APPROVAL DRAFT

FIRE PROTECTION PLAN FOR THE NEWLAND SIERRA PROJECT

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EXECUTIVE SUMMARY

This Fire Protection Plan (FPP) has been prepared for the Newland Sierra Planned Community (project) in northern San Diego County. This FPP evaluates and identifies the potential fire risk associated with the proposed project's land uses and identifies requirements for water supply, fuel modification and defensible space, access, building ignition and fire resistance, fire protection systems, and wildfire emergency pre-planning, among other pertinent fire protection criteria. The purpose of this plan is to generate and memorialize the fire safety requirements of the Deer Springs Fire Protection District (DSFPD) and the San Diego County Fire Authority (SDCFA) along with project-specific measures based on the site, its intended use, and its fire environment.

This document provides analysis of the site's fire environment and its potential impact on the proposed project as well as the project's potential impact on the existing DSFPD fire protection service. This document will be incorporated as a technical appendix of the project's Environmental Impact Report. Requirements and recommendations herein are based on site-specific fire environment and proposed project characteristics and incorporate input from DSFPD, SDCFA, area fire planning documents, site risk analysis, and standard principles of fire protection planning.

As described in this FPP, the project will meet or exceed all applicable Code requirements with the exception of a minor fuel modification area adjacent to 3 lots that will be modified and mitigated. The recommendations and conditions provided herein are also consistent with the lessons learned from After Fire Action Reports from numerous fires occurring over the last 20 years, including the 2003 and 2007 San Diego County Fires.

As determined during the analysis of this site and its fire environment, the Newland Sierra site, in its current condition, is considered to include characteristics that, under favorable conditions, have the potential to facilitate fire spread. Under extreme conditions, wildfires on the site could burn erratically and aggressively and result in significant ember production. Once the project is built, the Newland Sierra on-site fire potential will be lower than its current condition due to conversion of wildland fuels to managed landscapes, extensive fuel modification areas, improved accessibility to fire personnel, and structures built to the latest ignition resistant codes.

It is important to note that the fire safety requirements that will be implemented on this site, including ignition resistant construction standards, along with requirements for water supply, fire apparatus access, fuel modification and defensible space, interior fire sprinklers and 5 minute or less fire response travel times were integrated into the code requirements based on results of post-fire assessments, similar to the After Action Reports that are now prepared after large fire events. When it became clear that specifics of how homes were built, how fire and

embers ignited homes, what effects fuel modification had on structure ignition, how fast firefighters could respond, and how much (and how reliable) water was available, were critically important to structure survivability, the Fire and Building codes were revised appropriately. DSFPD and San Diego County now boast some of the most restrictive codes for building within Wildland Urban Interface (WUI) areas that focus on preventing structure ignition from heat, flame, and burning embers.

The developed portion of this property is proposed for improvements that include construction of 2,135 single and multi-family residential, a relatively small retail/commercial/office component, a school and associated infrastructure and utilities. The entire site has been designed with fire protection as a key objective. The site improvements are designed to facilitate emergency apparatus and personnel access throughout the site. Driveway and road improvements with fire engine turnouts and turnarounds provide access to within 150 feet of all sides of every building. Water availability and flow will be consistent with DSFPD requirements including fire flow and hydrant distribution. These features along with the ignition resistance of all buildings, the interior sprinklers, and the pre-planning, training and awareness will assist responding firefighters through prevention, protection and suppression capabilities.

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

Early evacuation for any type of wildfire emergency at Newland Sierra is the preferred method of providing for resident safety, consistent with the DSFPD's current approach for other communities and neighborhoods within the District. As such, Newland Sierra's Homeowner's Association will formally adopt, practice, and implement a "Ready, Set, Go!" (International Fire Chiefs Association 2013) approach to site evacuation. 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 potential for errors, maintaining the site's fire protection systems, and implementing a conservative (evacuate as early as possible) approach to evacuation and site uses during periods of fire weather extremes.

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

1. Preparation of a Construction Fire Prevention Plan detailing the important construction phase restrictions and fire safety requirements that will be implemented to reduce risk of ignitions and pre-plans for responding to an unlikely ignition.
2. Project buildings will be constructed of ignition resistant construction materials based on the latest Building and Fire Codes.
3. Fuel Modification will be provided throughout the perimeter of the site and will be 250 feet wide in most locations. Maintenance will occur as needed and the HOA will annually hire a 3rd party, qualified Fuel Modification Zone inspector to provide twice yearly (June 1 and October 1) certification that it meets the requirements of this FPP.
4. Fire apparatus access roads will be provided throughout the community and will vary in width and configuration, but will all provide at least the minimum required unobstructed travel lanes, lengths, turnouts, turnarounds, and clearances.
5. Firefighting staging areas/temporary refuge areas are available throughout the facility as well as along roadways and site green spaces.
6. Access to the site's open space area is provided via access points that are spaced on average every 650 lineal feet with a maximum of 1,300 feet.
7. Water capacity and delivery provide for a reliable water source for operations and during emergencies requiring extended fire flow.
8. A project-specific evacuation plan has been prepared for the project based on input and coordination with DSFPD and SDCFA.
9. The Community HOA will include an outreach and educational role to coordinate with DSFPD and the local Fire Safe Council, oversee landscape committee enforcement of fire safe landscaping, ensure fire safety measures detailed in this FPP have been implemented, educate residents on and prepare facility-wide "Ready, Set, Go!" plans.

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1 INTRODUCTION

This Fire Protection Plan (FPP) has been prepared for the Newland Sierra Project. The purpose of the FPP is to assess the potential impacts resulting from wildland fire hazards and identify the measures necessary to adequately mitigate those impacts. Additionally, this plan generates and memorializes the fire safety requirements of the Fire Authority Having Jurisdiction (FAHJ), which is the Deer Springs Fire Protection District (DSFPD) with support by the San Diego County Fire Authority (SDCFA). Requirements and recommendations are based on site-specific project characteristics and incorporate input from the project applicant and the FAHJ.

As part of the assessment, the plan has considered the property location, topography, geology, combustible vegetation (fuel types), climatic conditions, and fire history. The plan addresses water supply, access (including secondary), structural ignitability and fire resistive building features, fire protection systems and equipment, impacts to existing emergency services, defensible space, and vegetation management. The plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect one or more at-risk communities and essential infrastructures. The plan recommends measures that property owners will take to reduce the probability of ignition of structures throughout the area addressed by the plan.

The project is located within the DSFPD except for an ingress/egress road which lies within the San Marcos Fire Protection District (SMFPD). This FPP addresses DSFPD's response capabilities and response travel time within the project along with projected funding for facilities improvements and fire service level maintenance.

The following tasks were performed toward completion of this plan:

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

- Site photographs were collected and fuel conditions were mapped using 200-scale aerial images. Field observations were utilized to augment existing digital site data in generating the fire behavior models and formulating the recommendations presented in this FPP. Refer to Appendix A for site photographs of existing site conditions.

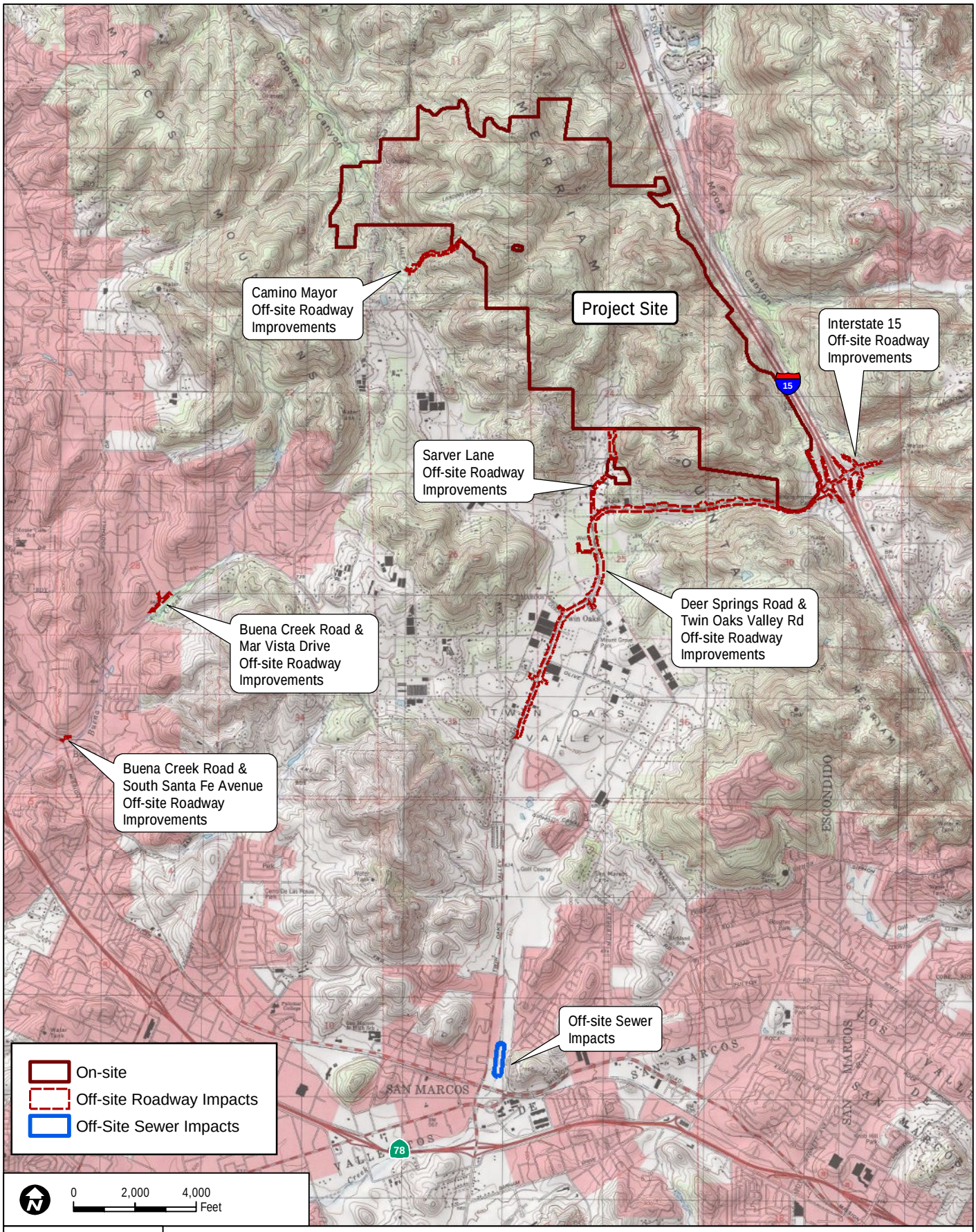
1.1 Newland Sierra Fire Protection Plan Summary

The project is located within an unincorporated portion of the County of San Diego within the North County Metro Subregion (Figure 1). The North County Metro Subregion is comprised of many non-contiguous "island" areas interspersed among the cities of Escondido, San Diego, San Marcos, Vista, and Oceanside with the most easterly portion adjacent to Valley Center. The North County Metro Subregion includes the communities of Hidden Meadows and Twin Oaks, with the project being located in the community of Twin Oaks. The project site is directly west of Interstate 15 (I-15), north of State Route 78 (SR-78), and south of State Route 76 (SR-76). The cities of Escondido and San Marcos are approximately 1 mile south of the site.

The project site consists of approximately 1,985 acres and is bounded by I-15 on the east, Deer Springs Road (County Road S12) on the south, and Twin Oaks Valley Road on the west, with a small portion of the northwestern edge of the site traversed by Twin Oaks Valley Road. Gopher Canyon Road is located approximately 2.5 miles north of the northern-most developed portion of the site.

Preparation of this FPP reflects completion of the following tasks:

- On-site risk assessment
- Fire behavior modeling
- FlamMap fuel modeling exhibits and other GIS analysis
- Fire history analysis
- Review of various project details/plans
- Coordination with DSFPD and SDCFA during multiple meetings and correspondence dating back to 2013Review and incorporation of FAHJ Fire Codes
- Incorporation of project-specific recommendations.



SOURCE: USGS 7.5-Minute Series San Marcos Quadrangle.

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FIGURE 1
Vicinity Map

Newland Sierra Fire Protection Plan

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1.2 Applicable Codes/Existing Regulations

This FPP demonstrates that the Newland Sierra Project will be in compliance with applicable portions of the County of San Diego 2017 Consolidated Fire Code and the Deer Springs Fire Protection District's Ordinance Number 16-01. The project will also be consistent with the latest edition of the California Building Code, Chapter 7A, and the latest edition of the California Fire Code, Chapter 49, as adopted by San Diego County. Chapter 7A of the California Building Code focuses primarily on preventing ember penetration into homes, a leading cause of structure loss from wildfires. Thus, it is an important component of the requirements of this FPP given the project's wildland urban interface location in which is within an area statutorily designated a Very High Fire Hazard Severity Zone (VHFHSZ) by CAL FIRE. Fire hazard designations are based on topography, vegetation, and weather, amongst other factors with more hazardous sites including steep terrain, unmaintained fuels/vegetation, and wildland urban interface (WUI) locations. As described in this FPP, the project will meet or exceed all applicable Code requirements at the time of building permit application.

1.3 Project Summary

1.3.1 Location

The Newland Sierra Project is located in the Merriam Mountains of northern San Diego County, California. The project site is bounded by Interstate 15 (I-15) on the east; by Deer Springs Road (S12) on the south; by Twin Oaks Valley Road on the west, except for a small portion of the site crossing west of Twin Oaks Valley Road; and by Lawrence Welk Drive at the northeast corner of the site. Gopher Canyon Road is located approximately 2.5 miles north of the northerly developed portion of the site. The project site encompasses approximately 1,985 acres, of which, approximately 1,579 acres will be permanent open space (1,209 acres of biological open space/preserve area and approximately 370 acres of fuel modification zones and fuel modification zone special management areas) and approximately 406 acres consisting of the graded project footprint.

The nearest urban developed areas (Cities of Escondido and San Marcos) occur roughly 1 mile to the south of the project. The project lies within Township 11 south, Range 3 west in Sections 10 through 14, 19, 23, and 24 in the northeastern portion of the San Marcos, U.S. Geographical Survey 7.5-minute quadrangle (dated 1968 and photo-revised in 1983). Figure 2 provides the project's site plan including roads and access points.

The Newland Sierra project site is located on the following Assessor Parcel Numbers:

178-101-01 and 16; 174-211-04 through 07; 178-101-17, 25, and 26; 174-190-12, 13, and 20; 174-210-01, 05, 07, 08, 17 and 18; 174-190-41 and 43; 178-221-09; 172-091-07; 172-

220-18; 186-611-07, 09, and 14 through 16; 187-540-49, 50 and 51; 186-250-13; 186-611-01 and 11; 186-611-08; 178-100-05 and 26; 174-280-11 and 14; 174-290-02; 178-101-27 and 28; 174-190-44; 172-220-14 and 16; 182-040-36 and 69; 178-222-29; 186-611-17 and 23; 178-222-16 and 28 (parcels of interest).

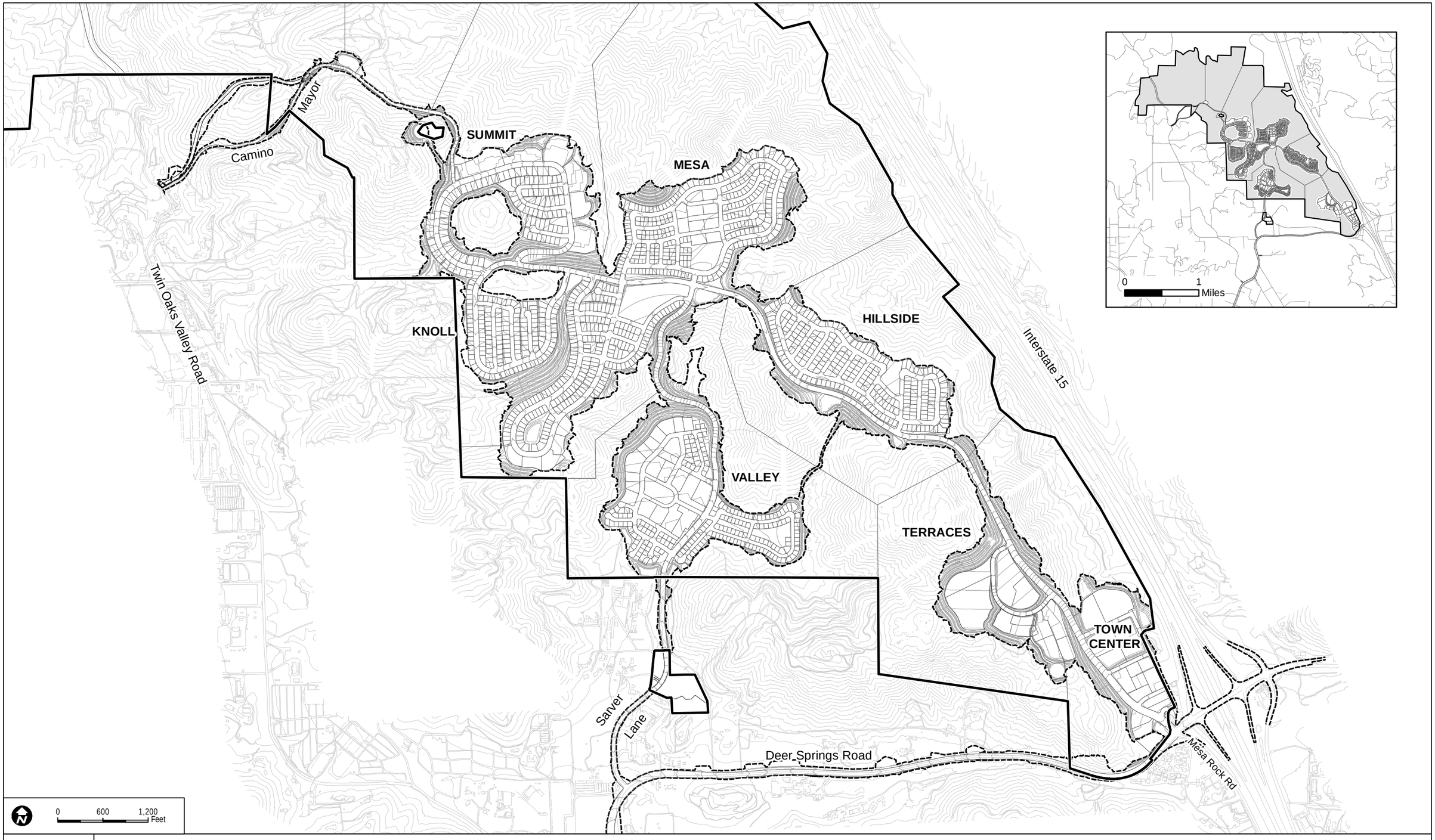
1.3.2 Project Description

The Newland Sierra Project proposes development of a master-planned community, composed of seven distinct planning areas and 2,135 dwelling units, including 1,040 single family dwelling units and 995 multifamily dwelling units. Of 2,135 dwelling units, 325 dwelling units would be age-qualified. Figure 2 depicts the locations of these generalized land uses within the project boundary and Table 1 presents generalized land use summaries for the Project.

Table 1
Land Use Summary

Land Use	Planning Areas	Acres	Dwelling Units/Square Feet (SF)	Zoning
Single-Family [1]	SF	180	1,140	RS
Multi-Family [1]	MF	77	995	RS, C34
Commercial	CM	12	81,000 square feet	C34
School Site	S	6		C34
Public Park	P- Public	22	N/A	RS, C34, A70
Private Parks	P- Private/HOA	14	N/A	RS, C34, A70
Biological Open Space Preserve	OS	1,209	N/A	OS
Common Areas	C	333	N/A	RS, C34, A70
Roads	R	116	N/A	RS, C34, A70
Water Quality/Detention Basins	B	12	N/A	RS, C34, A70
Water Reservoir Tank	WT	4	N/A	C34, OS
	Totals	1,985	2,135	

[1] 3 story structures will not exceed 35 feet in height



SOURCE: Fuscoe 2016

FIGURE 2
Site Plan

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Newland Sierra Fire Protection Plan

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1.3.2.1 Town Center Planning Area

The Sierra Town Center would be located off of Deer Springs Road, east of the main entry road in the southernmost portion of the project site. The Town Center would include commercial retail space, townhomes, and a school. The 95 multifamily dwelling units proposed for the Town Center would make up approximately 4.4% of the total units proposed. The Town Center would provide employment opportunities for future residents as well as for the surrounding area. The Town Center would be compact and walkable, as well as visually appealing and compatible with surrounding development.

In addition to these residential, commercial, and mixed use areas, a 6-acre school site would be located in the Town Center to serve the Sierra community and students in the surrounding area.

1.3.2.2 Terraces Planning Area

The Sierra Terraces planning area would be located directly north of the Sierra Town Center on the west side of the Main Entry Road in the southern portion of the project site. This planning area is composed of 446 multifamily dwelling units and would make up approximately 20.9% of the project's total dwelling units. This planning area will range in elevation between approximately 1,200 feet AMSL and 1,350 feet AMSL.

1.3.2.3 Valley Planning Area

The Sierra Valley planning area is west of the Sierra Hillside planning area, north of the Sierra Terraces, and south of Sierra Knoll. This planning area is composed of 505 dwelling units, including 316 multifamily dwelling units and 189 single family dwelling units on lots ranging in size from 3,500 SF to 4,000 SF. The 505 dwelling units proposed for this planning area would make up approximately 23.7% of the project's total dwelling units. The average elevation for the Sierra Valley planning area would be approximately 900 feet AMSL.

1.3.2.4 Hillside Planning Area

The Sierra Hillside planning area is located north of the Sierra Terraces planning area and along the east of Mesa Rock Road in the southern portion of the project site. Sierra Hillside would be composed of 241 single-family dwelling units on lots ranging in size from 4,500 SF to 5,000 SF, and would make up approximately 11.2% of the project's total dwelling units. The Sierra Hillside planning area contains lots for age-targeted, single story homes that will benefit from the views to the north and east of the project site.

1.3.2.5 Knoll Planning Area

The Sierra Knoll planning area is located south of Sierra Summit, southwest of Sierra Mesa, and north of Sierra Valley. This planning area would include a total of 372 dwelling units, including 29 multifamily dwelling units and 343 single family dwelling units on lots ranging in size from 4,500 SF to 5,500 SF. The 372 dwelling units proposed for this planning area would make up approximately 17.4% of the project's total dwelling units. The topography of this planning area has some of the highest elevations throughout the entire project area. Elevations range from 1,175 feet AMSL up to 1,400 feet AMSL. There are a number of viewing points scattered throughout this planning area as well. The Sierra Knoll planning area contains family lots and clusters that are designed to preserve the primary knolls in the area.

1.3.2.6 Mesa Planning Area

The Sierra Mesa planning area is located north of Sierra Hillside, east of Sierra Knoll, and southeast of Sierra Summit. This planning area would include 325 age-qualified dwelling units, including 60 multifamily dwelling units and 265 single family dwelling units on lots ranging in size from 3,000 SF to 6,000 SF. The 325 dwelling units proposed for this planning area would make up approximately 15.1% of the project's total dwelling units. Average elevation in the Sierra Mesa planning area ranges from 1,250 feet AMSL and 1,350 feet AMSL. The Sierra Mesa planning area contains age-qualified single family lots and multifamily clusters centered around a neighborhood park.

1.3.2.7 Summit Planning Area

The Sierra Summit planning area is the northernmost area of development located just north of Sierra Knoll and northwest of Sierra Mesa. This planning area would include 151 dwelling units, including 49 multifamily dwelling units and 102 single family dwelling units. This planning area is composed of the project's largest lots with lots ranging in size from 6,000 SF to 7,500 SF. Only 151 dwelling units are proposed for this planning area, which accounts for approximately 7.3% of the total dwelling units proposed. The highest elevations in the project area occur in this planning area. Average elevations range from 1,390 feet AMSL up to 1,600 feet AMSL. There will be a trail leading up to the highest point in the planning area where a lookout will be located. The Sierra Summit planning area contains grade adaptive large lots and family clusters that are designed to take advantage of the views of the surrounding area from this part of the project site.

1.3.2.8 Additional Amenities

In addition to the residential, commercial and school sites, there will be community/ neighborhood parks and pocket parks with amenities such as open lawn areas, multi-use courts, picnic areas, children's play areas, pools, a community garden, and an equestrian staging area,

would also be present throughout each of the different planning areas to compliment the natural parks, many community trails, and large open space preserve areas.

The project will include an extensive trail system including multiuse pathways and trails through the community and into the project's open space areas. Trails would include existing dirt trails; paved utility access ways; and new soft-surface trails. Existing dirt trails not used as part of the trail plan will be revegetated with native habitat. The project will include access points to trail systems to facilitate emergency response. Trails will be managed and maintained by the HOA, CFD, or other approved entity.

The project will preserve approximately 1,209 acres of land as Biological Open Space (preserve area). This largely contiguous block of land is located in the northern and eastern portion of the project area. Development in this area would include the recreational trails and utility maintenance access as required for existing infrastructure, which are largely in place as existing dirt roads. The preserve will be managed and maintained by the preserve manager as described in the Resource Management Plan prepared for the project.

Common open space areas include approximately 370 acres of irrigated and non-irrigated Fuel Modification Zones. This includes manufactured slopes and non-graded areas such as fuel reduction areas (i.e., Fuel Modification Zone 2 and Special Management Areas)

1.4 Site Characteristics

1.4.1 Topography

The Newland Sierra project site is situated within the central portion of the Merriam Mountains, a narrow chain of low mountains generally trending north–south with a variety of east–west trending ridgelines and scattered peaks. These mountains originate near the northern portions of City of Escondido and are bordered by Gopher Canyon Road to the north, I-15 to the east, and Twin Oaks Valley Road to the west. Large rock outcroppings and pinnacles commonly occur throughout the Merriam mountain range on the property. The project vicinity is composed of hills and valleys with moderate to steeply sloping terrain. Elevations on the site range from 660 feet above mean sea level (AMSL) near the intersection of Deer Springs Road and I-15 to roughly 1,750 feet AMSL in the north-central portion of the property. Approximately 50% of the 1,985-acre property includes rugged terrain with slopes ranging from 25% to 45%. Prominent, generally east–west trending ridgelines divide the site into five separate drainage basins, which are tributaries to Moosa Canyon, Gopher Canyon, and San Marcos Creek. Gopher Canyon is located north of the project site and the South Fork of Gopher Canyon Creek runs 0.1 miles southeast–northwest through the northwestern area of the site, eventually meeting the San Luis Rey River.

1.4.2 Existing/Vicinity Land Use

The project area is currently undeveloped and the dominant vegetation is Southern Mixed Chaparral. A number of dirt roads and trails that provide access to each parcel and service roads for the existing two water tanks crisscross the project site. Over the years, portions of the property have been used for various unauthorized land uses, including horseback riding, hiking, mountain biking, off-roading, motorcycling, shooting, and occasional dumping. Also, an abandoned private landing strip and unused rock quarry are located generally in the northwestern portion of the site.

The surrounding land uses to the north, west, and south of the project site include large-lot, single-family residences and avocado groves, commercial uses such as a Special Events center (Twin Oaks Valley House); and equestrian boarding and training facilities. Existing uses south of the site also include a gas station and mobile home park along Deer Springs Road adjacent to the southeastern portion of the site, single family home parcels, , a nursery, vacant parcels, and the 600+ acre Golden Door Spa and Resort, which are separated from the site by Deer Springs Road. Lawrence Welk Village, a 600+ acre vacation resort facility, and the Champagne Village mobile home park, and the communities of Hidden Meadows and Rim Rock lie to the east of I-15.

1.4.3 Vegetation

The Newland Sierra property supports a variety of vegetation types that are relatively common in north-inland San Diego County. Fire history data indicates that the site's vegetation has been unburned for over 100 years. Therefore, the structure of the dominant plant communities is tall, dense, with relatively few species compared to vegetation composition in the period following wildfire. A total of 21 vegetation and land cover types were delineated on site by the project biologist (Dudek 2014), which includes one non-fuel land cover type (urban/developed areas). These vegetation and land cover types were verified by Dudek fire protection planners and assigned a fuel model for use during site fire behavior modeling. The vegetation and land cover types and their coverage totals as well as corresponding fuel models are summarized in Table 2.

Table 2
On-Site Vegetation and Land Cover Types – Newland Sierra Project Site

General Vegetation Community/Land Cover Type	Code[1]	Acres
Coastal Scrub		
Diegan coastal sage scrub (including disturbed) *	32500	68.2
Coastal sage scrub – Baccharis dominated (including disturbed)	32530	2.0
Flat-topped buckwheat – disturbed*	32800	1.7
Coastal sage – chaparral transition*	37G00	7.8
	Subtotal	*79.7*

Table 2
On-Site Vegetation and Land Cover Types – Newland Sierra Project Site

General Vegetation Community/Land Cover Type	Code[1]	Acres
Chaparral		
Granitic southern mixed chaparral* (including disturbed)	37121	1,700.7
Mafic southern mixed chaparral*	37122	58.8
Scrub oak chaparral*	37900	44.3
	Subtotal	*1,803.8*
Woodland		
Coast live oak woodland *	71160	9.1
Riparian		
Freshwater marsh*	52400	0.1
Southern coast live oak riparian forest*	61310	5.2
Mulefat scrub*	63310	0.2
Southern willow scrub*	63320	2.5
Southern willow scrub/tamarisk scrub*	63320/63810	0.3
	Subtotal	*8.3*
Non-native Communities and Land Covers		
Eucalyptus woodland	79100	0.5
Intensive agriculture	18200	<0.0
Orchard and vineyards	18100	2.0
Urban/developed	12000	9.2
Disturbed habitat	11300	57.0
Non-native grassland*	42200	16.1
	Subtotal	*84.8*
	Total [2]	1,985.6

1 Holland (1986) as modified by Oberbauer et al. (2008)
2 May not total due to rounding
* Considered special-status by the County of San Diego (2010a).

As presented, the majority of the vegetation on the project site is associated with the Southern mixed chaparral (88.1%), while the remainder of the vegetation cover types individually amount to 1% or less of the total project site, except coastal sage scrub (3.1%), disturbed habitat (2.9%), and scrub oak chaparral (2.2%). The project's vegetation and land coverage is illustrated in Figure 3 and briefly described below.

Changes to site vegetation types will be associated with grading for development pads and roads and installation of fuel modification zones in strategic locations at the perimeter of the developed project site. Site-adjacent vegetation (off-site and adjacent the fuel modification zones) is important relative to wildfire as some vegetation, such as brush and grassland habitats are highly flammable while other vegetation, such as riparian communities or forest understory, are less flammable due to their higher plant moisture content, compact structure, and available shading from overstory tree

canopies. The effect vegetation has on fire behavior is substantial and understanding vegetation dynamics is important for developing an effective fuel modification plan.

1.4.3.1 Site Vegetation and Land Cover Type Descriptions

The following descriptions are adapted from the site's Draft Biological Resources Report (Dudek 2014).

Non-Native Communities and Land Covers

Agriculture. Agriculture lands supporting active or historical agricultural operation.

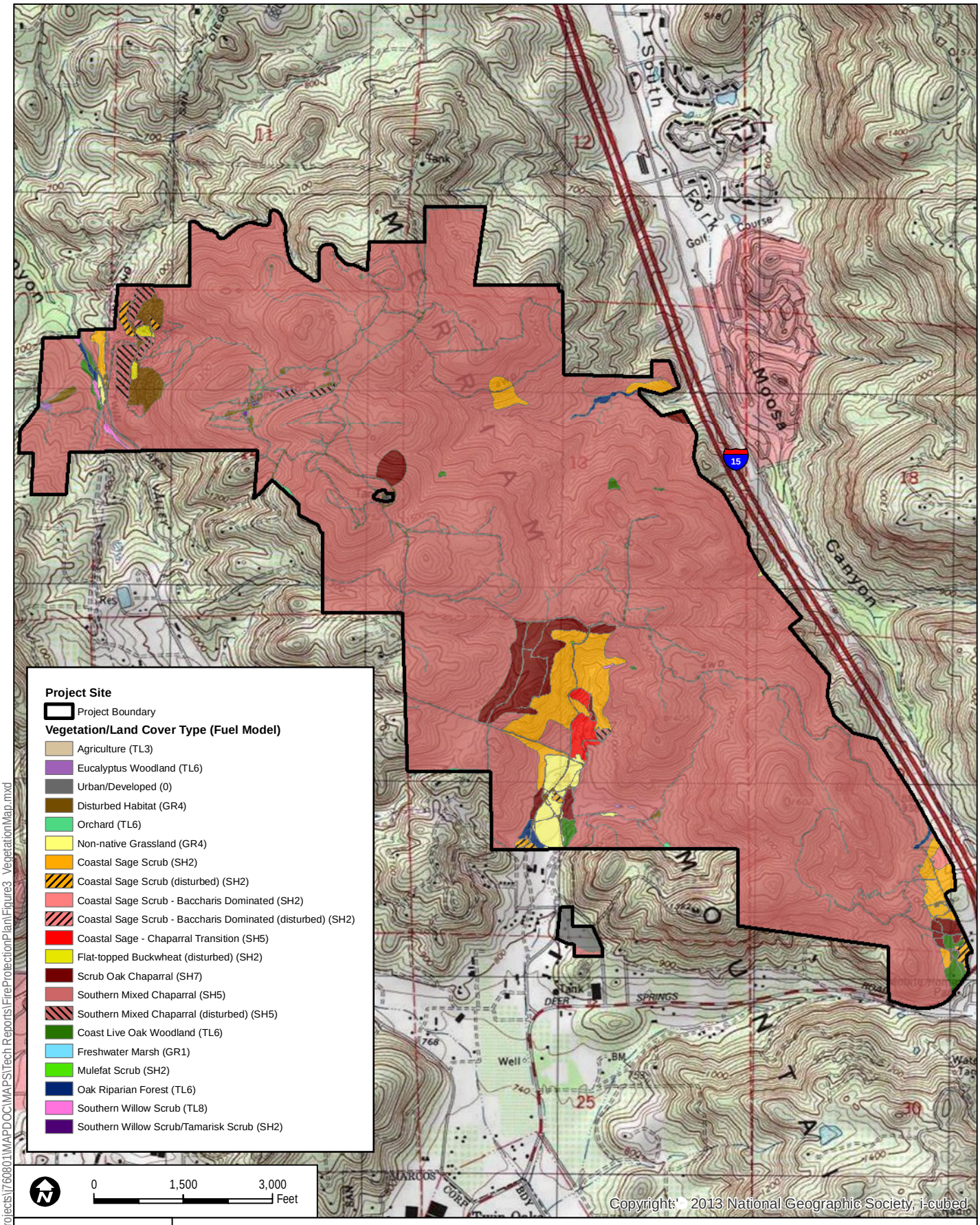
Eucalyptus Woodland. Scattered A small pocket of eucalyptus trees exist on the far northwestern portion of the project site. This portion of the project site is not proposed to be developed.

Urban/Developed. Developed areas support no native vegetation and may be additionally characterized by the presence of man-made structures, such as buildings or roads. The level of soil disturbance is such that only the most ruderal plant species occur. Urban/Developed lands occur in the southeastern portion of the site along Mesa Rock Road.

Disturbed Habitat. This category consists of permanently disturbed land cover consisting of small areas, including adjacent to the north end of Mesa Rock Road, the defunct quarry site adjacent to Twin Oaks Valley Road, and limited areas adjacent to the abandoned aircraft landing strip in the northwest quadrant of the site.

Orchard. Small areas in the southwest and northwest quadrant of the site contain apparently non-commercial orchard crops, primarily as a result of incursion from existing adjacent agricultural uses.

Non-Native Grassland. This vegetation is primarily located in an area termed the linear "meadow" (north of Sarver Lane). Biologically, it is not a meadow, but rather an open field of non-native grasses and forbs, largely ripgut grass (*Bromus diandrus*). Within the site, the inner meadow is largely covered by weedy non-native grasses, is surrounded by a perimeter dirt road, and has another dirt road diagonally crossing it from southwest to northeast. Additionally, there are several areas used for informal dirt-bike tracks within the grassland area.



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SOURCE: Dudek 2014

FIGURE 3

Site Vegetation Map

Newland Sierra Fire Protection Plan

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Upland Scrub and Chaparral

Coastal Sage Scrub. A few relatively limited areas of the site are covered with open Coastal Sage Scrub vegetation. The most extensive patch of this vegetation occurs on the south-facing slopes of the southern valley. At the northwestern corner of the site, those areas not cleared by the aqueduct or for the avocado groves have an association of California sagebrush (*Artemisia californica*) and flat-top buckwheat (*Eriogonum fasciculatum*).

Coastal Sage Scrub – Baccharis Dominated. Coastal sage scrub – baccharis dominated is similar to Coastal Sage Scrub but dominated by Baccharis species (desert broom [*B. sarothroides*] and/or coyotebrush [*B. pilularis*]). This community typically occurs on disturbed sites or those with nutrient-poor soils and often found within other forms of Coastal Sage Scrub and on upper terraces of river valleys. This community is distributed along coastal and foothills areas in San Diego County. Areas mapped as coastal sage scrub - baccharis within the project site are dominated by California sagebrush and coyotebrush.

Coastal Sage – Chaparral Transition. Coastal sage – chaparral transition habitats include a mix of sclerophyllous, woody chaparral species and drought-deciduous, malacophyllous sage scrub species. Chamise and coastal sagebrush (*Artemisia californica*) are dominant in equal cover. Generally, laurel sumac (*Malosma laurina*), black sage (*Salvia mellifera*), and lemonade sumac (*Rhus integrifolia*) are more common in coastal sage scrub, while *Ceanothus* spp. and mission manzanita (*Xylococcus bicolora*) are more common in chaparrals. Areas mapped as coastal sage – chaparral transition within the project site are dominated by coastal sagebrush.

Flat-topped Buckwheat (disturbed). Flat-topped buckwheat is a nearly monoculture community usually resulting from disturbance and transitioning to coastal sage scrub or chaparral. Species characteristic of this community, Eastern Mojave buckwheat and common deerweed (*Acmispon glaber*), appear over time. This community often occurs in disturbed areas in the coastal and foothill areas of San Diego County and often intergrades with Diegan coastal sage scrub. Areas mapped as flat-topped buckwheat within the project site are dominated by Eastern Mojave buckwheat (*Eriogonum fasiculatum*).

Scrub Oak Chaparral. Scrub oak chaparral habitats are composed of a dense, evergreen chaparral that is typically dominated by Nuttall's scrub oak (*Quercus dumosa*) with birchleaf mountain mahogany (*Cercocarpus betuloides*). In San Diego, scrub oak (*Quercus berberidifolia*) is usually the dominant species with over 50% vegetation cover usually occurring in small patches within a variety of other vegetation communities. Areas mapped as scrub oak chaparral within the project site are dominated by scrub oak.

Southern Mixed Chaparral. The site is largely covered by Southern Mixed Chaparral that varies from an almost pure "Chamisal" of chamise (*Adenostoma fasciculatum*) to a mountain-mahogany-dominated type (*Cercocarpus minutiflorus*) in the deeper soil of inner valleys. The indicators of the more widespread Southern Mixed Chaparral on the site are chamise, mission manzanita (*Xylococcus bicolor*), black sage (*Salvia mellifera*), and Ramona wild-lilac (*Ceanothus tomentosus*). The extent of exposure, soil depth, and slope affect the extent of the diversity of the chaparral on the site. One major characteristic of the on-site chaparral vegetation is its level of maturity. This Mediterranean climate–associated vegetation is highly correlated with periodic fires that recycle the surface load of organic material and nutrients back into a nutrient-poor soil system. The fires also allow the cycling of a major suite of annual native wildflowers and stimulate the regrowth of the major shrubs in the region from subsurface specialized stems. A large portion of the site's chaparral has not burned in over 100 years. Isolated coast live oak trees (*Quercus agrifolia*) and small stands of scrub oak (*Quercus berberidifolia*) occur in several areas mapped as Southern Mixed Chaparral, but do not constitute distinct oak woodlands.

Woodland

Coast Live Oak Woodland. The Deer Springs area at the southeastern corner of the site has a mature stand of coast live oak and occasional Engelmann oak. The area was the site of a prior residence, so the understory is largely disturbed and recruitment or new growth of young trees has been arrested by the presence of the weedy understory. Coast live oaks also occur scattered about the site, especially as part of the chaparral vegetation on protected north-facing slopes, but the principal mapped unit of Coast Live Oak Woodland lies only at this southeastern corner. The drainage that flows out of the southern valley has riparian oak woodland that differs from the savanna-type oak woodland at the southern area.

Riparian

Freshwater Marsh. A small amount of Freshwater Marsh habitat exists in the Twin Oaks Valley Creek, west of and adjacent to Twin Oaks Valley Road, in the west-central portion of the site. This area is dominated by cattails, but shows evidence of occasional channel clearing (perhaps for mosquito control).

Mulefat Scrub. This vegetation is a tall, herbaceous riparian scrub strongly dominated by baccharis. On the Sierra site, small drainage channels in various areas with occasional mulefat shrubs occur, including drainages associated with the southeastern central valley and the graded area of the defunct aircraft landing strip.

Oak Riparian Forest. Oak Riparian Forest on site consists largely of black willow (*Salix gooddingii*) and arroyo willow (*S. lasiolepis*), with occasional coast live oaks. The largest occurrence of this vegetation on site is along the bottom of the eastern central canyon. It also occurs just off site, along the creek south of Deer Springs Road. Oak Riparian Forest extends beyond the site from the southern valley and is dominated by coast live oaks.

Southern Willow Scrub. This vegetation type is fairly typical of Holland's (1986) Southern Willow Scrub, described as "dense, broad-leafed, winter-deciduous riparian thickets dominated by several willow species with scattered emergent cottonwoods (*Populus fremontii*) and sycamores." This vegetation occurs along the streamside in the South Fork of Gopher Canyon, adjacent to Twin Oaks Valley Road.

Southern Willow Scrub/Tamarisk Scrub. A small amount of this habitat exists in a previously graded area adjacent to the abandoned aircraft landing area in the northwest quadrant of the site. The topography of this area allows rainwater to pond and promotes this artificial wetland-like habitat, consisting of scattered willows and tamarisk.

1.4.3.2 Vegetation Dynamics

The vegetation characteristics described above and presented in Table 2 are used to model fire behavior, discussed in Section 3.0 of this FPP. Variations in vegetative cover type and species composition have a direct effect on fire behavior. Some plant communities and their associated plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (bark thickness, leaf size, branching patterns), and overall fuel loading. For example, the native shrub species that compose the chaparral communities on site are considered to be less likely to ignite, but would exhibit higher potential hazard (higher intensity heat and flame length) than grass dominated plant communities (fast moving, but lower intensity) if ignition occurred. The corresponding fuel models for each of these vegetation types are designed to capture these differences. Additionally, vegetative cover influences fire suppression efforts through its effect on fire behavior. For example, while fires burning in grasslands may exhibit lower flame lengths and heat outputs than those burning in native shrub habitats, fire spread rates in grasslands are often more rapid.

As described, vegetation plays a significant role in fire behavior, and is an important component to the fire behavior models discussed in this report. A critical factor to consider is the dynamic nature of vegetation communities. Fire presence and absence at varying cycles or regimes disrupts plant succession, setting plant communities to an earlier state where less fuel is present for a period of time as the plant community begins its succession again. In summary, high frequency fires tend to convert shrublands to grasslands or maintain grasslands, while fire exclusion tends to convert grasslands to shrublands, over time. In general, biomass and

associated fuel loading will increase over time, assuming that disturbance (fire, grazing) or fuel reduction efforts are not diligently implemented. It is possible to alter successional pathways for varying plant communities through manual alteration. This concept is a key component in the overall establishment and maintenance of the proposed fuel modification zones on site. The fuel modification zones on this site will consist of irrigated and maintained landscapes as well as thinned native fuel zones that will be subject to regular "disturbance" in the form of maintenance and will not be allowed to accumulate excessive biomass over time, which results in reduced fire ignition, spread rates, and intensity.

Conditions adjacent the project's footprint (outside the fuel modification zones), where the wildfire threat will exist post-development, are classified as medium to heavy fuel loads due to the dominance of chaparral fuels.

1.4.4 Climate

North San Diego County and the project area are influenced by the Pacific Ocean and are frequently under the influence of a seasonal, migratory subtropical high pressure cell known as the "Pacific High" (WRCC 2014a). 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 (WRCC 2014a). The average high temperature for the project area is approximately 75.9°F, with average highs in the summer and early fall months (July–October) reaching 88.2°F. The average precipitation for the area is approximately 16.2 inches per year, with the majority of rainfall concentrated in the months of December (2.7 inches), January (3.2 inches), February (3.1 inches), and March (2.7 inches), while smaller amounts of rain are experienced during the other months of the year (WRCC 2014b).

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), averaging 2 miles per hour (mph). During the summer season, the diurnal winds may average slightly higher (approximately 16 mph) than the winds during the winter season due to greater pressure gradient forces. Surface winds can also be influenced locally by topography and slope variations. The highest wind velocities are associated with downslope, canyon, and Santa Ana winds.

The project area's climate has a large influence on the fire risk as drying vegetation during the summer months becomes fuel available to advancing flames should an ignition be realized. Typically the highest fire danger is produced by the high-pressure systems that occur in the Great Basin, which result in the Santa Ana winds of Southern California. Sustained wind speeds recorded during recent major fires in San Diego County exceeded 30 mph and may exceed 50 mph during

extreme conditions. The Santa Ana wind conditions are a reversal of the prevailing southwesterly winds that usually occur on a region-wide basis during late summer and early fall. Santa Ana winds are warm and dry winds that flow from the higher desert elevations in the north through the mountain passes and canyons. When present, these winds significantly increase the fire risk throughout much of Southern California, including at the project site. As they converge through the canyons, their velocities increase. Consequently, peak velocities are highest at the mouths of canyons and dissipate as they spread across valley floors. Santa Ana winds generally coincide with the regional drought period and the period of highest fire danger.

Determination of Project Effects

FPPs provide an evaluation of the adverse environmental effects a proposed project may have from wildland fire. The FPP must provide mitigation for identified impacts to ensure that development projects do not unnecessarily expose people or structures to a significant loss, injury or death involving wildland fires. Significance is determined by answering the following guidelines:

Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The wildland fire risk in the vicinity of the project site has been analyzed and it has been determined that wildfires may occur in wildland areas adjacent the project site as well as potentially in any preserved on-site fuels, but would not be significantly increased in frequency, duration, or size with the construction of the project. In fact, the existing site includes numerous potential fire issues including unmaintained vegetation. The project would include conversion of fuels to maintained urban development with designated landscaping and fuel modification areas. As such, a condensed portion of the site will be largely converted from readily ignited fuels to ignition resistant structures and landscape, including 250 feet wide fuel modification zones on the perimeter of the project.

The types of potential ignition sources that currently exist in the area include vehicle and roadway, electrical transmission line, and machinery associated with agricultural operations and off-site residential neighborhoods. The project would introduce potential ignition sources, but would also include conversion of ignitable fuels to lower flammability landscape and include better access throughout the site, managed and maintained landscapes, more eyes and ears on the ground, and generally a reduction in the receptiveness of the area's landscape to ignition. Fires from off site would not have continuous fuels across this site and would, therefore, be expected to burn around and/or over the site via spotting. Burning vegetation embers may land on project structures, but are not likely to result in ignition based on ember decay rates and the types of non-combustible and ignition resistant materials that will be used on site.

The Project would comply with applicable fire and building codes and would include a layered fire protection system designed to current codes and inclusive of site-specific measures that will result in a Project that is less susceptible to wildfire than surrounding landscapes and that would facilitate fire fighter and medical aid response.

Would the project result in inadequate emergency access?

The project includes fire access throughout the neighborhood and is consistent with the General Plan, DSFPD Ordinance 2013-01 and SDCCFC in terms of meeting the 5 minute response travel time. Fire apparatus access throughout the development will include roads that meet the code requirements for width, grade, clearance, turnouts, and turnarounds. Fire access on the project site will be improved from its current condition, which provides only limited access on rugged dirt/gravel roads. Therefore, the project's access is considered consistent with code requirements.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance service ratios, response times or other performance objectives for fire protection?

The project is projected to add a conservatively estimated 818 calls per year to the DSFPD's existing call load. The actual number of calls will likely be lower based on several factors, but is assessed using the DSFPD's per capita volume. The primary response (first in) would be provided by Station 12, which has averaged 497 calls per year over the last several years, or roughly 1.4 calls per day. The addition of 818 calls/year (2.2 calls/day) to a station that currently responds to 1.4 daily calls is considered substantial, but the capacity for the station to respond to the additional calls is available, as analyzed in Section 4.2 of this FPP. The anticipated 3.7 calls per day is below what would be considered a busy station. For perspective, urban fire stations that respond to five calls per day are considered average and 10 calls per day would be considered a busy station while a suburban/rural station that responds to roughly 6 calls per day can be considered busy (Hunt 2013). For comparison, Vista Fire Protection District, San Marcos Fire Department, and City of Escondido Fire Department all respond to an average of 5 calls per day per station[1].

A portion of the project's parcel tax revenue which includes one-time fees and ongoing annual assessments, will be allocated to fire protection, which can be used to maintain current levels of

[1] Dudek 2014. Analysis of Deer Springs Fire Protection District neighboring fire agency call volumes. Average call volumes are calculated by dividing the total number of annual calls by the number of fire stations serving those calls

protection without impacting existing citizens. The final Applicant funding amount will be determined by the applicant and DSFPD and included in a Fire Service Agreement to be completed prior to map recordation.

Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The project will be served by Vallecitos Municipal Water District and sufficient water supplies will be available to serve the project from existing entitlements and resources. The pressures in the development will remain above 20 psi at 2,500 gallons per minute when meeting the fire requirements for the DSFPD. The measures described in the responses to these significance questions are provided more detail in the following sections.

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2 ANTICIPATED FIRE BEHAVIOR

2.1 Fire History

Fire history is an important component of an FPP. Fire history information can provide an understanding of fire frequency, fire type, most vulnerable project areas, and significant ignition sources, amongst others. *Appendix B – the Newland Sierra Vicinity Fire History Exhibit* presents a graphical view of the project area's recorded fire history. As presented in the exhibit, there have been several fires recorded by CAL FIRE in their FRAP database (FRAP 2014) [2] in the direct vicinity of the project site. The most notable fire, occurring to the north and east of the project site, was the 1969 Moosa Fire. That fire burned 6,900 acres in 1969 and spread within 1,200 feet of the Newland Sierra project site, opposite I-15. A total of three fires are noted within 1 mile of the project site dating back to 1969. This information excludes fires less than 10 acres. There have been multiple fires throughout North County inland including two fires along Old Castle Road to the east of the project area and numerous fires along the I-15 corridor to the north and south of the project area during the summer of 2006. Rapid and overwhelming response to these fires has resulted in their containment before they could grow to the size that would include them in CAL FIRE's database. Similarly, more recent fires are not included in the database until their data are loaded by CAL FIRE. For example, the May 2014 fire that occurred near SR 76 and Old Highway 395 in the Bonsall area of San Diego County would not be included in the database. That fire, burned a substantial acreage (just under 400 acres), and was roughly 6 miles north of the northern boundary of the Newland Sierra project site. It occurred during a Red Flag Warning, initially alluded containment, and caused evacuations of approximately 2000 residents.

As indicated, portions of the Newland Sierra project's landscape and some areas to the east and west of I-15 have not burned in 100 years or more. The Merriam Mountains, as with much of the open space in the region, in their present state, represent a potential threat to the many existing homes scattered along Deer Springs Road, the small avocado and citrus ranches and homes along the western side of the Merriam Mountains and the City of San Marcos and beyond, which are all at immediate risk from a Santa Ana wind driven wildfire. One scenario San Diego County firefighters have modeled and pre-planned is a Santa Ana wind driven wildfire igniting to the east of, and jumping the I-15 freeway from the northeast, or sourcing on the west side of the I-15 freeway and burning up the slopes, across the Newland Sierra project site and into the expanding City of San Marcos and other neighboring downwind communities. The proposed Newland Sierra community

[2] Based on polygon GIS data from CAL FIRE's Fire and Resource Assessment Program (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 1878–2013.

will provide a substantial fuel break, significantly interrupting the continuous fuels currently found within the southern portion of the Merriam Mountains.

2.2 Fire Behavior Modeling

Following site evaluation and vegetative fuels data collection efforts, fire behavior modeling was conducted to document the type and intensity of fire that would be expected on the project site given characteristic site features including topography, vegetation, and weather. Dudek utilized FlamMap, which is a graphics-based GIS model that utilizes the same fire spread algorithms contained in the BehavePlus software package. The advantage of FlamMap modeling is that it evaluates anticipated site-wide fire intensity and flame length values based on variations in topography and vegetative cover and provides a graphical output that can be evaluated on site maps, whereas BehavePlus provides a tabular output. BehavePlus was utilized for specific target areas for confirmation of FlamMap results.

2.2.1 Modeling History

Fire behavior modeling has been used by researchers for approximately 50 years to predict how a fire will move through a given landscape (Linn 2003). The models have had varied complexities and applications throughout the years. One model has become the most widely used for predicting fire behavior on a given landscape. That model, known as "BEHAVE", was developed by the U. S. Government (USDA Forest Service, Rocky Mountain Research Station) and has been in use since 1984. Since that time, it has undergone continued research, improvements, and refinement. The current version, BehavePlus, 5.0.5, includes the latest updates incorporating years of research and testing. Numerous studies have been completed testing the validity of the fire behavior models' ability to predict fire behavior given site specific inputs. One of the most successful ways the model has been improved has been through post-wildfire modeling (Brown 1972, Lawson 1972, Sneeuwjagt and Frandsen 1977, Andrews 1980, Brown 1982, Rothermel and Rinehart 1983, Bushey 1985, McAlpine and Xanthopoulos 1989, Grabner, et. al. 1994, Marsden-Smedley and Catchpole 1995, Grabner 1996, Alexander 1998, Grabner et al. 2001, Arca et al. 2005). In this type of study, Behave is used to model fire behavior based on pre-fire conditions in an area that recently burned. Real-world fire behavior, documented during the wildfire, can then be compared to the prediction results of Behave and refinements to the fuel models incorporated, retested, and so on.

Fire behavior modeling includes a high level of analysis and information detail to arrive at reasonably accurate representations of how wildfire would move through available fuels on a given site. Fire behavior calculations are based on site specific fuel characteristics supported by fire science research that analyzes heat transfer related to specific fire behavior. FlamMap, a GIS-based fire behavior software application that uses the same principles as BehavePlus was

used to provide useful graphical displays of the modeling output. Additionally, fire behavior for the Highway Fire in May of 2014 was reviewed since it occurred in similar terrain and fuels as occur on site. A Fire Captain on duty on May 12, 2015, was interviewed from CAL FIRE's Miller Station. He responded to the Highway Fire on May 15, 2015, and confirmed that flame lengths were in the 50 feet tall range with longer flame lengths in the Ravine bottoms where oak trees and larger shrubs were involved. Fire behavior models indicate a similar burn would occur with average flame lengths between 40 and 70 feet and jackpot fuels producing flame lengths of an estimated 100 feet.

Predicting wildland fire behavior is not an exact science. As such, the minute-by-minute movement of a fire will probably never be predictable, especially when considering the variable state of weather and the fact that weather conditions are typically estimated from forecasts made many hours before a fire. Nevertheless, field-tested and experienced judgment in assessing the fire environment, coupled with a systematic method of calculating fire behavior yields surprisingly accurate results. To be used effectively, the basic assumptions and limitations of fire behavior modeling applications must be understood.

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

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

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

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

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

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

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

Table 3 provides a description of 9 fuel models (including one non-burnable model) coded for the site that were subsequently used in the on-site, existing condition FlamMap analysis for this project.

Table 3
On-Site Fuel Model Characteristics – Existing Condition

Fuel Model	Description	Land Cover Classification	Canopy Cover Value
0	Non-burnable	Urban/Developed	0
GR1	Short, Sparse Dry Climate Grass	Freshwater Marsh	0
GR4	Moderate Load, Dry Climate Grass	Disturbed Habitat, Non-native Grassland	0
SH2	Moderate Load Dry Climate Shrub	Coastal Sage Scrub, Coastal Sage Scrub – Baccharis Dominated, Flat-topped Buckwheat, Mulefat Scrub, Southern Willow Scrub/Tamarisk Scrub	0
SH5	High Load, Dry Climate Shrub	Coastal Sage – Chaparral Transition, Southern Mixed Chaparral	0
SH7	Very High Load, Dry Climate Shrub	Scrub Oak Chaparral	0
TL3	Moderate Load Conifer Litter	Agriculture	0
TL6	Moderate Load Broadleaf Litter	Eucalyptus Woodland, Orchard, Coast Live Oak Woodland, Oak Riparian Forest	2 (Eucalyptus Woodland, Orchard, Coast Live Oak Woodland), 3 (Oak Riparian Forest
TL8	Long-Needle Litter	Southern Willow Scrub	1

2.2.2 FlamMap Analysis

FlamMap software was utilized to graphically depict potential fire behavior for the project site. FlamMap utilizes the same fire spread equations built into the BehavePlus software package, but allows for a geographical presentation of fire behavior outputs as it applies the calculations to each pixel in the associated GIS landscape (Finney 2006). Both summer weather conditions (on-shore flow) and more extreme fall weather conditions (off-shore, Santa Ana conditions) were modeled for both the existing site condition and the proposed post-development site condition.

2.2.2.1 FlamMap Fuel Model Inputs

FlamMap software requires a minimum of five (5) separate input files that represent field conditions in the analysis area, including elevation, slope, aspect, fuel model, and canopy cover. Each of these files was created as a raster GIS file using ArcGIS 10.2.2 software, exported as an ASCII grid file, then utilized in creating a FARSITE Landscape file that served as the base for the FlamMap runs. The resolution of each grid file and associated ASCII file that was used in the models described herein is 3 meters, based on available digital terrain data sets for San Diego

County (SANGIS 2014). In addition to the Landscape file, wind and weather data are incorporated into the model inputs. The output fire behavior variables chosen for each of the modeling runs was flame length (measured in feet) and spread rate (feet/minute).

The following paragraphs provide descriptions of the input and output variables used in processing the FlamMap models. In addition, data sources are cited and any assumptions made during the modeling process are described.

Elevation

Elevation data were derived from a SANGIS Digital Elevation Model (DEM) file, projected in the NAD 1983, California State Plane, Zone 6 coordinate system with 3-meter ground resolution. Elevation on the site ranges from 621–1,755 feet AMSL. These data were utilized to create an elevation grid file, using units of feet above sea level. The elevation data are a required input file for FlamMap runs and are necessary for adiabatic adjustment of temperature and humidity and for conversion of fire spread between horizontal and slope distances.

Slope

Using ArcGIS Spatial Analyst tools, a slope grid file was generated from the elevation grid file described above. Slope measurements utilized values in percent of inclination from horizontal. Slope values in the analysis area range from 0%–184%. The slope input file is necessary for computing slope effects on fire spread and solar radiance.

Aspect

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

Fuel Model

Vegetation coverage data in the form of a GIS shapefile (Dudek 2014) were used in this analysis to create a fuel model file for existing conditions, which was derived from vegetative cover data mapped for the analysis area (on-site and within a 100-foot project buffer). Vegetation mapping data was utilized in field efforts to classify vegetation cover type with an appropriate fuel model. Fuel model assignments for existing vegetation are presented in Table 2.

To analyze post-development fire behavior, a separate fuel model shapefile was created using the existing vegetation coverage and reclassifying fuels based on location within the proposed development. All fuels within areas proposed for conversion to non-fuel types (e.g., roads,

driveways, structures) were reclassified as Fuel Model "0" to represent developed, non-combustible land uses. Post-development fuel model classification for non-developed areas within the project site were classified as follows:

- Fuel Modification Zone 1: Fuel Model 8
- Fuel Modification Zone 2: Fuel Model SH1

Table 4 provides a description of 11 fuel models (including one non-burnable model) coded for the post-development site condition (including developed and non-developed areas) that were subsequently used in the on-site, post-development FlamMap analysis for this project.

Table 4
On-Site Fuel Model Characteristics – Post-Development Condition

Fuel Model	Description	Land Cover Classification	Canopy Cover Value
0	Non-burnable	Urban/Developed	0
8	Closed Timber Litter	Fuel Modification Zone 1	0
GR1	Short, Sparse Dry Climate Grass	Freshwater Marsh	0
GR4	Moderate Load, Dry Climate Grass	Disturbed Habitat, Non-native Grassland	0
SH1	Low Load Dry Climate Shrub	Fuel Modification Zone 2	0
SH2	Moderate Load Dry Climate Shrub	Coastal Sage Scrub, Coastal Sage Scrub – Baccharis Dominated, Flat-topped Buckwheat, Mulefat Scrub, Southern Willow Scrub/Tamarisk Scrub	0
SH5	High Load, Dry Climate Shrub	Coastal Sage – Chaparral Transition, Southern Mixed Chaparral	0
SH7	Very High Load, Dry Climate Shrub	Scrub Oak Chaparral	0
TL3	Moderate Load Conifer Litter	Agriculture	0
TL6	Moderate Load Broadleaf Litter	Eucalyptus Woodland, Orchard, Coast Live Oak Woodland, Oak Riparian Forest	2 (Eucalyptus Woodland, Orchard, Coast Live Oak Woodland), 3 (Oak Riparian Forest
TL8	Long-Needle Litter	Southern Willow Scrub	1

Once fuel model values were assigned to vegetation or land cover types, the vector-based vegetation data files (existing and proposed) were converted to grid files for inclusion in FlamMap modeling.

Canopy Cover

Canopy Cover is a required raster file for FlamMap operations. It is necessary for computing shading and wind reduction factors for all fuel models. Canopy cover is measured as the horizontal fraction of the ground that is covered directly overhead by tree canopy. Crown closure refers to the ecological condition of relative tree crown density. Stands can be said to be "closed" to recruitment of canopy trees but still only have 40% or 50% canopy cover. Coverage units can be categories (0–4) or percentage values (0–100).

For the purposes of the FlamMap analysis, Dudek utilized vegetation type classifications to determine canopy cover assignments. Canopy cover assignments are presented in Tables 3 and 4, by fuel model.

Weather

Fire behavior modeling conducted in support of this FPP utilized the guidelines and standards presented by the County of San Diego, Department of Planning and Land Use (County of San Diego 2010). These guidelines identify acceptable fire weather inputs for fire conditions during summer months and Santa Ana fire weather patterns. The County analyzed and processed fire weather from Remote Automated Weather Stations (RAWS) between April 15 to December 31 in order to represent the general limits of the fire season. Data provided by the County's analysis included temperature, relative humidity, and sustained wind speed and is categorized by weather zone, including Maritime, Coastal, Transitional, Interior, and Desert.

As identified in the County's guidelines, Dudek utilized the Fine Dead Fuel Moisture (FDFM) tool within BehavePlus (v. 5.0.5) fire behavior modeling software package to determine fuel moisture values to be input into the FlamMap runs discussed in this FPP. The temperature, relative humidity, and wind speed data for the Transitional (SANGIS 2014) weather zone were utilized for this FPP based on the project's location. Reference fuel moistures were calculated in the FDFM tool and were based on site-specific topographic data inputs. Table 5 summarizes the FDFM in puts and the resulting fine dead fuel moisture values. Table 6 presents the fire behavior modeling input variables for the project site.

Table 5
BehavePlus Fine Dead Fuel Moisture Calculation

Variable	Summer Weather	Peak Weather
Dry Bulb Temperature	90 -109 deg. F	90 -109 deg. F
Relative Humidity	10 - 14 %	5 -9 %
Reference Fuel Moisture	2 %	1 %
Month	May June July	May June July

Table 5
BehavePlus Fine Dead Fuel Moisture Calculation

Variable	Summer Weather	Peak Weather
Time of Day	12:00 - 13:59	12:00 - 13:59
Elevation Difference	Level (within 1,000 ft.)	Level (within 1,000 ft.)
Slope	30% +	30% +
Aspect	West	West
Fuel Shading	Exposed (< and > 50% shading)	Exposed (< and > 50% shading)
Fuel Moisture Correction	1 %	1 %
Fine Dead Fuel Moisture	3 %	2 %

Table 6
Fire Behavior Modeling Inputs

Variable	Summer Weather Condition	Peak Weather Condition (offshore/Santa Ana Condition)
Fuel Models	variable	variable
1h Moisture	3%	2%
10h Moisture	6%	3%
100h Moisture	8%	5%
Live Herbaceous Moisture	60%	30%
Live Woody Moisture	90%	50%
20-foot Wind Speed (upslope/downslope)	19 mph	41 mph
Wind Direction	225°	45°

2.2.2.2 FlamMap Fuel Model Outputs

Two output grid files were generated for each of the FlamMap runs and represents flame length (feet) and spread rate (feet/minute) in existing and proposed site conditions during Summer and Peak weather scenarios. 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). It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fireline personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). The information in Table 7 presents an interpretation of flame length and its relationship to fireline intensity.

Table 7
Fire Suppression Interpretation

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4–8	100–500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8–11	500–1,000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Over 11	Over 1,000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: BehavePlus 5.0.5 Online Documentation, March 16, 2010. BehavePlus Fire Modeling System: Version 4.0 User's Guide (Andrews, Bevins, and Seli 2008)

Maps depicting flame length values for the Summer weather scenario and the Peak weather scenario are included in Appendices C-1 and C-2, respectively. The fire behavior modeling results vary depending on topography and fuel type. As FlamMap utilizes site-specific digital terrain data (including slope, vegetation, aspect, and elevation data) slight variations in predicted flame length values can be observed based on fluctuations of these attributes across the landscape. As presented, wildfire behavior in each of the fuel types varies depending on weather conditions.

When classifying vegetation types into fuel models, efforts were made to most accurately represent the fuel type observed. However, the scale at which the vegetation mapping was conducted did not allow for small-scale fuel mapping within a larger vegetation type classification. For example, small pockets of tall grass within a larger area classified as scrub were not separated for this analysis. Second, the fuel models selected to represent post-developed conditions were selected based on expected fire behavior in these fuel types, as no available fuel models exist for managed and/or irrigated landscape vegetation.

2.2.3 BehavePlus Analysis

In addition to the FlamMap analysis conducted for the project and described above, an analysis utilizing the BehavePlus software package was conducted to evaluate fire behavior variables and to provide a verification of FlamMap outputs. Utilizing the dominant on-site vegetation (chaparral, Fuel Model SH5), 90th percentile slope values for the site (65% slope), and the Peak and Summer wind and fuel moisture values included in the FlamMap runs, fire behavior calculations were conducted, with the results presented in Table 8.

Table 8
BehavePlus Fire Behavior Modeling Results

Scenario	Flame Length (feet)	Rate of Spread (mph)	Spotting Distance (miles)
Summer (19 mph winds)	32.7	4.3	1.0
Peak (41 mph winds)	66.6	17.3	2.8

Note: Flame lengths are based on the use of a customized fuel model (SH 7) developed for Southern California chaparral that more accurately portrays how chaparral on this site would burn compared to the over-predicting SH-4 model, which has been shown to produce more aggressive fire behavior than typically occurs within Southern California fuels (Weise and Regelbrugge 1997).

As presented in Table 8, wildfire behavior in non-treated heavy chaparral, presented as a Fuel Model SH5, represents the most extreme conditions, varying with different wind speeds. In this case, flame lengths can be expected to reach up to approximately 33 feet with 19 mph wind speeds (Summer condition) and 67 feet with 41 mph wind speeds (Peak condition). Spread rates range from 4.3 mph (Summer) to 17.3 mph (Peak). Spotting distances, where airborne embers can ignite new fires downwind of the initial fire, range from 1.0 miles (Summer condition) to 2.8 miles (Peak condition).

It should be noted that the results presented in Table 4 depict values based on inputs to the BehavePlus software. The Fire Protection Plan prepared for a previous project at this location utilized an older, over predicting fuel model for much of the site's chaparral and predicted flame lengths in excess of 100 feet. While there may be pockets of fuels that would produce flame lengths on that order, the average flame lengths across the site's chaparral are predicted to be 67 feet. The model used in this analysis is a custom model that was designed by the USFS to more accurately represent southern California chaparral. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. 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.

2.2.4 Fire Behavior Summary

2.2.4.1 Existing Condition

Appendices C-1 and C-2 present graphical representations prepared by Dudek using FlamMap GIS based fire behavior modeling software. As presented, wildfire behavior in non-treated heavy chaparral, presented as a SH5, varies based on timing of fire. A worst case summer fire (Summer condition) would result in a fire spreading at a rate of up to 4.3 miles per hour (mph). During a fall fire with gusty Santa Ana (Peak condition) winds and low fuel moisture, fire is expected to be fast moving at up to 17.3 mph with highest flame length values reaching approximately 67 feet in specific portions of the property. Spotting is projected to occur up to nearly 1.0 mile during a summer fire and nearly 2.8 miles during a fall fire.

2.2.4.2 Post-development Condition

As illustrated in *Appendix D*, Dudek conducted modeling of the site, including post-FMZ fuel reductions recommended for this project. Fuel modification includes establishment of irrigated and thinned zones on the periphery of the project's neighborhoods and roads as well as interior landscape requirements. For modeling the post-FMZ treatment condition, fuel model assignments were re-classified for the developed landscape (Fuel Model 0), Fuel Modification Zone 1 (including vineyards) (Fuel Model 8), and Fuel Modification Zone 2 (Fuel Model SH1). Fuel model assignments for all other areas remained the same as those classified for the existing condition. As depicted, the fire intensity and flame lengths in untreated, biological open space areas would remain the same. Conversely, the FMZ areas experience a significant reduction in flame length and intensity. The 67-foot tall flames predicted during pre-treatment modeling are reduced to 10 feet tall at the outer edges of the FMZ and to 3 by the time the inner portions of the FMZ are reached.

3 ANALYSIS OF PROJECT EFFECTS

3.1 Field Assessment

Dudek conducted a field assessment of the project site on February 19, 2014, in order to confirm/acquire site information, document existing site conditions, and to determine potential actions for addressing the protection of the project's structures. While on site, Dudek assessed the area's topography, natural vegetation and fuel loading, surrounding land use and general susceptibility to wildfire. Among the field tasks that were completed are:

- Vegetation estimates and mapping refinements
- Fuel load analysis
- Topographic features documentation
- Photograph documentation
- Confirmation/verification of hazard assumptions
- Ingress/egress documentation.
- Meetings with fire agencies dating to 2013 and as recently as May 2015

3.2 Fire Response

3.2.1 Fire Facilities

The project is located within the Deer Springs Fire Protection District (DSFPD) and the County of San Diego. DSFPD is provided fire service through a contract with CAL FIRE, which provides staffing for the District. DSFPD currently operates three Fire Stations, all of which could respond to a fire or medical emergency at the site. Table 9 provides a summary of the DSFPD's fire and emergency medical delivery system.

Table 9
Deer Springs Fire Protection District Fire and Emergency Medical Delivery System

Fire Station	Address	Staffing	Apparatus
11 (Headquarters)	8709 Circle R Drive Escondido, California 92026 760.749.8001	3; with one Medic; plus 2 private medics on ambulance	1 Type I and 1 Reserve Type I engine and one medic ambulance
12	1321 Deer Springs Road Escondido, California 92069 760.741.5512	3; with one Medic	One Type I and one Type III engine

Table 9
Deer Springs Fire Protection District Fire and Emergency Medical Delivery System

Fire Station	Address	Staffing	Apparatus
13	10308 Meadow Glen Way West Escondido, California 92026 760.751.0820	3; with one Medic	1 Type I and 1 Reserve Type I engine

Note: The CAL FIRE Miller Station located at 9127 West Lilac Road includes 1 Type III engine staffed by 3 EMTs for most of the year and 2 EMTs during the Amador period. . However, it is not a DSFPD station.

The closest station is FS 12, located at 1321 Deer Springs Road, which staffs a minimum of three firefighters 24 hours per day/seven days per week and houses one Type I Engine and a Type III engine. Secondary response would be provided from other DSFPD Fire Stations as needed. Station 13 is the next closest DSFPD station and is located in the Hidden Meadows community at 10308 Meadow Glen Way East. The station staffs three on-duty, 24-hours per day and houses a Type I and a reserve Type I engine. Station 11, DSFPD's headquarters, is located at 8709 Circle R Drive and houses a Type I and a reserve Type I engine as well as a private paramedic ambulance.

There is a closest unit boundary drop in effect for several fire agencies in north SD County. Units dispatched by Northcom include North County Fire Protection District, Vista Fire Protection District, San Marcos Fire Protection District, , Pala, Oceanside Fire Department, and Rancho Santa Fe Fire Protection District. Vehicles have automatic vehicle locators (AVL) and CAL FIRE, through San Diego County Fire Authority funding, is being outfitted with AVL's so that the dispatch center CAD system can locate and dispatch the closest units to the emergency. The dispatch center for the auto aid units is Northcom. CAL FIRE Monte Vista dispatch center dispatches the CAL FIRE operated DSFPD units. If automatic aid units are needed, Monte Vista notifies Northcom via a CAD system with very little delay. CAL FIRE dispatch center is the secondary public safety answering point (PSAP). All 911 calls in DSFPD are routed to CAL FIRE first.

3.2.2 Emergency Response Travel Time Coverage

The project Facility Availability Form (Appendix E) provided by the DSFPD Fire Chief provides Fire Department input regarding travel time.

Dudek conducted a GIS-based travel time coverage modeling effort in order to determine if the project meets the General Plan's 5 minute travel time standard applicable to this project. Following compilation of all necessary data layers received from project applicants and acquired via publicly available sources, Dudek verified that all data layers were in the California State Plane Zone 6 coordinate system with units in feet. A network data set was then created utilizing ESRI's Network Analyst extension in the Arc Catalog module. The data set was created by

merging the existing centerline street layer, acquired from SANGIS (2014), with the proposed Newland Sierra Project centerline street data, provided by project applicants, and assigning parameters to the created data set. Several parameters are available during the creation of a network data set and include elevation constraints, U-turn capabilities, curb approach direction and travel impedance.

Due to the emergency nature of the response scenarios modeled in this analysis, U-turns were permitted on every road. Curb approach determines on which side of the street the vehicle needs to approach and includes three options, left, right, or either. The 'either' option was selected for all roads in this analysis based on the emergency nature of the response situations. Finally, travel impedance was utilized to include the effect of speed limits on response travel time. A custom impedance value was created for each road segment and was a function of road segment distance (miles) divided by speed (mph). This value was utilized in Network Analyst calculations for both modeling types and reflected the time necessary for a vehicle to cover the distance of the road segment. Speed was set at 35 mph, consistent with National Fire Protection Association (NFPA) 1142 Table C.11(b). Speed was adjusted for one road segment based on input from the DSFPD to adjust for a steep grade that could slow down a responding engine.

Once the network data set parameters were finalized, the route analysis was run using the Network Analyst extension in ArcGIS 10.2.2. This function determines the best route between a minimum of two points based on the parameters chosen. The analysis includes only response from Station 12 throughout the Newland Sierra project and surrounding areas where roads provide access. A route analysis procedure was then run using Network Analyst with the fire station as the starting point, and a remote location within the Newland Sierra Project as the destination. The map depicting Station 12's 5 minute coverage area is presented in Figure 4. As indicated, modeling results indicate that station 12 can reach the entire project area within 5 minutes travel, consistent with the General Plan Safety Element.

In summary, initial fire response for the improved portions of the Newland Sierra project area will be provided by DSFPD's station 12, due to its proximities that enable response within five minutes travel to all improved areas. In addition to station 12, Stations 11 and 13 can also respond to the project within 10 minutes to round out the effective firefighting force. In addition, San Marcos Fire Protection District, and Escondido Fire Department, as well as other north county fire agencies, are parties to automatic aid or mutual aid agreements. These agreements provide additional resources during emergency conditions. Wildland areas adjacent to the project are the responsibility of CAL FIRE due to their State Responsibility Area designation. DSFPD, along with other area agencies, respond simultaneously with CAL FIRE for wildland fires through a coordinated local agency response system.

3.3 Estimated Calls and Demand for Service from the Project

As presented in Table 10, over the last three years, Station 12 has ranged between 487 (2012) and 518 (2014) calls per year, averaging between 1.33 and 1.42 calls per day, respectively. The most recent three year average call volume is 1.33 calls per day (DSFPD 2015).

Table 10
Deer Springs Fire Protection District Call Volume Totals 2012-2014

Response within IA	Station 12		
	2012	*2013*	*2014*
Medical Aid = MA	323	356	320
Vegetation Fire = VEG	17	12	13
Structure Fire = STR	5	8	7
Other Fires	94	110	93
Hazardous Material Response =HAZ	7	3	5
Law Enforcement	0	0	1
Public Assists/Others	41	29	49
Annual Total Responses	487	518	488
Total Calls Per Day	1.3	1.4	1.3
3 Year Average Calls Per Day	1.4		

Further, Station 11 has responded to the highest number of calls each year from January 2012 through December 2014, averaging approximately 2.0 calls per day (high in 2014 was 2.1 calls per day). Station 13 responds to the fewest calls over that same three year period, averaging 1.1 calls per day (high in 2013 was 1.1 calls per day).

The estimated incident call volume at buildout from the Newland Sierra Project site is based on a conservative estimate of the maximum potential number of persons on site at any given time combining all phases and uses together (considered a "worst case" scenario). The project includes 2,135 residential units, 81,000 square feet of commercial retail uses, 36 acres of parks, and a 6-acre, 555-student school site. The school site and the parks have been sized in accordance with the project's student generation and resident population, respectively. The vast majority of the students and park users would be from the same population residing in the project. The retail uses have also been sized in accordance with the project residents' needs and an internal capture rate of 15% was used in the project's Traffic Impact Analysis to calculate the number of trips going to the retail coming from the project's residential neighborhoods. A total population of 6,600 people was calculated for the "worst case" scenario. Table 11 below summarizes the population calculations for each of the project's uses to derive this population calculation of 6,600 people:

Table 11
Newland Sierra Population Calculations

Use	Formula	Population
Residential Areas	2,135 Dwelling Units x 2.84 PPH [1]	6,064
School Site	25% x 555 Students + 26 teachers/administrators [2]	165
Commercial Areas	85% x (81K SQ x 4 parking spaces/1K SQ x 1.2 PPV) [3]	331
Parks, Other Project Areas [4]		40
	Total Population	6,600

1 The County uses a persons per household (PPH) number of 2.84.
2 This estimate is based off of 25% of the students being from outside the project and a school with 22 teachers and four administrators/other personnel on site.
3 This estimate is based off of an internal capture rate of 15% for the retail (confer Sierra TIA April 2017), a parking ratio of 4 spaces per 1,000 square feet of retail (confer Sierra Specific Plan Section 3.5.2), and 1.2 people per vehicle (based on a conservative carpool ratio consistent with carpool ratios for the area and San Diego region). Effectively, this estimate is based on the retail parking being 100% occupied net of the project's residents.
4 An additional 40 users (net of the project's residents) was assumed to be using the parks or other areas of the project at any given time.

Therefore, the applicant provided numbers are used in this analysis. San Diego County fire Authority has utilized an estimate of 82 annual calls per 1,000 population based on the number of annual calls divided by the population x 1,000. The DSFPD's per capita call generation is 1,609 average annual calls divided by 13,000 persons = 0.124 calls per person x 1,000 = 124 calls per 1,000 persons, significantly higher than the County average. This is estimated to be due to the calls related to the large senior population and I-15 related incidents. As a conservative approach, this FPP uses DSFPD's current call volume to calculate the project's projected call generation. The project's estimated 6,600 maximum residents and visitors/guests would generate up to 818.4 calls per year (roughly 2.2 calls per day), 85% of which (695 per year) are expected to be medical-related calls.

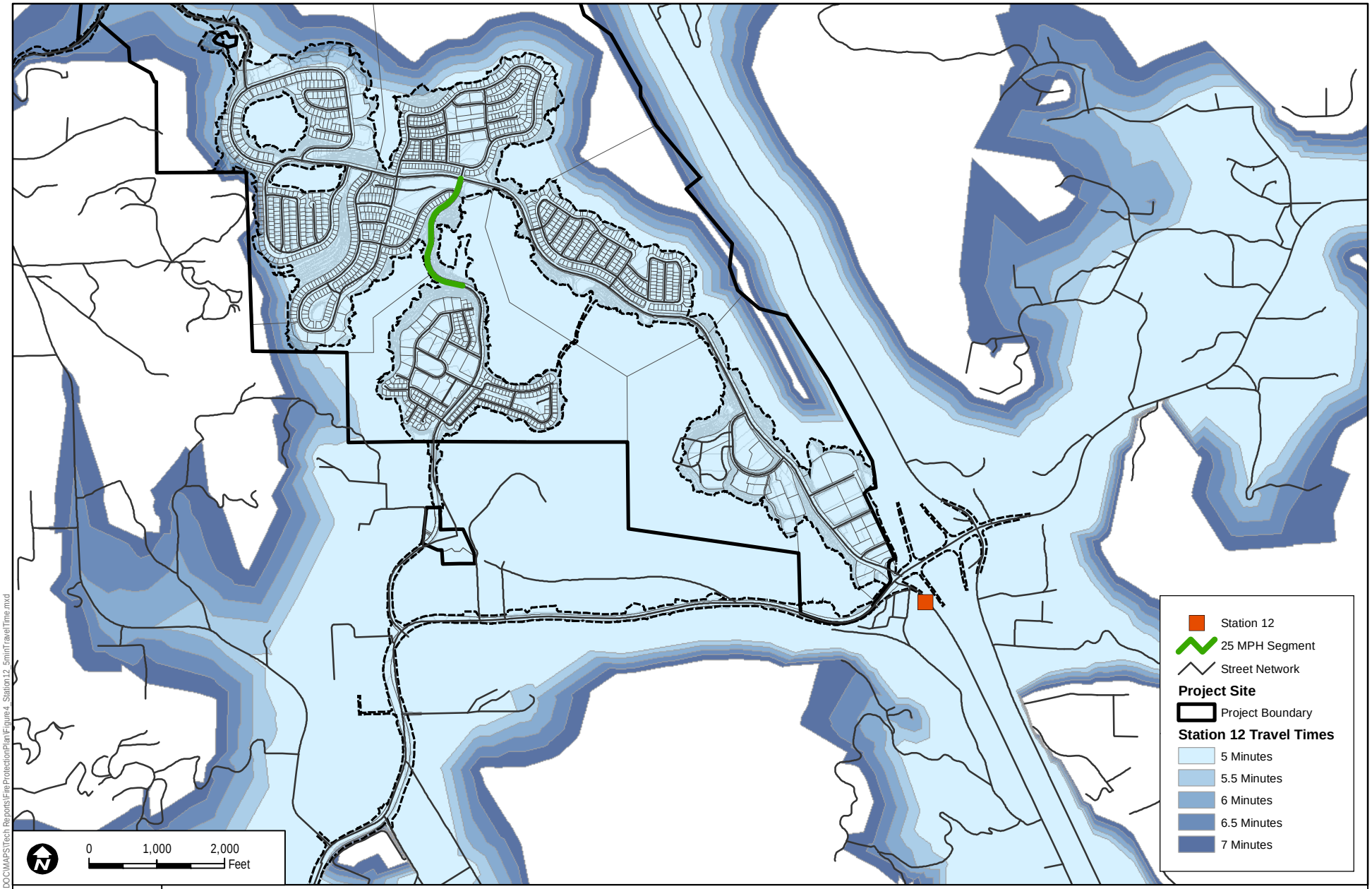
Medical calls are the largest component of the District's call volume, and reflects the District's population, 30% of which is in the "over 65" age bracket. Typical fire department, especially urban department's call volume, includes 80% or more medical related responses. Residents over the age 65 collectively use over two times more EMS service as compared to younger population, and those over 85 collectively use over three times more EMS service (Blanda 2005).

3.4 Response Capability Impact Assessment and Mitigation

The available firefighting and emergency medical resources in the vicinity of the Sierra site include an assortment of fire apparatus and equipment considered fully capable of responding to the type of fires potentially occurring within and adjacent the project. Existing DSFPD fire station facilities from which response will occur vary in overall condition.

The Newland Sierra project includes a large number of new homes and service level requirements. The community is projected to possibly double Station 12's current call volume. The requirements described in this FPP are designed to aid firefighting personnel and minimize the demand placed on the existing emergency service system.

The project will enter into a Fire Service Agreement with DSFPD to provide funding that will augment the DSFPD's capabilities for continued provision of high-level service to its primary jurisdictional area, including the Newland Sierra project. The final funding amount will be determined by the applicant and DSFPD and included in a Fire Service Agreement to be completed prior to map recordation.



SOURCE: ESRI, SanGIS 2013, Fuscoe 2014

FIGURE 4

Fire Station 12 Five Minute Travel Time Exhibit

DUDEK

Newland Sierra Fire Protection Plan

NOTE: Existing roads use speeds from SanGIS. Plan area roads assume speeds between 25-35 MPH.

Path: Z:\Projects\T\60801\MAPDOC\MAPS\Tech Reports\FireProtectionPlan\Figure4_Station12_5minTravelTime.mxd

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4 FIRE SAFETY REQUIREMENTS – INFRASTRUCTURE, BUILDING IGNITION RESISTANCE, AND DEFENSIBLE SPACE

4.1 Roads

4.1.1 Access

Site access will comply with the requirements of the San Diego County Consolidated Fire Code and DSFPD (Section 503.1 and 503.2). The project's on-site roads will be public and built to the County's Public Road Standards. The project includes two options for the off-site portion of Camino Mayor, one option that follows the existing easement and alignment of the dirt road and a second option that shifts the off-site portion of the road approximately 1,000 feet to the north. Under both options, Camino Mayor will be built to County Public Road Standards, open to traffic in both directions, and connect to Twin Oaks Valley Road where the road connects today. Under the option where Camino Mayor follows its existing alignment, the portion from Saddleback Park to Twin Oaks Valley Road (effectively the off-site portion) will be a private road. Under the northern alignment option for Camino Mayor, the entire length of Camino Mayor will be a public road. The project site would have two main access roads along Deer Springs Road at Sarver Lane and Mesa Rock Road, with an additional access point at Camino Mayor off of North Twin Oaks Valley Road. The main access road at Mesa Rock Road will be a four-lane entry road built to County Public Road Standards with a median that turns into a four lane entry road with 58 feet of paving in the Town Center and 34 feet of paving further into the project site. Inside the Town Center, this road will provide four 12 foot wide travel lanes, a 14 foot wide median, and 5 foot wide bike lanes on the outer edges. Sarver Lane will be a two-lane entry road built to County Public Road Standards with 40 feet of paving with no parking from Deer Springs to Sierra Farms Park with two 12 foot wide travel lanes and 8 foot wide paved bike route/shoulders, then 34 feet wide with no parking from the park up the hill where it connects with Mesa Rock. Under both options for Camino Mayor, this road will be built with a paved width of 28 feet with no parking (two 14 foot wide travel lanes) in a 40-foot-wide right of way. Residential streets will vary between 28 feet to 36 feet in paved width. Parking will not be allowed on streets with paved widths less than 32 feet.

In summary:

4.1.2 Road Widths and Circulation

- All on-site roads will be constructed to current County of San Diego Consolidated Fire Code and DSFPD Road standards, including minimum 24-foot road widths unobstructed by parking (503.2.1), and shall be improved with asphalt paving materials.

- All streets within the project, public and private, include on-street parking when there is at least 32 feet of paved road width. Parking is designated on the Tentative Map road cross sections (Sheet 2) as "shoulder" and varies between 6 and 8 feet in width.
- Parking will be restricted along red curb painted fire lanes and by posting of signs stating "No Parking: Fire Lane" correctly marked per the California Vehicle code to preserve the unobstructed width for emergency response. The signs shall include language identifying the towing company and their phone number enabling legal enforcement of the no parking areas.
- Turnouts along the primary access road will be provided every 800 to 1,130 feet (average 979 feet) and will meet the DSFPD's requirements regarding taper and length.

4.1.3 Access and Egress

The project provides roadways throughout each neighborhood as well as three potential ingress/egress ways. The primary ingress/egress is located at Deer Springs and Mesa Rock Road. Mesa Rock Road includes 4 lanes at this location and would be 72 feet wide (including 4 travel lanes, median, and bike lane/shoulders. Sarver Lane is the next project ingress/egress occurring along Deer Springs Road and will be 40 feet wide with no parking at the entrance to the Sierra Farms Park. The third ingress/egress is Camino Mayor which intersects North Twin Oaks Valley Road. Camino Mayor will be 28 feet wide with no parking. These three ingress/egress points occur along Deer Springs Rd., with the eastern ingress/egress point at Mesa Rock Rd. being separated from the western ingress/egress point at N. Twin Oaks Valley Rd. (via Camino Mayor) by approximately 2.1 miles.

4.1.4 Interior Circulation Roads

- Interior circulation roads include all roadways that are considered common or primary roadways for traffic flow through the site and for fire department access and serving in excess of two structures. Any dead-end roads serving new buildings that are longer than 150 feet shall have approved provisions for fire apparatus turnaround.
- Fire apparatus turnarounds to include turning radius of a minimum 28 feet, measured to inside edge of improved width, per Consolidated Fire Code.
- Minimum paved radius width for a cul-de-sac is 42 feet. Cul-de-sac bulbs will have signs posted "No Parking; Fire Lane."
- Cul-de-sac bulbs are required on dead-end roads in residential areas where roadways serve more than two residences.
- Roadways and/or driveways shall provide fire department access to within 150 feet of all portions of the exterior walls of the first floor of the structures (all structures are sprinklered).

- Traffic calming devices (including, but not limited to, speed bumps, speed humps, speed control dips, etc.) shall be prohibited unless approved by the fire code official (Sec. 503.4.1 Traffic calming devices). Vertical clearance along roadways is required to be 13.5 feet. Proper maintenance is required to ensure that vegetation and trees on roadsides do not grow over or into the roadway and impede emergency apparatus access. No mature tree trunks shall intrude into the road. The type of vegetation shall be fire resistant and comply with this plan.
- Existing interior circulation roads shall maintain a 30 feet buffer along either side where fuel modification/reduction is completed twice per year asis according to specifications provided in this FPP.
- Angle of approach/departure shall not exceed 7° (12%) (County Consolidated Fire Code, Section 503.2.7), unless mitigated to approval by the Fire Chief.
- The gradient for a fire apparatus access roadway shall not exceed 15.0%. The fire code official may allow roadway grades up to 20.0% provided that the roadway surface conforms to section 503.2.3. The fire code official may require additional mitigation measures where he deems appropriate. The angle of departure and angle of approach of a fire access roadway shall not exceed 7 degrees (12%) or as approved by the fire code official (Sec. 503.2.7 Grade). Any new development which necessitates updating emergency response maps due to new structures, hydrants, roadways or similar features shall be required to provide map updates in a format compatible with current department mapping services and shall be charged a reasonable fee for updating all response maps. At a minimum, the map updates shall be provided in PDF or a CAD format approved by the FAHJ (Sec. 505.5 Response map updates).

4.2 Gates

Access gates are not proposed for this project.

4.3 Driveways

Any new structure that is 150 feet or more from a fire apparatus access road shall have a paved driveway meeting the following specifications:

- Grades shall be less than 15%. If over 15%, they require Portland cement base with heavy broom finish and in no case can they exceed 20%
- Approved fire apparatus turnouts will be provided every 400 feet if over 600 feet long
- Sec. 503.2.3 Surface. Fire apparatus access road shall be designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 lbs. unless authorized by the FAHJ) and shall be provided with an approved paved surface so as to provide all-

weather driving capabilities. The paving and sub-base shall be installed to the standards specified in the County of San Diego Parking Design Manual. A residential driveway constructed of 3½" Portland cement concrete may be installed on any slope up to 20% provided that slopes over 15% have a deep broom finish perpendicular to the direction of travel or other approvel surface to enhance traction. The fire code official shall establish a policy identifying acceptable turnarounds for various project types.

- (a) Fire apparatus access roads shall have an unobstructed improved width of not less than 24 feet, except for single-family residential driveways serving no more than two single-family dwellings, which shall have a minimum of 16 feet of unobstructed improved width. Any of the following, which have separated lanes of one-way traffic: gated entrances with card readers, guard stations or center medians, are allowed, provided that each lane is not less than 14 feet wide.
- Driveway gates shall comply with this section.
- Driveways shall have 20-foot vegetation management zone on each side.

Identification of roads and structures will comply with the Consolidated Fire Code, Sections 503.3 and 505, as follows:

- Approved numbers and/or addresses shall be placed on all new and existing buildings and at appropriate additional locations, plainly visible and legible from the street or roadway fronting the property when approaching from either direction.. The numbers shall contrast with their background and shall meet the following minimum size standards: 4" high with a ½" stroke for residential buildings, 6" high with a ½" stroke for commercial and multi-residential buildings and 12" high with a 1" stroke for industrial buildings. Additional numbers shall be required where deemed necessary by the fire code official, such as rear access doors, building corners and entrances to commercial centers. The fire code official may establish different minimum sizes for numbers for various categories of projects (Sec. 505.1 Address numbers).
- Multiple structures located off common driveways will include posting structure identification on structures, on the entrance to individual driveways, and at the entrance to the common driveway.
- If the structure is 100 feet from the roadway, structure identification should also be located at the entrance to the driveway.
- Access roads to construction areas shall be completed and paved prior to issuance of building permits and prior to combustible construction occurring.

- A lighted directory map, meeting current fire department standards, shall be installed at the driveway entrance to a residential project or a mobile home park, with more than 15 units. (SDCCFC Sec. 505.4 Directory map)

4.4 Structures

4.4.1 Ignition-Resistant Structural Requirements

This section outlines ignition-resistant construction (for all structures) that will meet the requirements of the DSFPD and San Diego County Consolidated Fire Code. The following construction practices respond to the requirements of the Consolidated Fire Code, Section 4905 and the County Building Code (Chapter 7A), "Construction Methods for Exterior Wildfire Exposure". These requirements include the ignition -resistant requirements found in Chapter 7A of the County Building Code. While these standards will provide a high level of protection to structures in this development, there is no guarantee of assurance that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

All new structures will be constructed to DSFPD and SD County standards. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the latest County 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.

4.4.2 Structure Setbacks

Although not required by DSFPD, structure setbacks from top of slope can help separate structures from wildfires. The goal for single-story structures is to achieve a setback of a minimum of 15 feet horizontally from top of slope to the farthest projection from a roof.The goal for two-story structures is to provide a setback a minimum of 30 feet horizontally from top of slope to the farthest projection for a roof. The Newland Sierra project meets the setback for the majority of the lots. However, there are a total of up to 170 lots that may not be able to provide a full 30 feet of structure setback (if two story homes are planned). A large percentage of these lots will be provided additional protections, as described further in Section 6. Some of the identified lots where the setbacks cannot be fully provided are adjacent internal slopes that will be landscaped and managed. These lots are not proposed to receive heat deflecting walls. The heat deflecting view wall potential locations (subject to further study and DSFPD approval) are depicted in (Figure 7-1).

4.4.3 Additional Requirements and Recommendations Based on Occupancy Type

All retail, commercial, and office buildings will comply with appropriate building codes. The school will comply with California State Architects Office requirements.

4.5 Fire Protection Systems

4.5.1 Water

The project will be served by Vallecitos Municipal Water District and sufficient water supplies will be available to serve the project from existing entitlements and resources. The static water pressure will remain above 20 psi at 2,500 gallons per minute when meeting the fire requirements for the DSFPD.

Fire Hydrants

Proposed fire hydrants locations are illustrated in Appendix G (San Diego County Consolidated Fire Code Section in parentheses).

- Required installations. The location, type and number of fire hydrants connected to a water supply capable of delivering the required fire flow shall be provided on the public or private street, or on the site of the premises to be protected or both. Fire hydrants shall be accessible to the fire department apparatus by roads meeting the requirements of section 503 (Sec. 507.5.1). Location of fire hydrants. Fire hydrants shall be located as required by the fire code official using the following criteria and taking into consideration departmental operational needs. Hydrants shall be located at intersections, at the beginning radius of cul-de-sacs and at intervals identified in the following tables and criteria. Hydrants located across heavily traveled roadways shall be not considered as serving the subject property (Sec. 507.5.1.1).
- Fire hydrant construction and configuration (Sec. 507.5.1.1.3). All fire hydrants shall be of bronze construction, including all internal parts except seats. Alternative materials may be used if approved by the fire code official and the local water district having jurisdiction. The stems shall be designed and installed in a manner that will ensure that they will not be projected outward from the main body by internal water pressure due to disassembly. The number and size of fire hydrant outlets shall be as follows:
    1. One 4 inch and one 2½ inch NST outlet.
    2. One 4 inch and two 2½ inch NST outlets.
- In some instances the fire code official may require a fire hydrant to have any other combination of 4 inch and 2½ inch outlets. Prior to the issuance of building permits, the

applicant shall submit to DSFPD and the County plans demonstrating a water system capable of handling the fire flow requirements.

- Fire service laterals, valves, and meters will be installed on site as required by the water district.
- Signing of water sources and fire department connections. The fire code official may require fire hydrants and fire department connections to be identified. Fire hydrants may be identified by a reflectorized blue marker and fire department connections may be identified by a reflectorized green marker, with a minimum dimension of 3 inches, in the center of the travel lane adjacent the water source, or by other methods approved by the fire code official (Sec. 507.5.7.1).Crash posts will be provided where needed in on-site areas where vehicles could strike fire hydrants, fire department connections, etc.

Fire Sprinklers

- Where required. Approved automatic fire sprinkler systems shall be installed in all new structures. For the purpose of fire sprinkler systems, buildings separated by less than 10 feet from adjacent buildings shall be considered one building. Fire barriers and partitions, regardless of rating, shall not be considered as creating separate buildings for purposes of determining fire sprinkler requirements. Mezzanines shall be included in the total square footage calculation (Sec 903.2).
- Exceptions:
  1. Group U occupancies not greater than 500 square feet, when the building is more than 20 feet from an adjacent structure or property line.
  2. Accessory buildings/barns not greater than 1,000 square feet, and not otherwise considered enclosed buildings/structures, which are of ignition-resistant construction or as determined by the fire code official to not present a significant fire hazard.
  3. Agricultural buildings constructed of wood or metal frames over which fabric or similar material is stretched, which are specifically used as green houses are exempt from the automatic sprinkler requirements unless physically connected to other structures. Actual system design is subject to final building design and the occupancy types in the structure.

4.5.2 Fire Alarm Systems

- All residential units shall have electric-powered, hard-wired smoke detectors in compliance with County of San Diego Consolidated Fire Code. Hard-wired smoke alarms are to be equipped with battery backup.

- All multi-family and commercial structures are to be equipped with an electronically supervised fire alarm and detection system.

4.6 Defensible Space/Fuel Modification Zones

4.6.1 Zones and Permitted Vegetation

As indicated in preceding sections of this FPP, an important component of a fire protection system is the fuel modification area. Fuel modification zones (FMZ) are designed to gradually reduce fire intensity and flame lengths from advancing fire by placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of all structures and adjacent open space areas. Therefore, the fuel modification area is an important part of the fire protection system designed for this site.

Predicted flame lengths vary on the site-adjacent slopes which will be directly adjacent the provided fuel modification zones. The zones exceed the DSFPD requirements and are customized for the site based on slope and vegetation characteristics as well as resulting fire behavior modeling exercises. These variations were analyzed as were the site's specific features and conditions which complement and augment the proposed fuel modification areas. Fire behavior modeling, as previously described, was used to predict flame lengths and was not intended to determine sufficient fuel modification zone widths. However, the results of the modeling do provide important information which is a key element for determining distances for minimizing structure ignition and providing "defensible space" for firefighters.

The significance of the project's FMZ's cannot be understated. Based on scientifically modeled fire behavior calculations customized for the site, flame lengths under the most extreme fire weather conditions within the WUI areas could approach 67 feet in height. According to the model, wind experienced during extreme conditions would drive flames upslope and would "lay" them over so they paralleled the ground during gusts. Thus, one would expect that the tips of the flaming front would extend 67 feet in front of "involved" vegetation. Therefore, an appropriate FMZ would likely be roughly 150 feet wide, providing enough set-back from volatile fuels that heat and direct flame impingement is minimized or eliminated, providing firefighters "defensible" space in which they can work. For this project, as indicated in *Appendices H-1 and H-2*, the Fuel Modification Zones are at least three times wide as the modeled flame lengths in each of the fuel types represented on site, resulting in fuel modification areas that are 250 feet wide for most of the site, 2.5 times larger than the standard 100 foot wide requirement. Figure 5 illustrates the FMZ configuration that will be provided the Newland Sierra project.

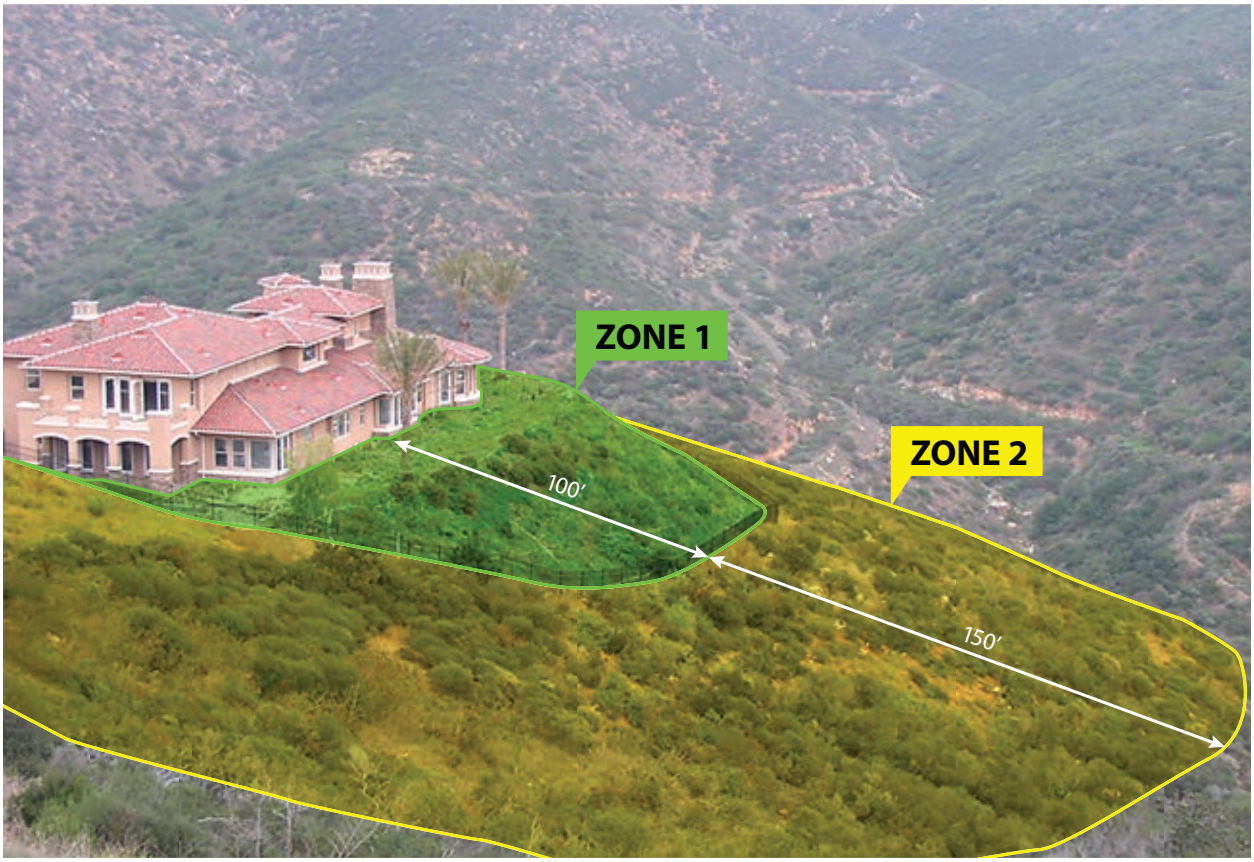

FIGURE IS FOR ILLUSTRATIVE PURPOSES ONLY.

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FIGURE 5

Typical Fuel Modification Zone Configuration and Width

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4.6.2 Fuel Modification Zone Requirements

Fuel modification zones will be implemented according to the following requirements. These zones are presented graphically in Appendices H-1 and H-2. In addition, a Prohibited Plant List is provided in Appendix I. Each zone would include permanent field markers to delineate the zones, aiding ongoing maintenance activities that will occur on site and the project would hire a qualified DSFPD-approved 3rd party fuel modification zone inspector to provide inspections twice annually, as detailed in the following sections.

4.6.2.1 Fuel Modification Zone 1 – Irrigated Structure Setback Zone (100+ feet wide)

Zone 1 is applicable site wide for every structure. All fuel modification will be provided within the project boundaries so there will be no off-site FMZ areas. All developed landscape areas internal to the project will be to Zone 1 conditions, thus, Zone 1 extends beyond 100 feet when the rear-yard is included in the measurement. The standard Zone 1 will be a minimum 100 feet wide starting at the structure and moving outward. All flammable native vegetation shall be removed. Single trees, ornamental shrubbery or cultivated ground covers may be permitted provided they are maintained in a manner that they do not readily transmit fire to the structure and meet the requirements herein. This zone will be planted with drought-tolerant, fire resistive plants from San Diego County Fire Chief's Association Fuel Modification Zone Plant Reference List (Appendix J) and an automatic irrigation system will be installed in this area to maintain hydrated plants without over-watering, allowing for run-off, or attracting nuisance pests. There will be no inclusion of non-fire resistive trees in the project's interior landscapes or perimeter fuel modification zones, exceeding the CFC requirement.

Zone 1 includes the following key components:

- Minimum of 100 feet wide.
- Automatic irrigation system to maintain hydrated plants without over-watering or attracting nuisance pests.
- High-leaf-moisture plants as ground cover, less than 4 inches high
- No trees within 10 feet of structures (drip line of mature trees shall be maintained 10 feet from structures)
- Tree spacing of a minimum 10 feet between canopies
- No tree limb encroachment within 10 feet of a structure or chimney, including outside barbecues or fireplaces

- Tree maintenance includes limbing-up (canopy raising) 6 feet or one-third the height of the tree
- Maintenance including ongoing removal and/or thinning of undesirable combustible vegetation, replacement of dead/dying plantings, maintenance of the programming and functionality of the irrigation system, regular trimming to prevent ladder fuels.
- A minimum of 36 inches of horizontal clearance and unlimited vertical clearance around the exterior of the structure (360°) provided for firefighter access. Within this clearance area, landscape such as low ground covers and shrubs are permitted so long as their placement and mature height do not impede firefighter access, consistent with purpose of this guideline.
- No combustible construction (structures) allowed in Zone 1.
- No permanent or portable fire pits, fire places, or flame generating devices that burn wood allowed within Zone 1 or within 10 feet of vegetation.
- Trees and tree form shrub species that naturally grow to heights that exceed 2 feet shall be vertically pruned to prevent ladder fuels.
- Grasses shall be cut to 4 inches in height. Native grasses can be cut after going to seed.
- Ground covers within first 5 feet from structure restricted to non-flammable materials such as stone, rock, concrete, bare soil, or other.
- Vegetation/Landscape Plan prepared and submitted to DSFPD in compliance with this plan.
- No plant species found on the Prohibited Plant List (Appendix I) shall be planted or remain in this Zone.

***Exception*:** Three lots on the northwest side of the project (lot #'s to be provided when available) are constrained by the property boundary and can achieve from 56 feet to roughly 80 feet wide FMZs. This FPP proposes that the entire area from the structures to the property boundary will be Zone 1 irrigated and an additional measure will be provided by placing a heat deflecting wall at the top of slope. Should an off-site fuel modification easement to extend a minimum of 36 feet (to provide 100 feet of FMZ) be agreed to, then that option would be implemented in lieu of the heat deflecting wall.

4.6.2.2 Fuel Modification Zone 2 – Thinning Zone (150 feet wide)

A thinning zone reduces the fuel load of a wildland area adjacent to Zone 1, and thereby, reduces heat and ember production from wildland fires, slows fire spread, and reduces fire intensity. Zone 2 adjoins Zone 1 and measures up to 150 feet in most areas with some slight variation in width, depending on available distance to property line. Where possible, which

is in the majority of the project's perimeter, a full 150 feet of Zone 2 will be provided. A total of 25 lots on the project's northwestern edge would include a reduced Zone 2, with most of these lots including a full Zone 1 and 50 feet of Zone 2 for a total of 150 feet and a smaller number of lots including no Zone 2 and a partial Zone 1. These lots and the alternative materials and methods provided are discussed in Section 7.

Zone 2 includes the following key components:

- Zone 2 requires a minimum of 50% thinning or removal of plants (50% no fuel).
- Grasses shall be cut to 4 inches in height. Native grasses can be cut after going to seed.
- Ground cover less than 6 inches high
- No trees, except sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), or Engelmann oak (*Quercus engelmannii*)
- Trees and tree-form shrub species that naturally grow to heights that exceed 4 feet shall be vertically pruned to prevent ladder fuels.
- No shrubs, except single-specimen native shrubs, exclusive of chamise and sage, 20 feet on center
- Maintenance including ongoing removal and thinning of dead/dying plant material, and regular trimming to prevent ladder fuels.
- Plant species introduced into Zone 2 shall be native, consistent with the existing native habitat within that portion of the Zone, not include prohibited or highly flammable species, and subject to the same maintenance requirements and restrictions contained in this list.
- No permanent or portable wood burning fire pits, fireplaces or other flame generating devices allowed.
- No plant species found on the Prohibited Plant List (Appendix I) shall be planted or remain in this Zone.

4.6.2.3 FMZ Special Management Areas (varying width)

FMZ Special Management Areas include areas where native fuels will be managed such that the highly flammable prohibited species and the dead and dying plants are removed while other native plants that are less prone to ignition and fire spread are allowed to remain. These areas are illustrated in Appendices H-1 and H-2 and are typically larger blocks of native habitat that are outside the Zone 1 and Zone 2 areas. These FMZ Special Management Areas are managed consistent with the fuel modification requirements of Zone 2 because they are considered important for fire behavior reduction, occur within otherwise developed areas, eliminate

peninsula conditions, or are strategically located in terrain that would facilitate fire spread if left unmanaged. These areas will be maintained on a regular basis along with Zones 1 and 2, but will focus on removal of prohibited plant species and dead and dying plant material.

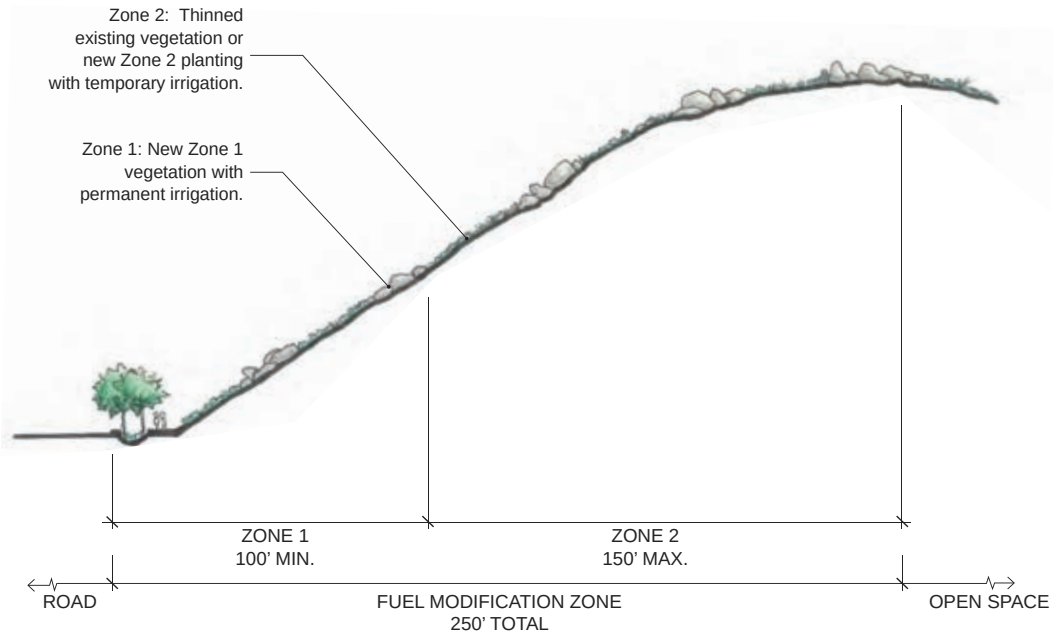
4.6.3 Other Vegetation Management

4.6.3.1 Roadside Fuel Modification Zones and Vineyard

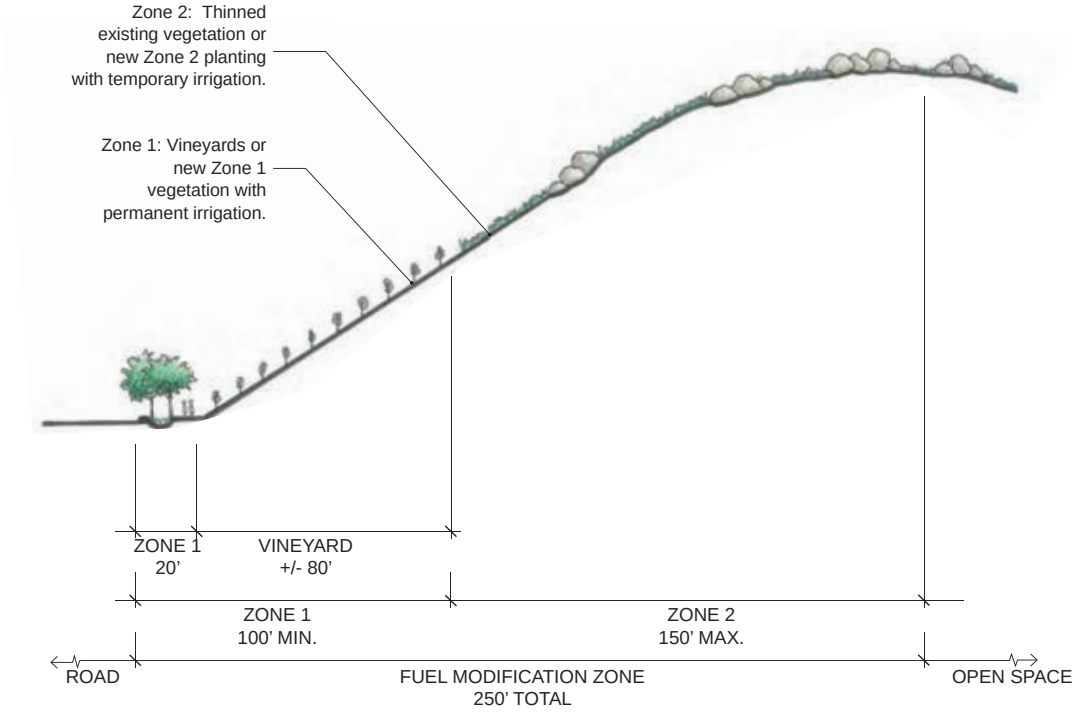
- Existing roads will include varying fuel modification zones with standard Zone 1 and Zone 2 standards described above, with a 100 feet wide Zone 1 and a 150 feet wide Zone 2 for the primary access backbone road and 100 feet of thinned vegetation adjacent secondary access roadways.
- Vineyards are proposed for inclusion in a portion of the Zone 1 fuel modification zones along the primary access road (Appendices H-1 and H-2). The vineyard area would be a community asset with the HOA responsible for funding and maintenance through a contract for management by a licensed viticulturist. The professional management of the vineyard will help ensure that the operation is successful and that maintenance occurs at a high level, resulting in consistency with the ignition resistance and reduced fuel structure of typical irrigated fuel modification. Figure 6 includes an illustration of the vineyard locations and configuration.
    - The grape plants would be grown on trellises made of non-combustible material. The plants will be irrigated via drip irrigation to maintain a high moisture content, dead and dying plants or plant materials and debris will be removed from the area on an on-going basis. Should the vineyard operation ever be vacated or otherwise cease to operate, the area will be converted to irrigated fuel modification zone consistent with the remaining irrigated FMZ throughout the community by the Newland Sierra HOA (or similar funding/management entity).

4.6.3.2 I-15 Frontage FMZ/Caltrans Coordination

Numerous vegetation ignitions occur annually along the Newland Sierra I-15 frontage due to vehicle related ignition sources. These fires have been controlled in in an efficient manner, with most remaining very small and none of them having escaped to burn large areas of the Merriam Mountains. However, under extreme Santa Ana conditions, a vegetation ignition along this stretch of I-15 could quickly become a significant wildfire. Ignitions may be caused by vehicle fire, catalytic converter, overheated wheel, brake, or exhaust components, sparks, and discarded cigarettes, amongst others. The I-15 includes a long uphill grade that flattens near the frontage of the project and can lead to overheating in improperly maintained vehicles and vehicles towing heavy loads.



SECTION A - Fuel Modification Zones



Note: Vineyards may extend into Zone 2, which increases the irrigated area and reduces Zone 2 vegetation in some locations.

SECTION B - Fuel Modification Zones with Vineyards

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SOURCE: SCHMIDT DESIGN GROUP, INC. 2014

FIGURE 6

Typical Vineyard Configuration within Fuel Modification Zone

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Reduction of ignitions along this stretch of interstate highway is not considered critical to protection of the project's structures, but would be an important measure for both fire safety and fire prevention as well as for habitat protection. The high frequency of fires along portions of the interstate has resulted in a type conversion of small areas of native shrub-dominated vegetation to annual grasslands. There are also grass-dominated areas along the road shoulder due to blading and ongoing maintenance. These grasslands are more prone to ignition due to their light, flashy nature and dry conditions in the fall and can carry fire into the adjacent shrub dominated landscape.

Reducing the number of ignitions along the Newland Sierra I-15 frontage is likely to require a combined and coordinated effort that includes Caltrans, DSFPD, and the Newland Sierra project. Caltrans maintains a Roadside Management Toolbox (Appendix K) that targets reduction of the amount of maintenance needed on roadsides. Many of the options included in the Toolbox would work along the project's frontage and would provide roadside "hardening". Hardening roadsides refers to deployment of safe, effective methods to reduce the occurrence of ignitions along roadways, which has been identified as the primary ignition threat for the preserve areas adjacent the Newland Sierra project. This FPP does not place limits on what could be employed, but focuses on currently used measures that are assumed to meet the safety and other requirements of Caltrans. Caltrans has recently (2014) installed cable barrier along virtually the entire Newland Sierra frontage with I-15. The cable barrier includes a concrete apron that is roughly 8 to 10 feet wide, steel posts approximately every 20 feet, and 4 rows of cable. This barrier will effectively minimize the occurrence of vehicles pulling off the road and getting close to the roadside vegetation. It also provides a weed-free fire break that is expected to reduce the amount of potentially ignition-causing debris that reaches flammable vegetation.

In addition to the cable barrier, it is imperative that Caltrans routinely mows the road shoulder and as possible, the disturbed slopes adjacent the shoulder to minimize ignitions in the non-native grasses that have established. These areas include flashy grass fuels that have repeatedly ignited over the years but have been confined to small burn areas. DSFPD has committed to coordinating with Caltrans so annual maintenance is performed in a timely manner. Additional ignition reduction may be provided through a habitat restoration process that focuses on recovery of the burned/disturbed areas to native shrubs and removal of the flashy grass fuels, which is an option in the Caltrans Roadside Management Toolkit. This is the recommended course of action and will require coordination between DSFPD, Newland Sierra, Caltrans, and possibly California Department of Fish and Wildlife and/or San Diego County MSCP. The project would coordinate with these agencies. The risk of ignition from the I-15 corridor will be reduced through implementation of these improvements and maintenance, and is further mitigated by the project's FMZ's that are 2.5 times the standard, the twice annual inspections that will occur to ensure they meet the intent of this plan and the DSFPD's requirements, and provided fire hydrants along the primary access road (Mesa Rock Road) and the communities on the north and eastern edge of the project.

4.6.3.3 Trail Vegetation Management and Response Facilitation

- A 10-foot vegetation modification zone is required on both sides of trails and paths on the perimeter of the property. This 10 foot zone requires removal of invasive, flammable species.
- Retention of ignition-resistant native vegetation is recommended for soil and slope stability and to prevent erosion.
- Invasive grasses must be kept mowed to 4 inches or less.
- Certain trees may be planted if they are not prohibited in this plan. Approved trees include coast live oak, Engelmann oak (*Quercus engelmannii*), and sycamore (*Platanus racemosa*).
- Trees within vegetation management zones must be properly spaced and maintained with no flammable understory.
- The trails system will be managed and maintained by a funded entity.
- The applicant will be required to submit digital mapping that can be incorporated into the Deer Springs Fire Response Map books, as well as appropriate trail marking/signage that correlate with Deer Springs Fire Map books. The map updates will be provided in a format compatible with current department mapping services. The project will be charged a reasonable fee for updating all response maps. At a minimum, the map updates shall be provided in PDF or a CAD format approved by the FAHJ (Sec. 505.5 Response map updates)

4.6.3.4 Central Green Spaces, Ball Fields, Parks

Fire-safe vegetation management is recommended within green spaces, parks, and open space areas in compliance with the guidelines in this plan.

- Green spaces, parks, and open space areas will be installed by the developer/builder, and managed and maintained by the respective neighborhood HOAs, master HOA, or facilities maintenance fee depending on how that entity is established.
- Flammable vegetation must be removed and prohibited.
- Grasses must be maintained/mowed to 4 inches stubble height.
- Types and spacing of trees, plants, and shrubs to comply with the criteria in this plan.
- Plant materials included in the Prohibited Plant List (Appendix I) are prohibited in this area.
- Areas shall be maintained free of downed and dead vegetation.
- Trees to be properly limbed and spaced and not of a prohibited type (identified in this plan).

4.6.3.5 Pre-Construction Structure Locations

- Vegetation management on structure locations will not be required until construction begins, unless it is located within the fuel modification zone of a structure under construction or completed.
- Prior to issuance of a permit for any construction, grading, trenching, or installation of fences, the outermost 50 feet of each structure location (pad) is to be maintained as a Vegetation Management Zone. This entails removal of vegetation as needed.
- The remainder of the Vegetation Management Zones required for the particular lot shall be installed and maintained prior to combustible materials being brought onto any lot under construction.
- Existing flammable vegetation shall be reduced by 100% on vacant lots upon commencement of construction.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuel shall be removed and trees/shrubs shall be properly limbed, pruned, and spaced per this plan.

4.6.3.6 Environmentally Sensitive Areas/Riparian Areas

Once the fuel modification zones are in place, there will not be a need to expand them as they have been planned conservatively larger than necessary. However, if unforeseen circumstances were to arise that required hazard reduction within an area considered environmentally sensitive, it would require approval from the County and the appropriate resource agencies (California Department of Fish and Game, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers) prior to any vegetation management activities occurring within those areas.

4.6.4 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 (structure promotes ignition or combustion) or chemical (volatile chemicals increase flammability or combustion characteristics). The plants included in the Prohibited Plant List (Appendix I) are unacceptable from a fire safety standpoint, and will not be planted on the site or allowed to establish opportunistically within fuel modification zones or landscaped areas.

4.6.5 Fuel Modification Area Vegetation Maintenance

All fuel modification area vegetation management shall occur as-needed for fire safety, compliance with the FMZ requirements detailed in this FPP, and as determined by the DSFPD. The Newland Sierra HOA or other established funding and management entity for each

development area or neighborhood if separate, shall be responsible for all vegetation management throughout the respective project sites, in compliance with the requirements detailed herein and FAHJ requirements. The HOA(s) shall be responsible for ensuring long-term funding and ongoing compliance with all provisions of this FPP, including vegetation planting, fuel modification, vegetation management, and maintenance requirements throughout the project.

4.6.6 Annual FMZ Compliance Inspection

The Newland Sierra HOA(s) shall obtain an FMZ inspection and report from a qualified DSFPD-approved 3rd-party inspector in May and September of each year certifying that vegetation management activities throughout the project site have been performed pursuant to this FPP. This inspection report and certification of compliance with the FPP shall be provided to DSFPD annually by June 1st and October 1st.

4.6.7 Construction Phase Vegetation Management

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

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

- All new power lines shall be underground for fire safety during high wind conditions or during fires on a right-of-way that can expose aboveground power lines. Temporary construction power lines may be allowed in areas that have been cleared of combustible vegetation.
- A construction fire prevention plan shall be prepared to minimize the likelihood of ignitions and pre-plan the site's fire prevention, protection and response plan.
- Caution must be used not to cause erosion or ground (including slope) instability or water runoff due to vegetation removal, vegetation management, maintenance, landscaping, or irrigation. No uprooting of treated plants is necessary.

5 ON-SITE RISK ASSESSMENT

Although a large wildfire has not occurred on the Newland Sierra project site in recorded history, the site would, under favorable weather conditions, facilitate wildfire spread, especially given the vegetation and topographical characteristics of the area, along with the off-site wildland fuels to the north and east and the ignition source presented by the I-15. The most common type of fire anticipated in the vicinity of the project area is a wind-driven fire from the north/northeast during the fall that ignites from a vehicle related incident along the I-15. Flame lengths can reach 110 feet long in certain small, isolated fuel pockets with an average flame length under worst case conditions of 67 feet.

The proposed Newland Sierra project is situated in an area that, due to its steep terrain, heavy fuels, adjacent ignition sources, and fire history, is subject to periodic wildfire. The project area, and nearby communities of Castle Creek, Hidden Meadows, and Lawrence Welk Resort, are all located in a Very High Fire Hazard Severity Zone, as designated by CAL FIRE. The hazard ratings for the area are presented in the exhibit in *Appendix L*. Wildland fires are a common natural hazard in most of southern California with a long and extensive history. Southern California landscapes include a diverse range of plant communities, including vast tracts of shrublands, like those found on the Newland Sierra site. Wildfire in this Mediterranean-type ecosystem ultimately affects the structure and functions of vegetation communities (Keeley 1984) and will continue to have a substantial and recurring role (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from forest to grasslands, become highly flammable each fall and 2) the climate of southern California has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with high winds (Santa Ana) occurring during autumn after a six-month drought period each year. Based on this research, the anticipated growing population of north County WUI areas, and the regions fire history, it can be anticipated that large wildfires will occur in north San Diego County, with the Merriam Mountains, and surrounding communities, being no exception.

Therefore, it will be critical that the latest fire protection technologies, developed through intensive research and real world wildfire observations and findings by fire professionals, for both ignition resistant construction and for creating defensible space in the ever-expanding WUI areas, are implemented and enforced. The Newland Sierra project will implement the latest fire protection measures as well as exceed standard requirements for fuel modification.

5.1 Wildfire Safety Considerations

There are two primary concerns for structure ignition from wildfires: 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 WUI built to these codes have proven to be very ignition resistant. Likewise,

radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior ignition-resistant walls, windows and doors. For example, San Diego County conducted after fire assessments that strongly indicate that the building codes are working in preventing home loss: of 15,000 structures within the 2003 Cedar 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 Witch Creek 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). Similarly, of 194 structures lost or damaged in the Orange County Freeway Complex Fire (2008), there were no structures within the fire perimeter lost that were built to at least the 1996 special fire area codes (similar to the CBC Chapter 7A requirements) enacted by the City of Yorba Linda (OCFA 2008). Those codes required structure hardening against wildfire, but are less restrictive and result in less ignition resistant structures than current Simi Valley and Ventura County Building and Fire Code requirements. Structures built to the 2010 (and more recent) Fire and Building Codes result in highly ignition and ember resistant structures. When combined with maintained fuel modification areas, fire apparatus access, water (fire flow), and an equipped and trained responding fire agency, the result is a defensible project, as detailed throughout this FPP.

Similarly to building code successes, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses by providing separation between structures and heat generated by wildland fuels. As such, most of the primary components of the layered fire protection system provided for the Newland Sierra project are required by DSFPD and County codes. However, they are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire. In addition, interior fire sprinklers which will be provided in all structures (now required by code), have a track record of extinguishing up to 95% of interior fires and significantly reducing fire damage. Although not designed for wildland fire defense, should embers succeed in entering a structure, sprinklers provide an additional layer of life safety and structure protection.

Even though these measures are now required by the latest Building and Fire Codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. The following project features are required for new development in WUI areas and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

1. Application of the latest adopted ignition resistant building codes
2. Exterior wall coverings are to be non-combustible or ignition resistant.

3. Multi- pane glazing with a minimum of one tempered pane
4. Ember resistant vents (recommend BrandGuard, O'Hagin, or similar vents)
5. Interior, automatic fire sprinklers to code for occupancy type
6. Modern infrastructure, access roads, and water delivery system
7. Maintained fuel modification areas
8. Fire apparatus access roads throughout the project

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6 MITIGATION MEASURES AND DESIGN CONSIDERATIONS FOR NON-CONFORMING FUEL MODIFICATION

As previously mentioned, due to constraints associated with portions of three lots located in the extreme western portion of the project (Figure 7), the available area for FMZ is limited. Two of the lots achieve 150 plus feet of FMZ for most of their perimeter, but this width is reduced to 60 to 80 feet for a small percentage of their FMZ. The third lot is constrained to as little as 56 to approximately 80 feet wide FMZ due to the project boundary that encroaches on the lot and would otherwise require off-site FMZ easement. As such, this FPP incorporates additional analysis and measures that will be implemented to compensate for potential fire related threats to these lots. These measures are customized for this site based on the analysis results and focus on providing functional equivalency as a full fuel modification zone.

In addition, although not a code requirement needing mitigation, there are up to 170 lots that cannot provide a full 30 feet of setback from top of slope for two story homes (Figure 7-1). Some of these lots are adjacent to internal slopes and as those slopes may be landscaped and maintained absent of native fuels, they will not be provided heat deflecting walls. As an additional project fire protection design consideration that is above and beyond requirements, the project will incorporate heat deflecting landscape walls for many of these lots.

Additional information that helps provide perspective and justification for approval of the reduced fuel modification zones includes the location of the structures and the off-site terrain and fuels. The off-site area adjacent to these three lots is considered less likely to produce significant fires that would threaten the community due to their down-wind position (during Santa Ana winds). Additionally, directly to the southwest of these lots, a large area of fuel conversion has occurred related to two existing residences and a grove/orchard operation. The fuels on the project site would be converted to Zone 1 to the property line. Fuels off-site are limited to a short-run slope that slopes up and away from the project toward the grove/orchard. A heat-deflecting wall will be positioned at the top of slope/pad edge for the three affected lots.

The 170 lots that cannot provide a full 30 feet setback from the top of slope, although not required, are being protected through design considerations of a combination of extended fuel modification zone (2½ times the required 100 feet) and will also be provided heat deflecting walls/view walls.

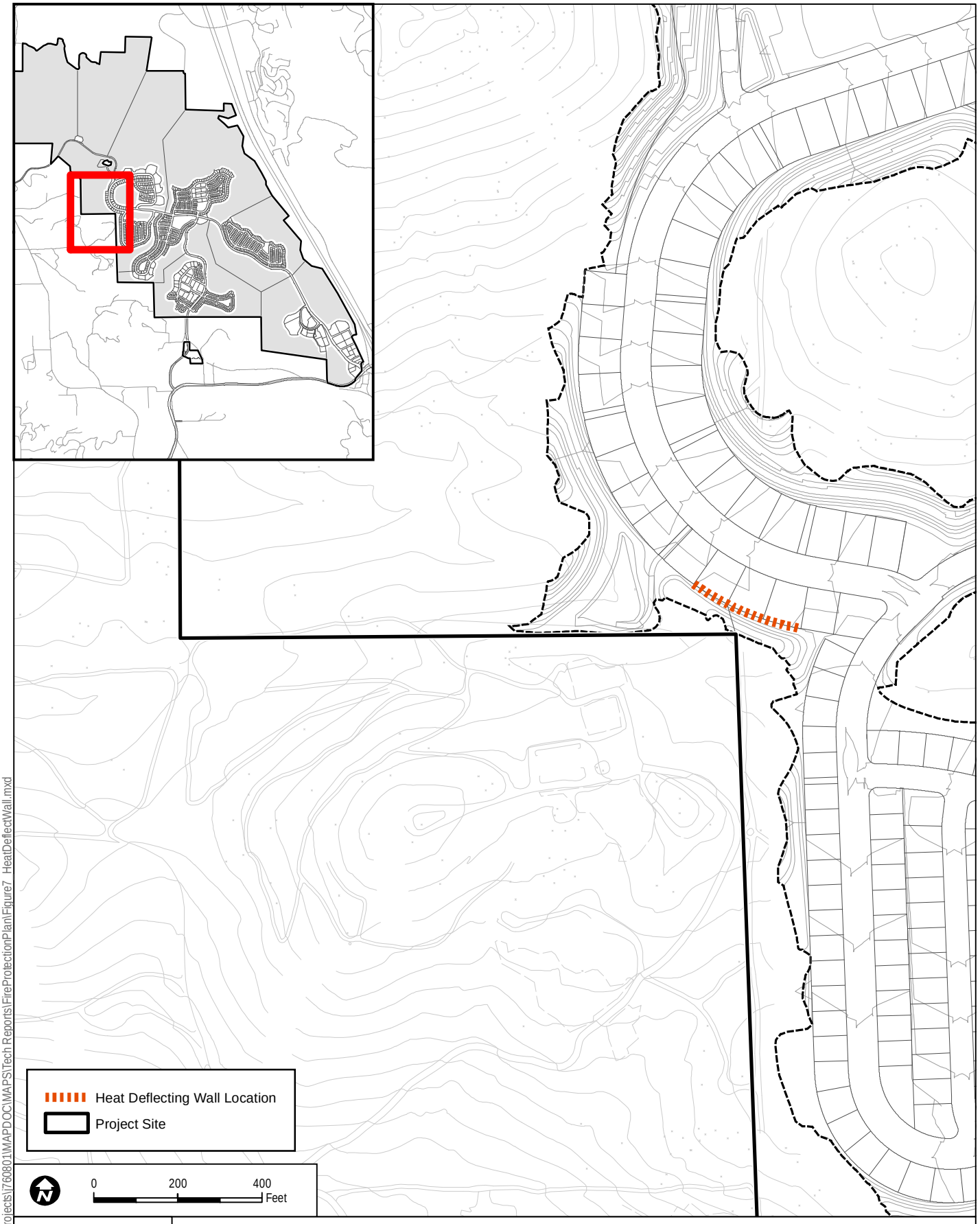
Research has indicated that the closer a fire is to a structure, the higher the level of heat exposure (Cohen 2000). However, studies indicate that given certain assumptions (e.g., 10 meters of low fuel landscape, no open windows), wildfire does not spread to homes unless the fuel and heat requirements (of the home) are sufficient for ignition and continued combustion (Cohen 1995, Alexander et al. 1998). 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 indicate strongly that the building codes are working in preventing home 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). Damage to the structures built to the latest codes is likely from flammable landscape plantings or objects next to structures or open windows or doors (Hunter 2008).

These results support Cohen's (2000) findings that if a community's homes have a sufficiently low home ignitability (i.e., 2014 San Diego County Consolidated Code and 2013 California Building Code), the community can survive exposure to wildfire without major fire destruction. This provides the option of mitigating the wildland fire threat to homes/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 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 ignition resistant exterior walls for structures built today.

Obstacles, including steep terrain and non-combustible walls can block or deflect all or part of the radiation and heat, thus making narrower fuel modification distances possible. Fire behavior modeling conducted for this project indicates that fires in the off-site areas would result in roughly 33-foot flame lengths under summer conditions. Extreme conditions may result in longer flame lengths, approaching 67 feet. However, extreme fire conditions typically include Santa Ana winds which would tend to push flames away from the Newland Sierra site on this western edge.

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



SOURCE: Fuscoe 2016

FIGURE 7

Heat Deflecting Wall Location

Newland Sierra Fire Protection Plan

DUDEK

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