2 and 3 would be similar with moderate to high rates of spread (0.4 - 0.5 mph in the thinned Zone 2 and 0.2 mph in the irrigated Zone 1), low to moderate flame lengths (approximately 3 feet in the irrigated Zone 1 and less than 7 feet in the thinned Zone 2). However, during 50 mph gusts, fire behavior would amplify of Zone 2 of both scenarios with up to approximately 16-foot flame lengths and spread rates at or above one mile per hour. These values represent a drastic reduction compared to those seen in the same scenarios for existing conditions of the Project site, and the fire behavior exhibited in Scenarios 4 and 5 for post-Project conditions during average conditions yield even milder results Flame lengths for both zones in both scenarios were low at less than two feet and spread rates for Zone 1 were 0.2 mph for both scenarios while Zone 1 was less than 0.1 mph while spotting distances were less than a tenth of a mile for both zones in both scenarios. As seen by contrasting the scenarios from the existing conditions to the post-Project conditions, after completion of the Proposed Project, fire behavior would be reduced. Dense coastal sage scrub and similar vegetation would be thinned and landscaping atop the peninsula would be irrigated and fire-resistant with a perimeter access road that would act as a fuel break. As a result of the proposed fuel modification, the fire hazard presented by the site would be reduced compared to its current state.

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

Fuel Models	Flame Length[1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance [1] (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet /second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site (2)							
Very High-load Timber-Shrub (TU5)	11.5 (22.2)	1,149 (4,816)	0.2 (1.0)	0.3 (1.5)	53.3 (228.5)	4,345 (38, 626)	0.3 (0.9)
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site (2)							
High-load Shrub (SH5)	19.9 (42.1)	3,769 (19,290)	1.3 (6.5)	0.5 (2.3)	N/A	N/A	N/A
Moderate-load Grass (GR4)	13.5 (33.9)	1,638 (12,036)	2.0 (14.5)	0.4 (2.0)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site (2)							
High-load Shrub (SH5)	20.4 (42.3)	3,991 (19,511)	1.3 (6.6)	0.5 (2.3)	N/A	N/A	N/A
Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
High-load Shrub (SH5)	11.5	1,153	0.5	0.3	N/A	N/A	N/A
Moderate-load Grass (GR4)	8.0	514	0.8	0.2	N/A	N/A	N/A
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Very High-load Shrubs (SH7)	10.6	969	0.3	0.2	N/A	N/A	N/A

Note:

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

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

Fuel Models	Flame Length [1] (feet)	Fireline Intensity[1] (BTU/feet /second)	Spread Rate[1] (mph)	Spotting Distance [1] (miles)	Crown Flame Length (feet)	Crown Intensity (BTU/feet/ second)	Crown Spotting Distance (miles)
Scenario 1: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts SE of the site ([2])							
Zone 1 & 2: Low-load Broadleaf Litter (TL2)	1.3 (1.9)	11 (22)	0.0 (0.1)	0.1 (0.3)	N/A[3]	N/A[3]	N/A[3]
Scenario 2: 45% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts E of the site ([2])							
Zone 1: Short, Sparse Grasses (GR1)	3.0 (3.1)	63 (67)	0.4 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	6.7 (15.5)	353 (2,181)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 3: 50% slope; Extreme winds (97th percentile), 10 mph sustained winds, 50 mph gusts N of the site ([2])							
Zone 1: Short, Sparse Grasses (GR1)	3.1 (3.1)	67 (67)	0.5 (0.5)	0.1 (0.4)	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	6.9 (15.5)	378 (2,207)	0.2 (1.0)	0.2 (1.2)	N/A	N/A	N/A
Scenario 4: 50% slope; Summer Average winds (50th percentile), 7 mph sustained winds W of the site							
Zone 1: Short, Sparse Grasses (GR1)	1.7	19	0.2	<0.1	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	1.4	12	<0.1	<0.1	N/A	N/A	N/A
Scenario 5: 45% slope; Summer Average winds (50th percentile), 7 mph sustained winds SW of the site							
Zone 1: Short, Sparse Grasses (GR1)	1.7	18	0.2	<0.1	N/A	N/A	N/A
Zone 2: Moderate-load Shrub (SH2)	1.3	11	<0.1	<0.1	N/A	N/A	N/A

Note:

1. Wind-driven surface fire.
2. Values in parentheses represent the respective output in the presence of 50 mph gusts.
3. Due to prescribed pruning and reduced understory fuels, a surface fire is not anticipated to transition to a crown fire.

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

Surface Fire:

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

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

Table 6: Fire Suppression Interpretation

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