APPENDIX F

Fire Protection Plan

FIRE PROTECTION PLAN
Otay Ranch Village 4 South

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EXECUTIVE SUMMARY

This document addresses fire protection for the Otay Ranch Village 4South Project in Chula Vista, San Diego County, California. This Fire Protection Plan (FPP) provides measures for fire protection that meet California Fire and Building Codes or provide the Fire Department the option of accepting equivalent protections where the code cannot be strictly achieved. Fire protection measures are provided based on code requirements and the analyzed fire risk associated with the Project's proposed land uses. The fire risk analysis forms the basis for identifying fuel modification, building design and construction and other pertinent development infrastructure criteria for fire protection. The primary focus of this FPP is providing an implementable framework for suitable protection of the planned project's structures and inhabitants. Tasks completed in the preparation of this FPP include data review, code review, site fire risk analysis, land use review, fire behavior modeling, and site-specific recommendations.

This FPP provides details regarding site-specific policies and implementation measures concerning fire protection. Further, the FPP outlines a "systems approach" to fire prevention, protection, suppression, and emergency relocation to ensure proposed improvements and uses will reduce potential risks associated with fire hazard. The structures in this community will include ignition resistant materials per the latest California Fire and Building Codes (2016). Structure protection will be complemented by a system of improved water availability, capacity and delivery; fire department access; monitored defensible space/fuel modification; interior fire sprinkler systems in all structures, monitored interior sprinklers in applicable structures; and other components to provide properly equipped and maintained structures with a high level of fire ignition resistance. Most of these features are required by code, but are specifically included because they address vulnerabilities noted in recent mega-fires in San Diego County and elsewhere. Structures built to the current fire and building codes are much less likely to be affected by fire and typically suffer much less damage from fire than structures built under less–stringent codes.

The site fire risk analysis conducted for this project resulted in the determination that wildfire may occur in the open space preserve areas adjacent to the porposed Project, but with moderate overall intensity based on fuels and terrain. This FPP outlines defensible space requirements based on the potential risk and predicted fire behavior. The modeling and fire risk analysis conducted for the Project site helps assess its unique fire risk and fire behavior, and this process helped determine that a 100-foot wide fuel modification zone will be suitable for anticipated fire intensity. The fuel modification zones perform as designed if they are maintained to original specifications; therefore, the fuel modification zones will be maintained in perpetuity by a Community Facilities District or Homeowner's Association (or similarly funded entity), ensuring the required inspections and fuel reduction work occur annually.

The City's current threshold for fire emergency response is 5 minutes for 90% of the responses and does not include dispatch and turnout time, which are commonly provided 1 minute each (resulting in a 6 minute travel time). The City's Fire Facility, Equipment, and Deployment Master Plan (FFMP) analyzes the need for new fire stations and the most efficient response coverage. As the FFMP is implemented over the next 15 years, three new fire stations are to be constructed as funding becomes available. The anticipated population and number of structures associated with the Project and the corresponding, calculated medical and fire calls will affect the response capabilities of CVFD's nearest existing stations. However, the Project is located in an area with nearby existing Chula Vista fire station 7 as well as planned stations in Village 8 West and the Eastern Urban Center (Millenia Fire Station) that would enable a 5-minute travel time standard for 90% of the project site (consistent with City standards). However, to meet the two-in, two-out standard, and because Staton 7 includes a 3.0 staffing model, the project proposes to be conditioned to pay for the 4th firefighter position at Station 7 for the period after the 120th dwelling unit is constructed until Village 8 West's station is operational. The 120 dwelling units (which includes either detached single family or attached multifamily residential) provides a financial base from which the project developer can contribute to the fourth firefighter. If Village 8 West's station is operational before the project exceeds 120 units, then the need for the 4th firefighter position will be negated and the project will not need to provide additional financial support.

1 INTRODUCTION

This Fire Protection Plan (FPP) was prepared for Village 4 South and provides specific measures for fire protection which meet or provide equivalent protection as 2016 California Fire and ignition resistant Building Codes. It also identifies the fire risk associated with proposed land uses, and identifies requirements for fuel modification, building design and construction and other pertinent development infrastructure criteria for fire protection. The primary focus of this FPP is providing an implementable framework for suitable protection of the planned structures and the people living and utilizing them.

The purpose of an FPP, as described in the International Code Council: Urban-Wildland Interface Code (Section 202) is:

> Fire Protection Plan: A document prepared for a specific project or development proposed for the urban-wildland interface area. It describes ways to minimize and mitigate the fire problems created by the project or development, with the purpose of reducing impact on the community's fire protection delivery system.

This FPP utilizes a "systems approach" for specifying fire protection measures. The measures consist of the components of fuel modification, passive and active structural protection, water supply, fire protection systems, access (ingress/egress), and emergency response. This FPP also provides additional details regarding wildfire risk assessment, fire history, fire behavior modeling, and construction and fire protection features that will be provided within this community.

1.1 Fire Protection Plan Summary

This FPP will guide the design, construction, and management of project-related improvements in compliance with applicable fire codes. When properly implemented and managed, the requirements and recommendations detailed herein are designed to result in fire hazard risk reduction and minimize the impact on the CVFD's fire protection system. To that end, preparation of this FPP reflects completion of the following tasks:

1. On-site risk assessment
2. Fire history analysis
3. Fire behavior modeling
4. Review of project site land use plans
5. Review of Chula Vista Fire Department's 2012 FFMP

6. Review and incorporation of Chula Vista Fire, Building (Chapter 7A), and Wildland Urban Interface (WUI) Codes, as applicable
7. Emergency Response Travel Time Analysis
8. Meetings with Chula Vista Fire Department
9. Generation of project-specific requirements and alternatives for fire protection.

1.2 Intent

The intent of this FPP is to provide management guidance and requirements for reducing fire risk and demand for fire protection services associated with Village 4 South. To that end, the fire protection "system" detailed in this FPP includes a redundant layering of measures including: pre-planning, fire prevention, fire protection, passive and active suppression and related measures proven to reduce fire risk. The fire safety system that will be enacted by the proposed Project has proven through real-life wildfire encroachment examples to significantly reduce the fire risk associated with this type of project.

1.3 Applicable Codes/Existing Regulations

This FPP demonstrates compliance with California Fire and Building Codes requirements, namely Title 15 – Building and Construction, Sections 15.34 (Fire Zones), 15.36 (Fire Code adopting the 2016 California Fire Code), and 15.38 (Urban Wildland Interface Code adopting the 2000 Urban Wildland Interface Code) and Section 15.08 adopting the 2016 California Building Code, specifically, Chapter 7A for development in WUI areas. Additionally, this FPP is consistent with the Chula Vista Fire Department's Fire Prevention Division's Fire Engineering Safety Detail and Specification Sheets. Lastly, this FPP conforms to the City's MSCP Subarea Plan Brush Management Guidelines and Resource Management Plan Preserve Edge Requirements. The project will comply with the applicable adopted codes in place at the time of construction. The project exceeds the allowable dead end road length, but provides mitigation through provisions for an emergency secondary ingress/egress road and coverage by two engine companies or 4.0 staffing, as discussed further in Section 3.3.1 of this FPP.

The entirety of the Village 4 South property lies within the local responsibility area (LRA) Non-Fire Hazard Severity Zone, as designated by the CVFD and CAL FIRE. Therefore, the requirements in Chapter 7A of the CBC would not typically be implemented for this development. However, the proposed fire protection measures for the Project will meet or under certain circumstances, exceed all applicable fire and building codes requirements.

1.4 Project Summary

1.4.1 Project Location

As depicted in Figure 1, Village 4 South is located within the eastern portion of the City of Chula Vista (City) in southwestern San Diego County, California. The project area includes the proposed development footprint and associated Preserve within the Village 4 South boundary. The proposed Village 4 South project occupies a 166.02-acre site, on Assessor Parcel Number 644-060-24 east of Wolf Canyon and North of the Vulcan Materials Company's Chula Vista Rock Quarry (Quarry). Specifically, the site lies immediately southwest of La Media Road, and is roughly 1.0 mile west of the South Bay Expressway (SR-125), 3.0 miles east of Interstate 805 (I-805), and 1.0 mile south of Olympic Parkway.

Surrounding land uses include open space/Preserve areas to the immediate north, south, and west. Land uses within the general vicinity of the project include future Otay Ranch 8 West and developed residential uses to the east and north; industrial and commercial developed lands in addition to the Otay Landfill and proposed Otay Ranch 3 North to the west; and the Sleep Train Ampitheater, Knott's Soak City Waterpark, and developed residential uses to the southwest. The project site is directly north of an on-going mining and processing operation (Quarry).

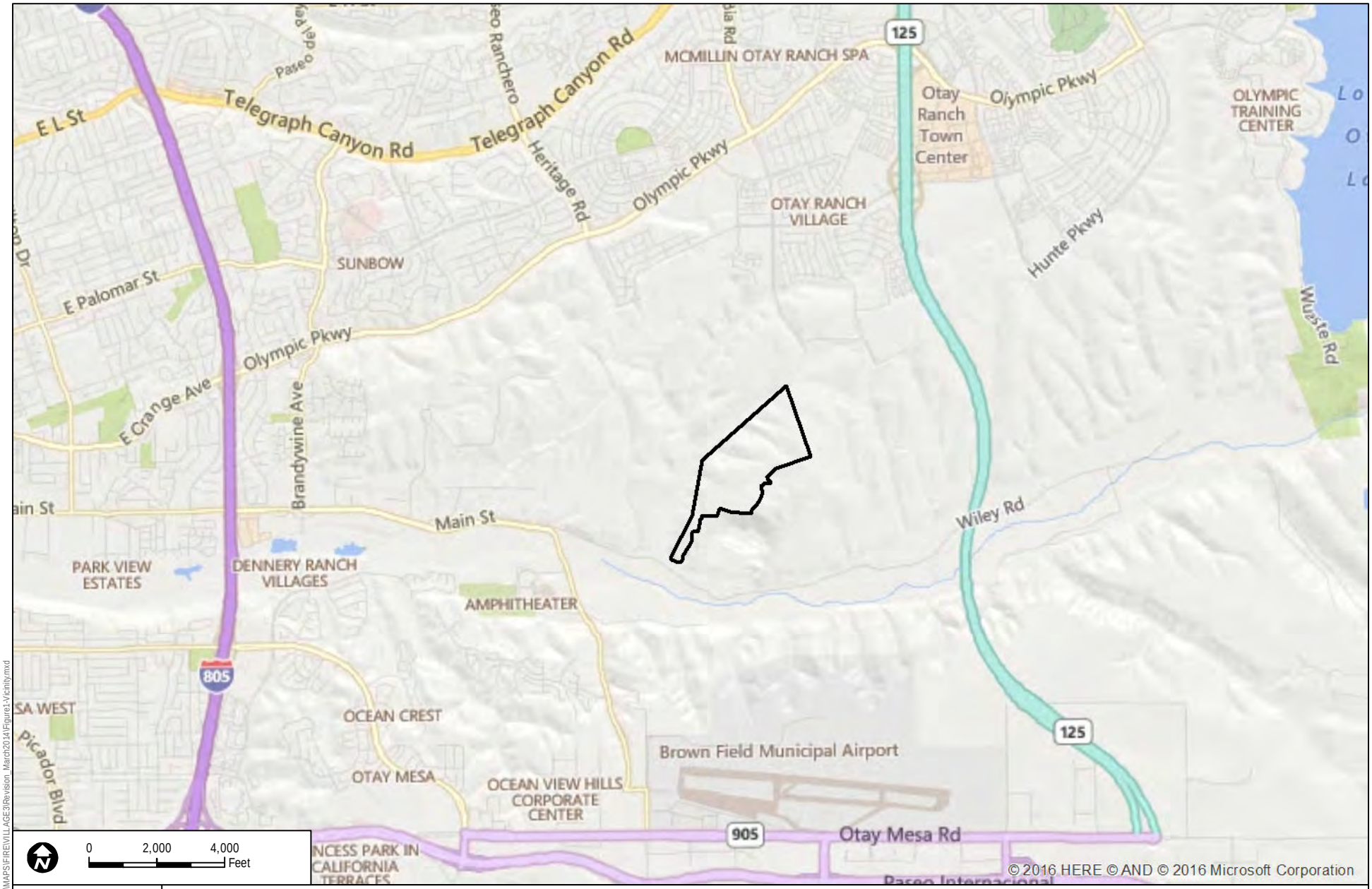
1.4.2 Project Description

The Village 4 South land plan proposes approximately 90 total lots, of which 73 lots are single-family residential, 3 lots are multi-family residential, 8 lots are master homeowners association (HOA) open space , 2 lots are Community Purpose Facility (CPF), and 4 open space preserve lots (Figure 2). The project proposes 350 total dwelling units.The single-family residential neighborhood would be constructed at the south and east ends of the site which will be accessed by public streets. Three large sheet-graded pads would be graded on the north and south sides of Main Street. The first graded pad (R-3) near the east portion of the site would consist of a 127-unit, multi-family lot. The remaining two graded pads (R-2A and R-2B) will be located on the south side of Main Street and divided by Street C. These lots would consist of 110 and 40 multi-family units to the northeast and southwest of Street C, respectively.

The project also proposes an approximately 2-mile eastern extension of Main Street, which provides additional access to the project site. In addition to the extension of Main Street, four internal village streets are proposed.

1.4.3 Project Access

The primary entry point into Village Four South is via Main Street from La Media Road. Additional access to the Village 4 South residential neighborhoods will be provided at two locations from an eastern extension of Main Street. The Main Street extension would connect generally west to east through the central portion of the site. Northbound access is provided via Main Street that links to La Media Road along the eastern edge of the project site and by an extension of Heritage Road along the western portion of Village 2. There are currently no improved roadways through the project site.



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SOURCE: ESRI 2016

FIGURE 1

Vicinity Map

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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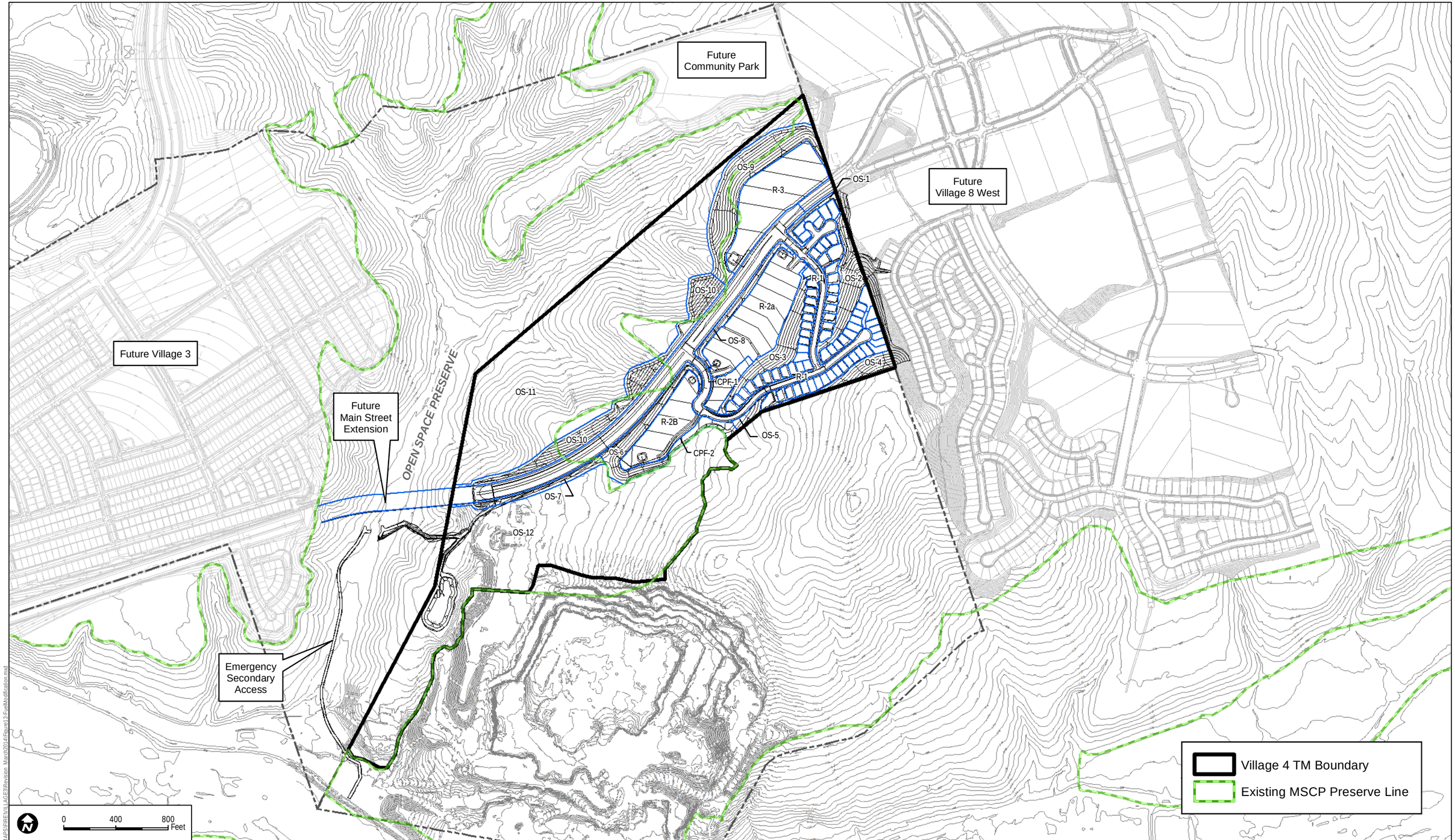

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SOURCE: HUNSAKER & ASSOCIATE, NOVEMBER 2016

FIGURE 2

Site Plan

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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2 RISK ANALYSIS METHODS

2.1 Field Assessment

Field assessments of the Village 4 South project area were conducted during April 2015 to document existing site conditions and for gathering necessary information to support overall fire risk evaluation. Assessments of the area's topography, natural vegetation and fuel loading, available setback areas, and general susceptibility to wildfire formed the basis of the site risk assessment.

Site photographs were collected (Appendix A) and fuel conditions were mapped using 100-scale aerial images. Field observations were utilized to augment existing site data in generating the fire behavior models and formulating the requirements provided in this FPP.

2.2 Site Characteristics

2.2.1 Topography

Village 4 South is located on the western flank of Rock Mountain. The property slopes west and includes several east-west trending, small drainages that empty into Wolf Canyon, which eventually drains into the Otay River Valley. Elevations range from roughly 185 feet above mean sea level (amsl) in the southwestern edge of Rock Mountain near the entrance to Vulcan Materials Company Quarry to nearly 608 feet amsl at the extreme southeast property boundary. Overall gradients are inclined up to 10%. Some terrain is inclined at 25% or steeper along the western portion of the property within the drainages.

2.2.2 Flammable Vegetation

Figure 3 provides Village 4 South Project's vegetation mapping results (Dudek 2015). A total of 630.59 acres, including 1.95 acres on the Vulcan Quarry property, were mapped for this Project. This acreage primarily consists of non-native grasslands and coastal sage scrub. The dominant vegetation type that was mapped on site is coatsal sage scrub which encompasses roughly 46.2% of the site. The slopes of the drainages and Rock Mountain, especially on the southern periphery of the project, contain stands of native coastal sage scrub habitat. Non-native grassland occurs throughout the property where development will occur and is found on 29.9% of the property.Other vegetation occurring on the site includes: maritime succulent scrub (10.3%), disturbed land (13.8%), cismontane alkali marsh (0.03%), and tamarisk scrub (0.02%). Adjacent to the site, in areas that will not be converted to urban landscapes, there is a mix of coastal sage scrub and riparian habitat to the south in Otay River Valley, non-native grasslands to the east, and patches of coastal sage scrub and maritime succulent scrub to the north and west. Appendix A provides photographs of the site and adjacent vegetation.

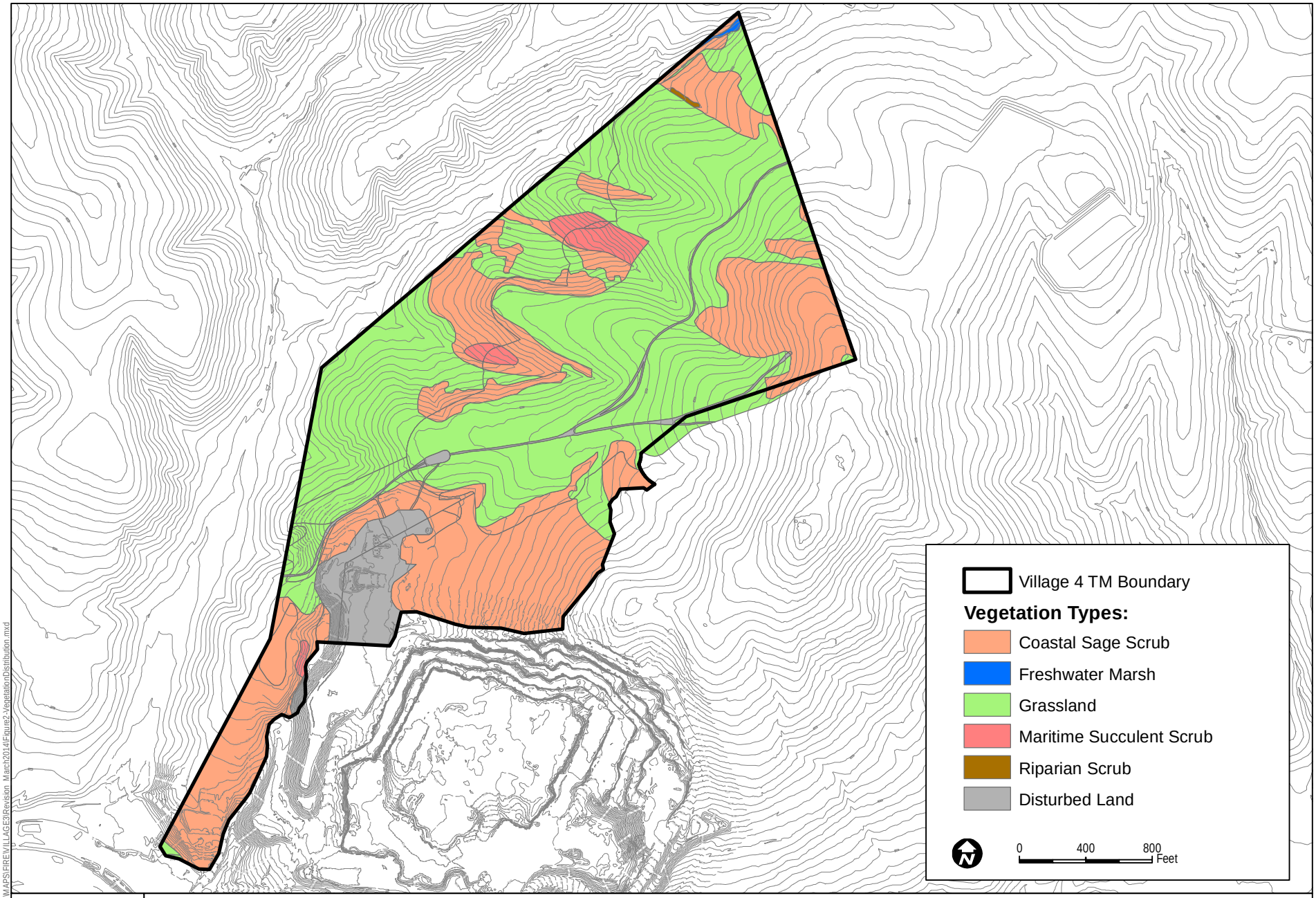
2.2.3 Climate

Throughout Southern California, including at the Project site, climate has a large influence on fire risk. Local climate is typical of a Mediterranean area, with warm, dry summers and wetter winters. Precipitation typically occurs between December and March. The prevailing wind is an on-shore flow from the Pacific Ocean, which is approximately 8.5 miles to the west, Santa Ana winds, which typically occur in the fall, from the northeast can gust to 50 miles per hour (mph) or higher. Drying vegetation (fuel moisture of less than 5% for 1-hour fuels is possible) during the summer months becomes fuel available to advancing flames should an ignition occur. Extreme conditions, used in fire modeling for this site, include 92°F temperatures in summer and winds of up to 50 mph during the fall. Relative humidity of 12% or less is possible during fire season. The site is within the coastal influence area and would be expected to, on average, include higher humidity and resulting plant moisture, than more inland areas.

2.3 Fire History

Fire history is an important component of FPPs. Fire history information can provide an understanding of fire frequency, fire type, most vulnerable areas, and significant ignition sources. In turn, this understanding of why fires occur in an area and how they typically behave can be used for pre-planning and designing defensible communities. Figure 4 –the Village 4 South Fire History Exhibit presents a graphical view of the project area's recorded fire history. As presented in the exibit, there have been several fires recorded by California Department of Forestry and Fire Protection (CAL FIRE) in their Fire and Resource Assessment Program (FRAP) database in the vicinity of the Project site, although no recorded fires have burned on site. The lack of a fire history does not indicate that fire cannot occur in the vegetation that will be adjacent to the project. It is expected that fires have not consistently spread into the Project area due to several factors: 1) the position of urban development to the north which is newer and ignition resistant, 2) the position of Otay Lake to the east, presenting a very wide fuel break, 3) the position of the Otay River valley to the south, where fire spread is inhibited due to higher vegetation moisture and less ignition prone vegetation types, and 4) the narrow opening south of Otay Lake and north of the Otay River Valley which can be more easily defended under typical fire conditions.

The nearest wildfires to the Village 4 South site include the 1994 Otay #4 Fire (approximately 1.2 miles to the southeast of Village 4 South), an un-named 1979 fire (approximately 1.3 miles to the northeast of Village 4 South), and an un-named 1945 fire (approximately 1.4 miles to the north of Village 4 South).Figure 3, Fire History, presents fire history in the Project vicinity and provides a graphical representation of the quantity of times the landscape has burned in the area.



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SOURCE: DUDEK MAY 2016

FIGURE 3

Vegetation/Fuels Distribution

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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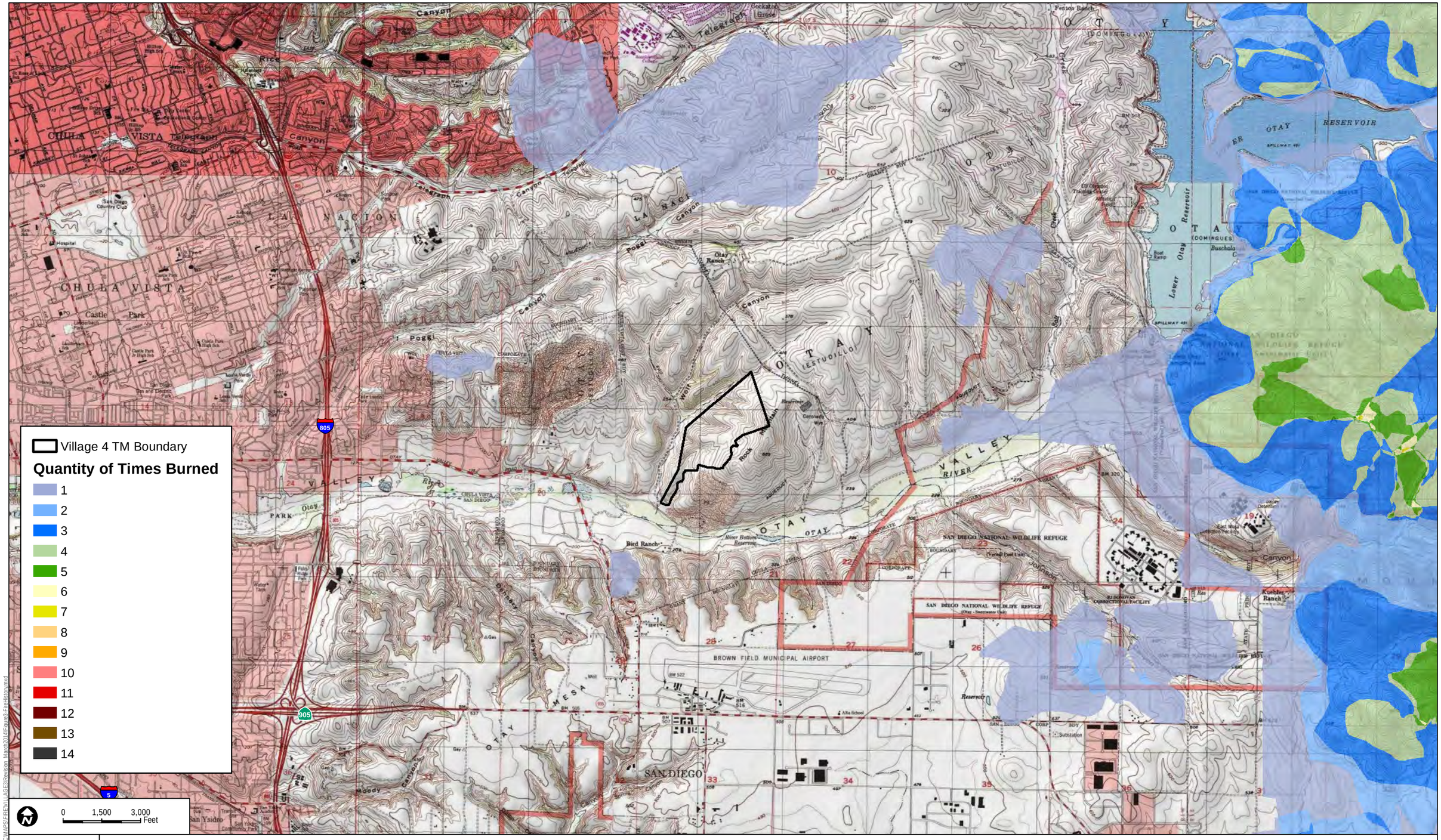

SOURCE: FRAP 2013; USGS 7.5 MINUTE SERIES QUADRANGLE

FIGURE 4

Fire History

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FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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2.4 FlamMap Analysis

FlamMap software was utilized to graphically depict fire behavior modeling results for the Project area, which includes the Project site and the area within one-half mile of the 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 1998). Both summer weather conditions (on-shore flow) and more extreme fall weather conditions (off-shore, Santa Ana conditions) were modeled.

2.4.1 FlamMap Fuel Model Inputs

FlamMap software requires a minimum of five separate input files that represent field conditions in the Project area, including elevation, slope, aspect, fuel model, and canopy cover. Each of these files was created as a raster GIS file using ArcGIS 9.3.1 software, exported as an ASCII grid file, then utilized in creating a FARSITE (Finney 1998) Landscape file that served as the base for the FlamMap runs. The resolution of each grid file and associated ASCII file that was used in the models for Project area is 30 meters, based on digital terrain data available from the San Diego Association of Governments (SANDAG 2010).

In addition to the Landscape file, wind and weather data are incorporated into the model inputs. For the FlamMap analysis, gridded wind speed and direction data was generated and incorporated into the model. Utilizing the WindNinja computer program (v. 2.0.3), ASCII grid files were generated for incorporation into the FlamMap analysis to better evaluate the effect of topography on wind flow (speed and direction).

The output files chosen for each of the modeling runs included flame length (feet) and fireline intensity (Btu/foot/second). The following provides descriptions of the input variables used in processing the FlamMap models. In addition, data sources are cited and any assumptions made during the modeling process are explained.

Elevation

Elevations were derived from digital terrain data available from SANDAG, projected in the UTM coordinate system, Zone 11 with units in meters. The resolution of the file was 30 meters and elevation within the Project area ranges from 34 meters (112 feet) to 197 meters (646 feet).[1] These data were utilized to create an elevation grid file, using units of meters above sea level. The elevation data are a necessary input file for FlamMap runs and are necessary for adiabatic

[1] Villages 3 North, Village 4 North and South, and nearby Villages 8 East and 10 were modeled comprehensively; hence, the site elevations described here reflect the high and low elevations over the five villages. The actual topography of the site is described in Section 2.2.3 and falls within this range.

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 degrees of inclination from horizontal. Slope values in the Project area range from 0–27 degrees. 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 were used in this analysis to create a fuel model file, which was derived from vegetative cover type mapping data for the Project area (SanGIS 2010). Using the Community type category, each vegetation type was coded with a unique fuel model value as described in Table 1. Vegetation mapping data was utilized in field efforts to classify vegetation cover type with an appropriate fuel model. The result includes seven separate fuel models utilized for the Project area, of which, one is a non-combustible types (e.g., water, agriculture, development). Once fuel model values were assigned to general vegetation types, the vector-based vegetation data file was converted to a grid file for inclusion in FlamMap modeling. Table 1 outlines the fuel model values applied to the general vegetation types found in the vicinity of the Project area.

Table 1
General Vegetation Types and Related Fuel Model Assignments in Vicinity of Project

General Vegetation Type	Fuel Model	Canopy Cover	Acreage	Percentage Cover
Disturbed Habitat*	1	0	72.3	4.7%
Urban/Developed	NB1	0	292.1	19.0%
Extensive Agriculture - Field/Pasture, Row Crops	1	0	277.5	18.1%
Maritime Succulent Scrub	SCAL18	0	61.7	4.0%
Diegan Coastal Sage Scrub	SCAL18	0	455.5	29.6%
Valley and Foothill Grassland	1	0	214.4	14.0%
Non-Native Grassland	1	0	108.8	7.1%
Freshwater Marsh	3	0	3.2	0.21%

Table 1
General Vegetation Types and Related Fuel Model Assignments in Vicinity of Project

General Vegetation Type	Fuel Model	Canopy Cover	Acreage	Percentage Cover
Mulefat Scrub	SH3	0	10.7	0.69%
Southern Willow Scrub	9	0	0.1	0.006%
Tamarisk Scrub	SH3	0	40.4	2.6%
		Total	**1,536.7**	**100.00**

* Assumes conversion to grassland-type fuels

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 classified as "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. For the purposes of this analysis, tree-dominated vegetation types (e.g., coast live oak woodland, riparian forest) were assigned a value of "3," while non-tree vegetation types were assigned a value of "0." Canopy classifications by vegetation type are presented in Table 1.

Weather

In order to evaluate specific weather variables for the Project area, data from the San Miguel Remote Automated Weather Station (RAWS) was analyzed. The San Miguel RAWS is the closest RAWS, located approximately 5.8 miles due north of the Project area, in a similar inland position and estimated to include consistent weather conditions as the Project area. The location and available data range for the San Miguel station is:

- San Miguel RAWS
  - Latitude: 32.68611
  - Longitude: -116.97833
  - Elevation: 425 feet
  - Data years: 2002 to 2010

Utilizing the FireFamily Plus v. 4.0.2 (FireFamily Plus 2008) software package, data from the San Miguel RAWS was processed and analyzed to determine 50th (typical) and 97th (extreme) percentile wind and fuel moisture conditions to be used in the fire behavior modeling efforts conducted for the Project area. Fuel moisture information was analyzed and incorporated into the Initial Fuel Moisture file used as an input in FlamMap, as well as directly input into the focused BehavePlus runs discussed in Section 2.5. Wind speed (20-foot) values for all fire behavior modeling runs were used as inputs into the WindNinja analysis in order to create the wind flow grids to be used in FlamMap. Two separate wind scenarios were analyzed in WindNinja and incorporated into the FlamMap model: summer fire (50th percentile values from June 1 to August 31) with 8 mph on-shore winds, and fall fire (97th percentile values from September 1 to November 30) with 50 mph winds (representing maximum wind gust speed). The use of 50 mph winds in modeling efforts is intended to represent wind gusts rather than sustained maximum wind speeds. The maximum RAWS wind speed for the San Miguel RAWS during the 97th percentile weather period (September 1 to November 30) was 20 mph, which represents a 10-minute average wind speed, not the maximum gust speed. As FlamMap presents a static representation of fire behavior, the inclusion of gust speed is appropriate to evaluate worst-case fire behavior outputs. Table 2 presents the weather and fuel moisture input variables used for all fire behavior modeling conducted for this FPP.

Table 2
Fire Behavior Weather and Fuel Moisture Inputs

Model Variable	50th Percentile (Onshore Flow)	97th Percentile (Offshore/Santa Ana conditions)
1 h fuel moisture	8%	2%
10 h fuel moisture	10%	3%
100 h fuel moisture	15%	7%
Live herbaceous moisture	90%	60%
Live woody moisture	122%	92%
20-ft. wind speed (mph)	8 mph	50 mph (representing max. gust)
Wind direction	Onshore, 270˚ for FlamMap	Offshore, 90˚ for FlamMap

2.4.2 FlamMap Fuel Model Outputs

Two output grid files were generated for each of the two FlamMap runs, and include representations of flame length (feet) and fireline intensity (BTU/foot/second). The aforementioned fire behavior variables are an important component in understanding fire risk and fire agency response capabilities. Flame length, the length of the flame of a spreading surface fire within the flaming front, is measured from midway in the active flaming combustion

zone to the average tip of the flames (Andrews, Bevins, and Seli 2004). It is a somewhat subjective and non-scientific measure of fire behavior, but is extremely important to fire personnel in evaluating fireline intensity and is worth considering as an important fire variable (Rothermel 1991). Maps depicting flame length and fireline intensity for the 50th and 97th percentile weather scenarios are included in Figures 5 through 8. The fire behavior analysis results for the Project area 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. Maximum flame lengths may exceed 45 feet in some sections of the analysis area under worst-case conditions. As illiustrated in Figures 6 and 8, expected fire behavior during extreme, Santa Ana wind-driven fires is closely correlated with fuel type and topography. Areas with light, flashy fuels (grasses) exhibit lower flame lengths and resulting fireline intensities but will promote fire spread at faster rates than heavier chaparral and sage scrub fuels, which exhibit higher flame lengths and resulting intensities. In general, the grasslands throughout much of the village areas exhibits lower flame length of less than 8 feet and lower fireline intensity potential due to lower fuel loads and more gently sloping topography. The areas that include a sage scrub element result in higher flame lengths from 11–45 feet and higher intensities, but are still considered "moderate" in terms of overall fire severity. Off-site, adjacent fire behavior varies with vegetation and terrain and includes predominantly flame lengths under 20 feet, with areas of higher flame length associated with sage vegetation. Roughly 75% of the off-site adjacent fuels would produce flame lengths lower than 20 feet, while the remaining 25%, mostly in the northeastern area of the Village, would produce greater than 30 foot flame lengths under worst-case weather input conditions. Fireline intensity is a measure of heat output from the flaming front, and also affects the potential for a surface fire to transition to a crown fire. The information in Table 3 presents an interpretation of these fire behavior variables as related to fire suppression efforts.

Table 3
Fire Suppression Guidelines

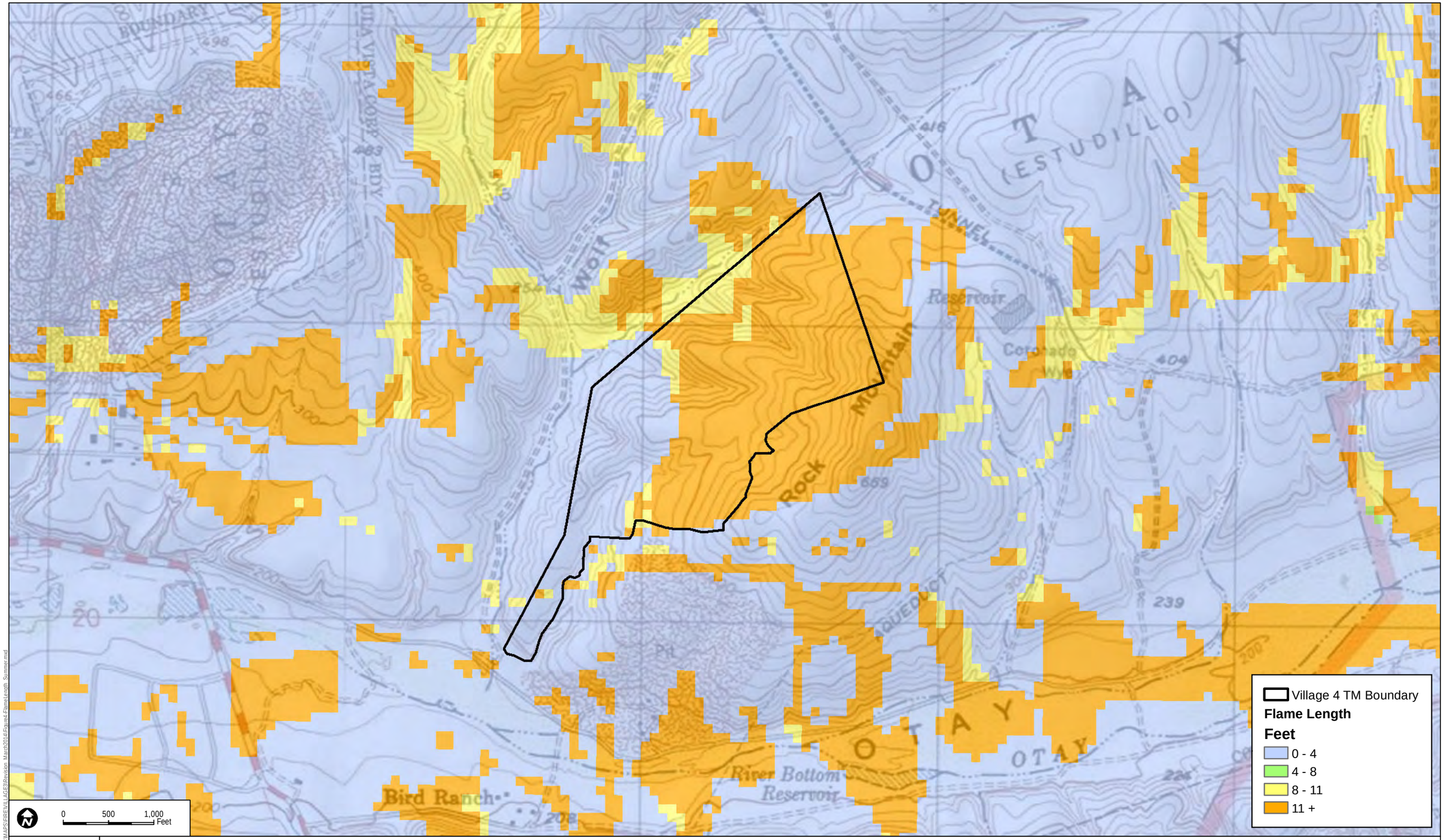
Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
Under 4	Under 100	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4–8	100–500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line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

Table 3
Fire Suppression Guidelines

Flame Length (feet)	Fireline Intensity (Btu/ft/s)	Interpretations
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 5.0.2 fire behavior modeling program (Andrews, Bevins, and Seli 2004)

Note: The fire behavior results described herein depict values based on inputs to the FlamMap software. Localized changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis, but assumed (averaged) across the landscape based on the available data resolution. Further, this modeling analysis assumes a correlation between the available vegetation data and fuel model characteristics. Recent fire activity may temporarily alter fuel beds, but fire behavior modeling efforts conducted for this project assume natural succession of burned areas to more mature stand conditions, resulting in a conservative (near worst-case) estimate of fire behavior. Since fire behavior for a given location will be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns, modeling results are applicable as a basis for planning, but need to be considered in context with other site variables.



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BASE SOURCE: USGS 7.5 MINUTE SERIES QUADRANGLE

FIGURE 5

FlamMap Flame Length Analysis Summer Fire

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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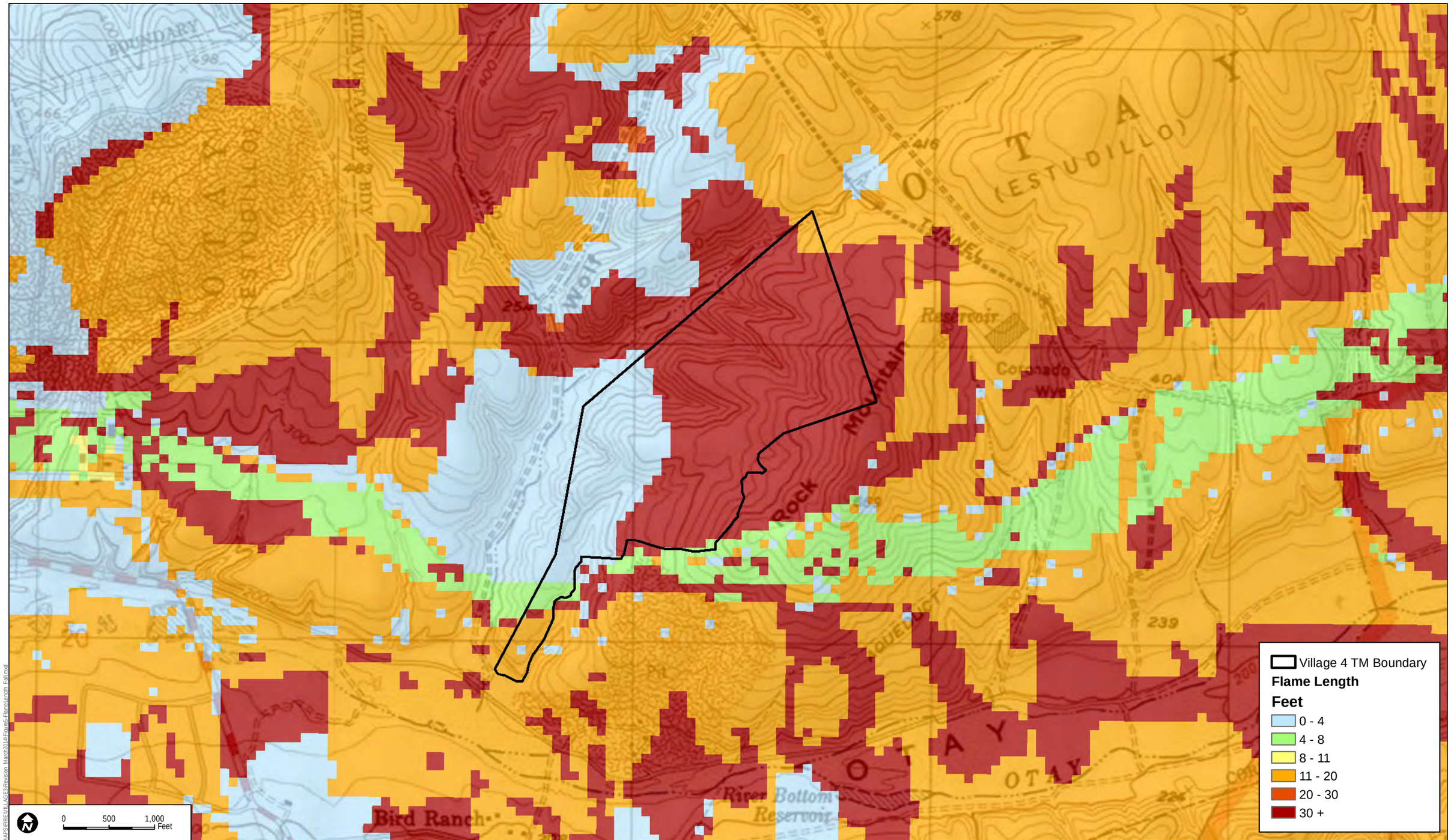

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BASE SOURCE: USGS 7.5 MINUTE SERIES QUADRANGLE

FIGURE 6

FlamMap Flame Length Analysis Fall Fire

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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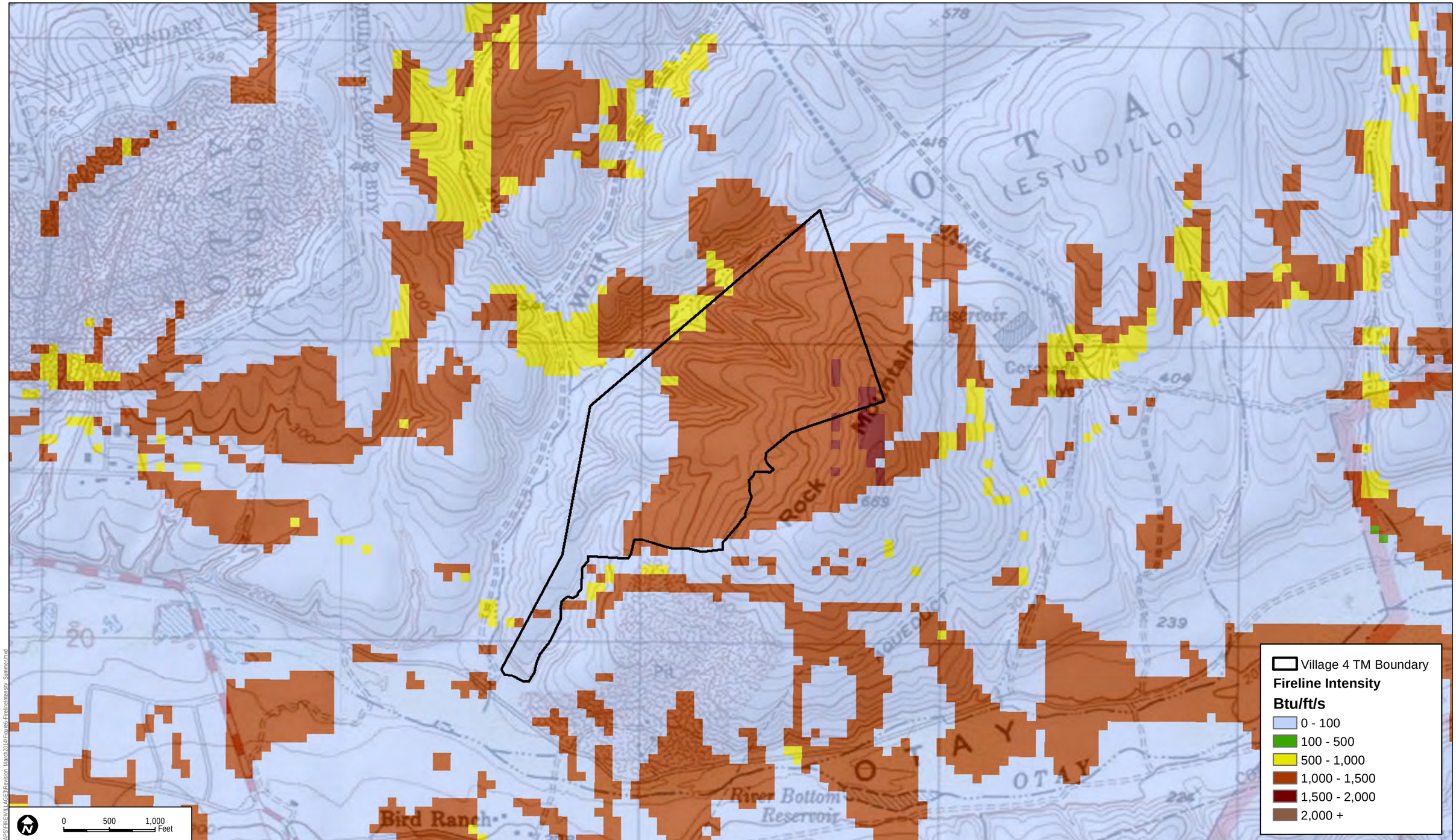

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BASE SOURCE: USGS 7.5 MINUTE SERIES QUADRANGLE

FIGURE 7

FlamMap Fireline Intensity Summer Fire

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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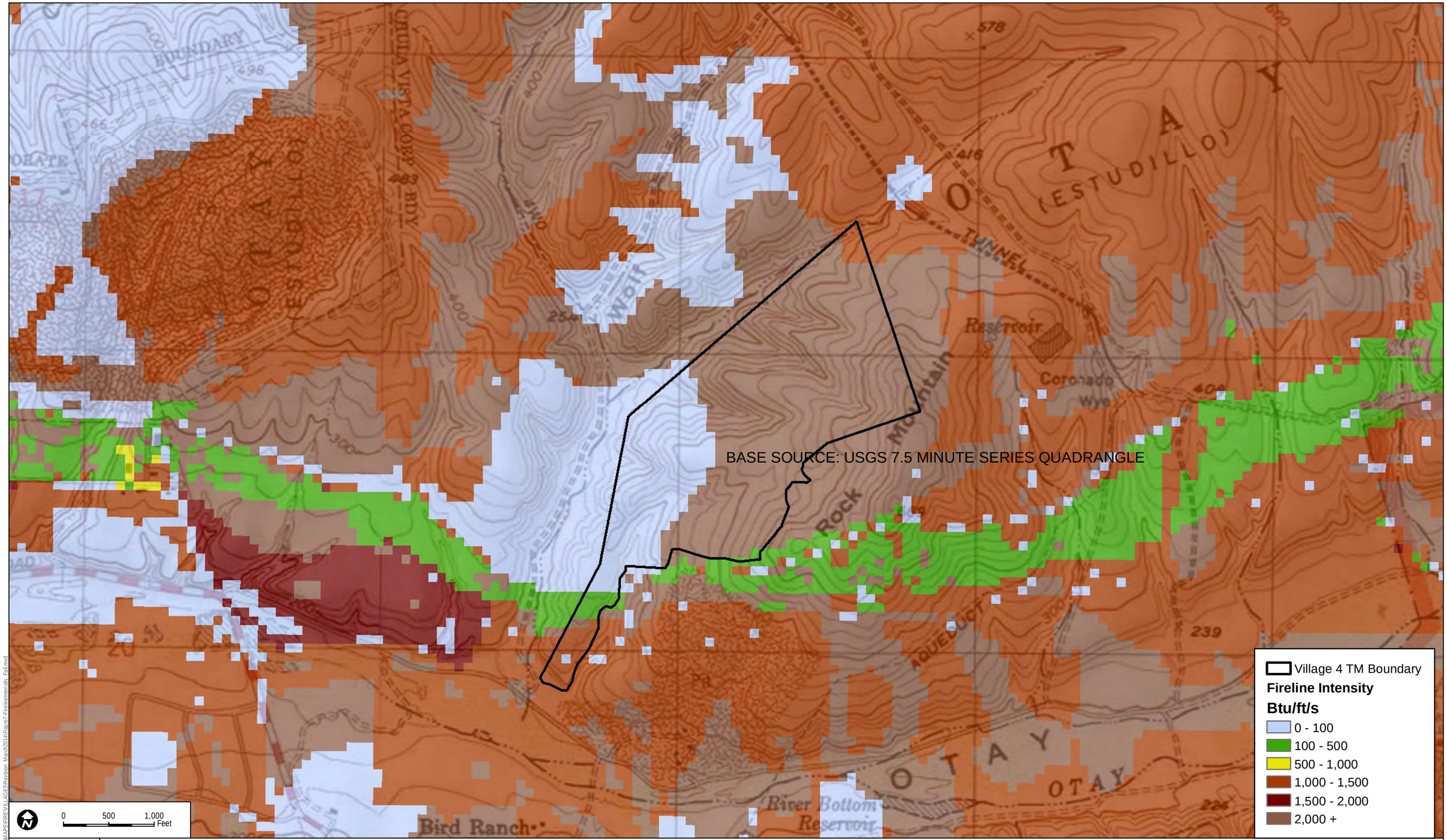

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BASE SOURCE: USGS 7.5 MINUTE SERIES QUADRANGLE

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

FIGURE 8

FlamMap Fireline Intensity Fall Fire

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2.5 BehavePlus Fire Behavior Modeling

In addition to the FlamMap fire behavior modeling conducted for the Village 4 South site, more focused fire behavior modeling utilizing BehavePlus 5.0.5 was conducted for Village 4 South. Similar to the FlamMap modeling, two weather scenarios were evaluated with BehavePlus. All fuel moisture and weather inputs remain consistent between the FlamMap and BehavePlus modeling efforts conducted in support of this FPP. Fuel model typing was completed in the field concurrent with site hazard evaluations. Based on field analysis, four different fire scenarios were evaluated for Village 4 South.

- **Scenario 1:** 97th percentile weather with off-shore, strong east winds and a fall fire burning in grassland fuels that are have been mowed or are naturally less than 18 inches along the eastern edge of the project site. This area is relatively flat (5% slope), with potential ignition sources along nearby surface streets (La Media Road), adjacent residential areas, or from a larger fire burning westward from the nearby Jamul and San Ysidro Mountains. Fire in this area would be moving downhill toward the proposed Project. It should be noted that portions of the area included under Scenario 1 is planned for future development; therefore, the modeled fire behavior is only relevant for the existing, non-developed condition.
- **Scenario 2:** 97th percentile weather with off-shore wind and a fall fire burning in coastal sage scrub shrub cover in rocky terrain along the southern edge of the project site. This area is moderately steep (20% slope), with potential ignition sources from SR-125 to the east.
- **Scenario 3:** 50th percentile weather with on-shore wind and a summer fire burning in grassland with sparse sage scrub shrub cover along the southwestern edge of the project site. This area is moderately steep (15% slope), with potential ignition sources from nearby surface streets, adjacent residential and commercial areas, and the Otay landfill to the west.
- **Scenario 4:** 50th percentile weather with on-shore wind and a summer fire burning in grassland with sparse coastal sage scrub and maritime succulent scrub shrub cover along the southwestern edge of the project site. This area is similar in environmental setting as scenario 3.

2.5.1 BehavePlus Fuel Model Inputs

BehavePlus software requires site-specific variables for surface fire spread analysis, including fuel type, fuel moisture, wind speed, and slope data. The output variables used in this analysis include flame length (feet), fireline intensity (BTU/feet/second), and spotting distance (miles). The following provides a description of the input variables used in processing the BehavePlus

models for Village 4 South. The unique terrain and fuel models used for BehavePlus modeling at the site are presented in Table 4, and the results of modeling efforts are provided in Table 5. Locations of BehavePlus model runs are presented graphically in Figure 9.

Weather

The same historical fuel moisture and wind speed data that was analyzed and used in the FlamMap analysis discussed previously were used for all BehavePlus runs prepared for this FPP. Table 2 presents the fuel moisture and wind speed values used for the BehavePlus analyses included in this FPP.

As wind speed values derived from RAWS data represent 20-foot wind speeds, BehavePlus includes a wind adjustment factor. In the case of the BehavePlus analyses completed in support of this FPP (which occur in shrub vegetation types), a wind speed adjustment factor of 0.4 was utilized to account for vertical differences in wind speed from the 20-foot recording height to mid-flame height prior to BehavePlus modeling efforts. A conservative wind adjustment factor of 0.4 indicates a fuel bed that is unsheltered from the wind with a fuel bed depth greater than 2.7 feet. It should be noted that mid-flame wind speeds may be only 10% of the wind speeds recorded or predicted at 20 feet, resulting in a conservative calculation.

Topography

Elevation data were derived from digital topographic files available for Village 4 South. This data source was evaluated in ArcGIS software in order to determine specific site elevation ranges and slope gradients. Elevation and slope are important components in fire behavior analysis as they affect temperature, humidity, solar radiance, and fire spread rates.

Fuel Model

Fuel model assignments for each of the BehavePlus modeling runs were based on field observations documented during the fire hazard assessments conducted in support of this FPP. Fire behavior model variables for BehavePlus modeling efforts are presented in Table 4.

Table 4
Village 4 South Fire Behavior Model Variables

Scenario	Fuel Model(s)	Slope	Aspect
1	Grass (1) and Mowed Grass (gr2)	5%	South
2	Coastal Sage Scrub (SCAL18)	20%	South-East
3	Grass (1) and Coastal Sage Scrub (SCAL 18)	15%	South-West
4	Grass (1) /Maritime succulent-coastal sage scrub (SCAL18)	15%	North-West

RUN 1

Run 1 (Fall Fire, Off-shore Flow)
Slope: 5%
Fuel Model: Grasslands (1), gr2
Flame Length: 12.7 feet
Fireline Intensity: 1,415 Btu/ft/s
Spread Rate: 8.3 mph
Spotting Distance: 1.0 mi.

RUN 4

Run 4 (Summer Fire, On-shore Flow)
Slope: 15%
Fuel Model: Grasslands (1), Coastal Sage Scrub (SCAL 18)
Flame Length: 10.9 feet
Fireline Intensity: 1,026 Btu/ft/s
Spread Rate: 0.47 mph
Spotting Distance: 0.3 mi.

Run 3 (Summer Fire, On-shore Flow)
Slope: 15%
Fuel Model: Grasslands (1), Coastal Sage Scrub (SCAL 18)
Flame Length: 10.9 feet
Fireline Intensity: 1,026 Btu/ft/s
Spread Rate: 0.47 mph
Spotting Distance: 0.3 mi.

RUN 2

Run 2 (Fall Fire, Off-shore Flow)
Slope: 20%
Fuel Model: Coastal Sage Scrub (SCAL18)
Flame Length: 34.1 feet
Fireline Intensity: 12,201 Btu/ft/s
Spread Rate: 1.9 mph
Spotting Distance: 2.0 mi.

RUN 3

Modeling Inputs:

50th Percentile Weather (RUN 3 & 4):
1h Fuel Moisture: 8%
10h Fuel Moisture: 10%
100h Fuel Moisture: 15%
Live Herbaceous Moisture: 90%
Live Woody Moisture: 122%
20-foot Wind Speed: 8 mph
Wind Adjustment Factor: 0.4

97th Percentile Weather (RUN 1 & 2):
1h Fuel Moisture: 2%
10h Fuel Moisture: 3%
100h Fuel Moisture: 7%
Live Herbaceous Moisture: 60%
Live Woody Moisture: 92%
20-foot Wind Speed: 30-40 mph (50 mph gusts)
Wind Adjustment Factor: 0.4

N
0 300 600 Feet

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BASE SOURCE: HUNSAKER 2016

FIGURE 9

BehavePlus Fire Behavior Modeling

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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2.5.2 BehavePlus Fuel Model Results

Based on the BehavePlus analysis, worst-case fire behavior is expected in coastal sage scrub fuels along the southern edge of proposed project development (Scenario 2) during a strong wind-driven fire event (97th percentile weather). Under this scenario, a fire originating south and east of Vilage 4 South and pushed by winds from the east results in flame lengths reaching 34.1 feet and fireline intensities reaching 12,201 BTU/feet/second and a spread rate of 1.9 mph. Spotting distance for this extreme fire weather scenario reaches 2.0 miles. During summer fire weather conditions (50th Percentile) expected flame lengths for Scenarios 3 and 4 reach 10.9 feet with fireline intensities reaching 1,026 BTU/feet/second and, a spread rate of 0.5 mph, and spotting up to 0.3 mile. The results from the BehavePlus fire behavior modeling scenarios are presented in Table 5.

Table 5
Village 4 South BehavePlus Fire Behavior Model Results

Scenario	Flame Length (feet)	Fireline Intensity (BTU/feet/second)	Spread Rate (mph)	Spotting Distance (miles)
Scenario 1: Grassland on south-facing, 5% slope				
Santa Ana (97th percentile with 50mph gusts)	12.7	1,415	8.3	1.0
Scenario 2: Coastal Sage scrub on South to East-facing, 20% slope				
Santa Ana (97th percentile with 50 mph gusts)	34.1	12,201	1.9	2.0
Scenario 3: Grassland and Coastal Sage Scrub on South- & West- facing, 15% slopes				
On shore (50th Percentile)	10.9	1,026	0.47	0.3
Scenario 4: Grassland/ Coastal Sage-Maritime SucculentScrub on North- & West- facing, 15% slopes				
On shore (50th Percentile)	10.9	1,026	0.47	0.3

Note: The results presented in Table 2 depict values based on inputs to the BehavePlus software. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. 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.

2.6 On-Site Wildland Fire Risk Assessment

Given the climatic, vegetation, ignition sources, wildland-urban interface location, and topography characteristics along with the fire history, ignition sources and fire behavior modeling results previously discussed in this FPP, the Project site is determined to be potentially exposed to wildfire encroaching on the perimeter of the development or spotting into the preserve areas to the north and south of the site, especially from up-wind fires driven by on-shore or Santa Ana type winds funneled into the Otay River Valley. Based on this information and the recorded history of fires in the area, along with the persistence of naturally vegetated open space on two Village 4 South exposures, it is expected that wind driven wildfires could occur near this site in the future, but are not anticipated to spread into the Project based on provided protections.

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3 FIRE RESPONSE CAPABILITIES

3.1 Estimated Calls and Demand for Service from the Project

This section analyzes the Village 4 South Project in terms of current CVFD Fire Service capabilities and resources to provide Fire Protection and Emergency Services. The analysis that follows examines the ability of the existing fire stations as well as fire stations planned in the approved Chula Vista FFMP to serve the area and ensure the timely provision of local fire protection and emergency service. Response times were evaluated using build-out conditions. It was assumed that phased construction would include access roads to the newly constructed dwelling units and that the shortest access route to those dwellings would be utilized.

The existing fire station 7, located 1.88 miles from the furthest point in the community would be a responding resource to Village 4 South. It is the closest existing station and does meet CVFD's 5 minute travel time goal for all structures, although it is staffed with a three person crew so may not be suitable for initial response in terms of providing 4 firefighters so the Occupational Safety and Health Administratoin (OSHA) two in and two out regulation is met. The following call volume data for Station 7 was obtained from Chula Vista Fire Department's 2016 Annual Stats Report: engine 57 (1,512 calls) and truck 57 (393 calls).

Based on the total number of calls handled in 2016 by Station 7,the average daily call volume is calculated as follows:

- **Station 7:** engine 57 – 4 calls per day, truck 57 – 1.1 calls per day

As summarized in Table 6, using the CVFD estimate of 74 annual calls per 1,000 population[2,3], the Project's estimated 1,141 residents[4] and visitors would generate approximately 84 calls per year (about 0.23 calls per day), roughly 68% of which (0.15 call per day) is expected to be medical emergencies, based on past call statistics.

[2] City of Chula Vista estimated total population of 267,500 people (City of Chula Vista 2017).
[3] Chula Vista Fire Department 2016 Annual Stats Report: Total number of Incidents = 19,892
[4] Assumes an average of 3.26 occupants per household for this type of community (U.S. Census Bureau 2014)

Table 6
Calculated Call Volume Associated with the Village 4 South

Emergency Calls per 1,000 (2015 CVFD Incident Data)	Estimated Population	Avg. No. Calls per Year (1,141\1,000)x74	Avg. No. Calls per Day (84/365)
74	1,141	84	0.23
Type of call	*Per capita call generation factor*		*Number of estimated annual calls*
Total Calls	**100%**		**84**
Total Fires	**1.9%**		**1.6**
Total EMS Calls	**67.8%**		**56.9**
Total Rescue Calls	**0.33%**		**0.3**
Total Other Calls	**29.97%**		**25.2**

The City predicts a population increase in the Otay Ranch Subarea of some 53,000 people at build out (City of Chula Vista 2012). This corresponds to a calculated call volume increase of nearly 3,500 calls per year, or roughly 10 calls per day. This call volume added to existing call volume from existing stations that would respond to this area as first responder or as Effective Fighting Force (EFF) would represent a significant increase. Additional stations would be necessary, as identified by the City in its FFMP, to adequately absorb the increased demand from build out of Otay Ranch. With the addition of two planned fire stations in the area, as described in Section 3.2, and the currently low call volume at Station 7, the additional calls associated with build out can be absorbed and still result in better than adequate emergency response. Only a small number (estimated at 1.6 calls per year) of fire related calls would be potentially realized at build out while the majority of calls would be medical related.

Based on the relatively low call volumes from existing, nearby fire stations, there is capacity to respond to a higher call volume. Station 7 is currently considered somewhat average based on their roughly five or fewer calls per day. For perspective, a typical station averages around five calls per day and a busy station responds to about ten calls per day. Table 7 presents estimated call volume increases based on the demand from Village 4 South.

Table 7
Calculated Call Volume Increase Per Station Associated with Village 4 South

Chula Vista Fire Station	Current Daily Call Volume	Estimated Daily Call Volume Increase	Estimated Total Daily Call Volumes with proposed Project
7	4.0 (engine) + 1.1 (truck)	0.23	5.3

If based only on call volume, the existing station would be able to respond to Village 4 South call volume increases. However, response times and the weight of response to Chula Vista's developing areas must also be considered when determining whether existing resources are adequate, or whether additional resources are necessary.

3.2 Emergency Response

The Project Site is located within the City of Chula Vista Fire Department jurisdictional area. Village 4 South would be serviced by existing Fire Station 7, located 1.88 miles from the furthest point in the project. Because Station 7 is a three person engine company (3 crew members), and the City follows the OSHA two-in and two-out standard[5], the weight of the initial response is considered insufficient. Either a fourth firefighter would need to be added to the Station 7 engine company or an additional engine would need to be able to respond within 5 minutes throughout the project. If available to respond to an incident, Truck 57 with it's complement of firefighters could respond to the Project site within five minutes and provide additional manpower to comply with the OSHA staffing standard.

If constructed as anticipated in the approved Chula Vista FFMP, the proposed Village 8 West Fire Station located 0.73 mile to the most remote portion of the village from the project area would also respond to emergency calls for service within 5 minutes and satisfying the two in, two out standard. Existing Fire Station 3 (4.63 miles from the project) and the approved Millenia Fire Station (2.02 miles from the project) would possibly also respond, but would not meet 5 minutes for the entire project.

Dudek conducted GIS based emergency response modeling from existing and planned fire stations to the project to determine potential response coverage. The modeling utilized CVFD input variables that are consistent with the FFMP, but used an ESRI network response area model assuming 35 mph as standard speed and impedances (slow downs) at each intersection for consistency with the ISO formula. Emergency travel time for first arriving engines from each station are provided in Table 8. Automatic and/or Mutual Aid agreements with surrounding fire departments are in place and would potentially result in additional resources that are not analyzed in this FPP.

[5] 1990 Occupational Safety Health Administration (OSHA) Staffing Policy is commonly called the "two-in/two-out" policy. This policy requires firefighters to enter serious building fires in teams of two, while two more firefigthers are outside and immediately ready to rescue them should trouble arise.

Table 8
Village 4 South CVFD Emergency Response Analysis

Chula Vista Fire Department Station No.	Total Mileage to Village 4 South (furthest point)	Estimated Response Travel Time	% of Village Lots within 5-minute Travel Time
		First Arriving	*First Arriving*
7	1.88	3 min. 50 sec.	100%
3**	4.63	8 min. 31 sec.	0%
3 (future road network)	3.9	7 min. 17 sec.	0%
6	5.61	10 min. 11 sec.	0%
6 (future road network)	5.5	10 min.	0%
8	5.74	10 min 25 sec.	0%
8 (future road network)	5.66	10 min 16 sec	0%
Proposed Village 8 West	0.73	1 min. 54 sec.	100%
Approved Millenia***	2.27	4 min31 sec.	100%

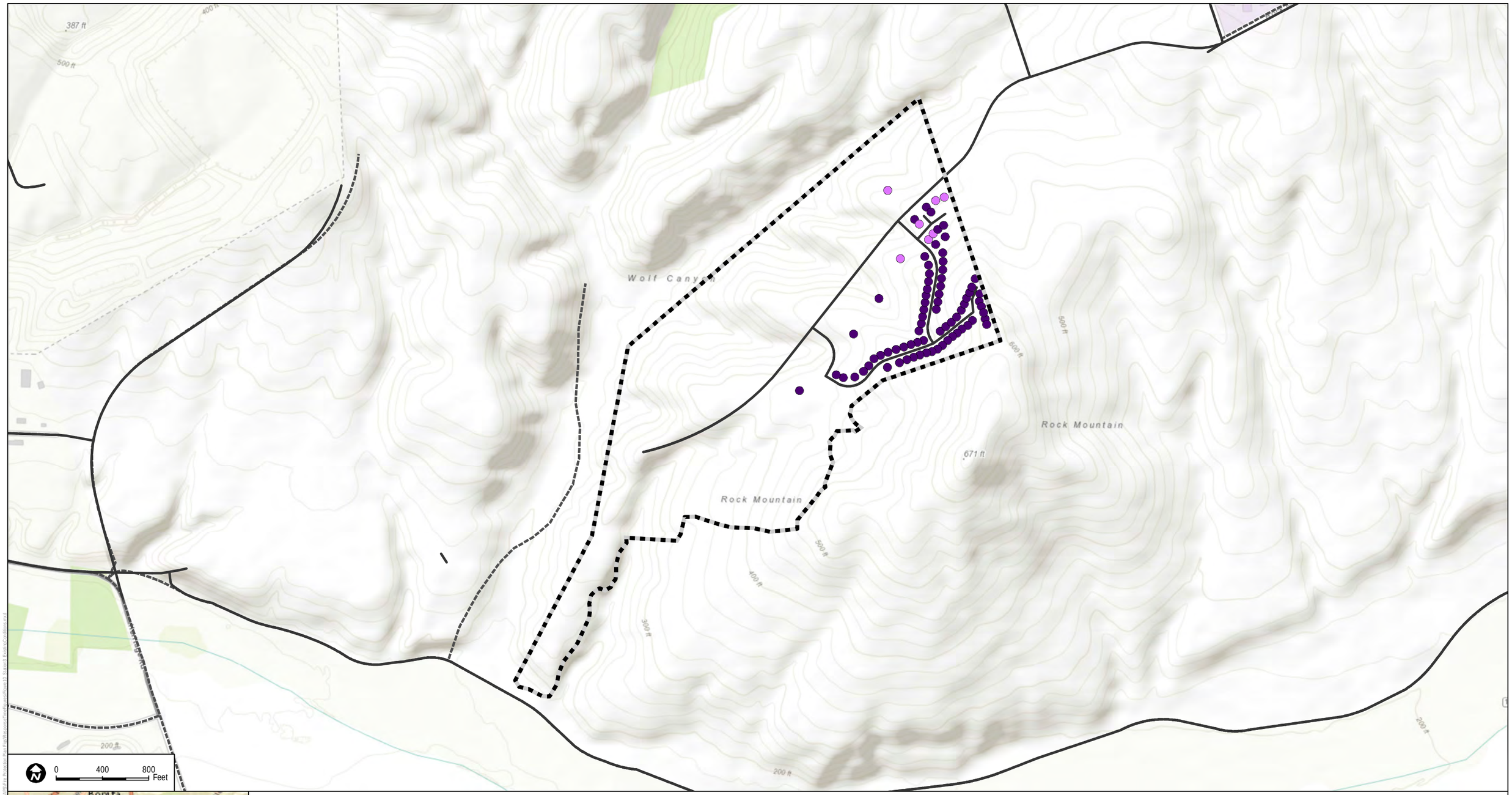
* Table 8 presents results of response travel time utilized the ISO formula (T=.65+1.7D) that discounts speed to account for slowing along the response route whereas Figures 10 through 19 illustrate model runs with a constant speed of 35 mph which results in faster overall coverage times and 100% coverage under 5 minutes.

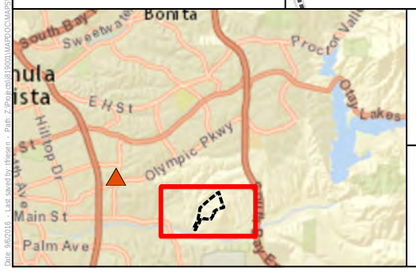
** The Station 3 emeregency response analysis was conducted for travel distance and time from La Media Road via Olympic Parkway to the northeast entrance on Main Street. It was assumed that the Main Street extension and bridge were not built at this point in time.

*** Note that the Millenia Fire Station was used for modeling since it was determined to be the optimal location for a new fire station (FFMP 2012)

As indicated in Table 8 and Figures 10 through 19, the first arriving engine from Station 7 achieves a 5-minute travel time throughout the entire development, conforming with the approved response goal of 7 minutes 90% of the time (5 minutes travel + dispatch + turnout). The 100% achievement is based on a study of the number of lots in the project and the percentage of those lots that can be reached within 5 minutes travel using the Insurance Service Office's travel time forumula. Station 7 can successfully achieve response 73 single-family and 3 multi-family lots (100%) of Village 4 South within 3 minutes 50 seconds travel time. Achievement of 100% coverage under 4 minutes is considered to exceed the City's standard. The Effective Fighting Force (first 3 engines, 1 truck and battalion chief for a total of 14/15 firefighters) could be on-scene within roughly 10 minutes 11 seconds travel time from three existing stations and within one minute (to the furthest village extent) from the proposed Village 8 West station and 4 minutes 33 seconds from the Millenia Fire Station. In this case, the proposed Village 8 West and Millenia stations provide significant time savings, as both responses are within 5 minutes and under the 8-minute travel time goal.

In order to meet the EFF for Village 4 South, the Millenia Fire Station would need to be operational and with a Type I Fire Engine. This assumes that each surrounding fire facility also has operational Fire Engine companies. A single fire engine responding from a nearby Station may not meet the operational needs in providing EFF, particularly for structure fires.





Village 4 Boundary
Fire Station Location
Study Area Road Network
Other Streets (SanGIS)

Lot Point - Station 3 Response Times
7-8 minute Travel Time
> 8 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 10

FS-03 Existing Fire Station Response Times

Fire Protection Plan - Village 4 South

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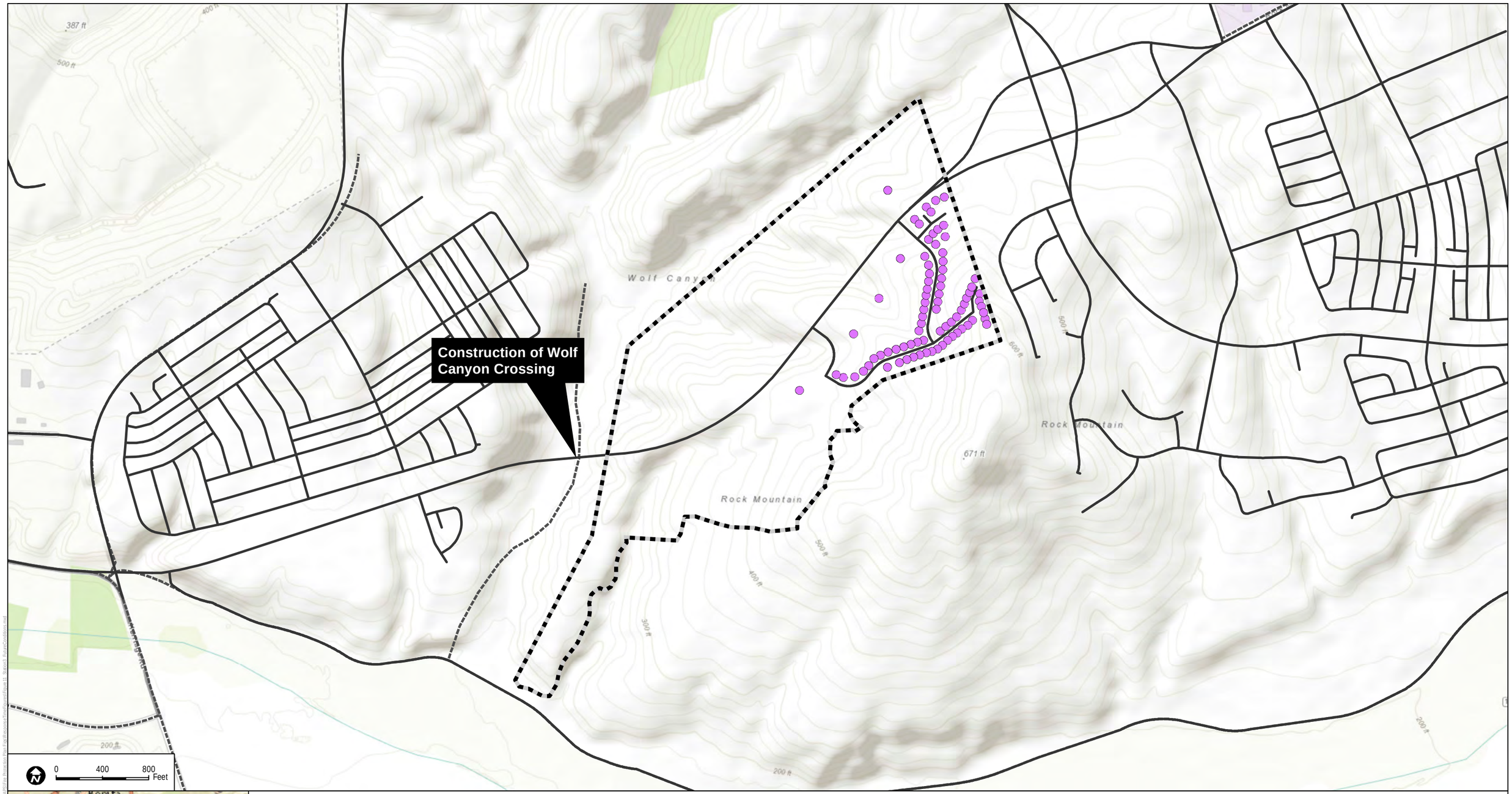

SOURCE: SanGIS 2015, Hunsaker 2016

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FIGURE 11

Proposed Road Network - FS-03 Fire Station Response Times

Fire Protection Plan - Village 4 South

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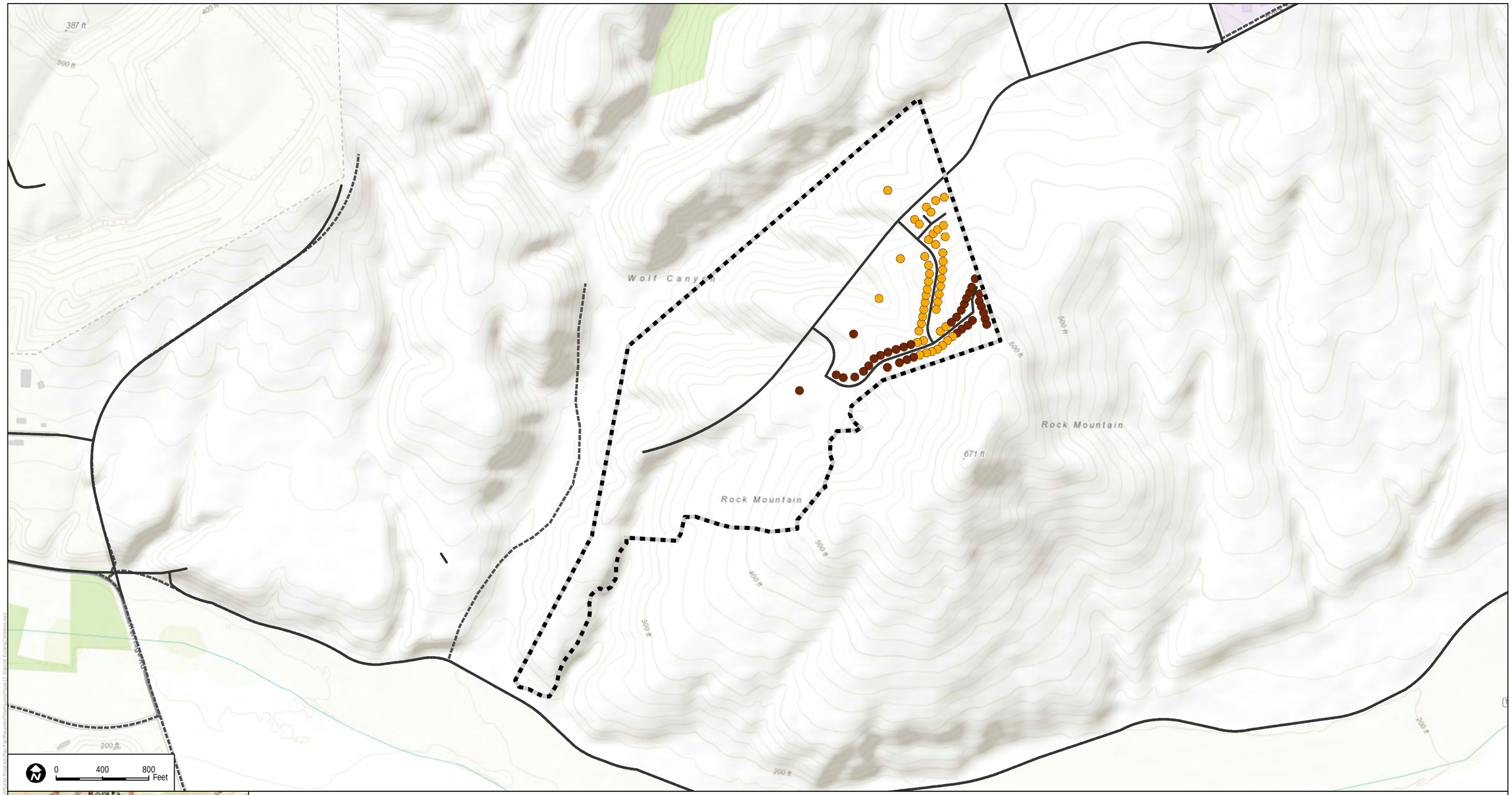

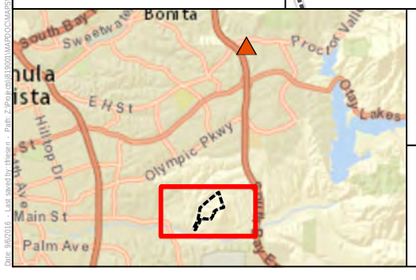

Village 4 Boundary
Fire Station Location
Study Area Road Network
Other Streets (SanGIS)

Lot Point - Station 6 Response Times

9-10 minute Travel Time
> 10 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

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FIGURE 12

FS-06 Existing Fire Station Response Times

Fire Protection Plan - Village 4 South

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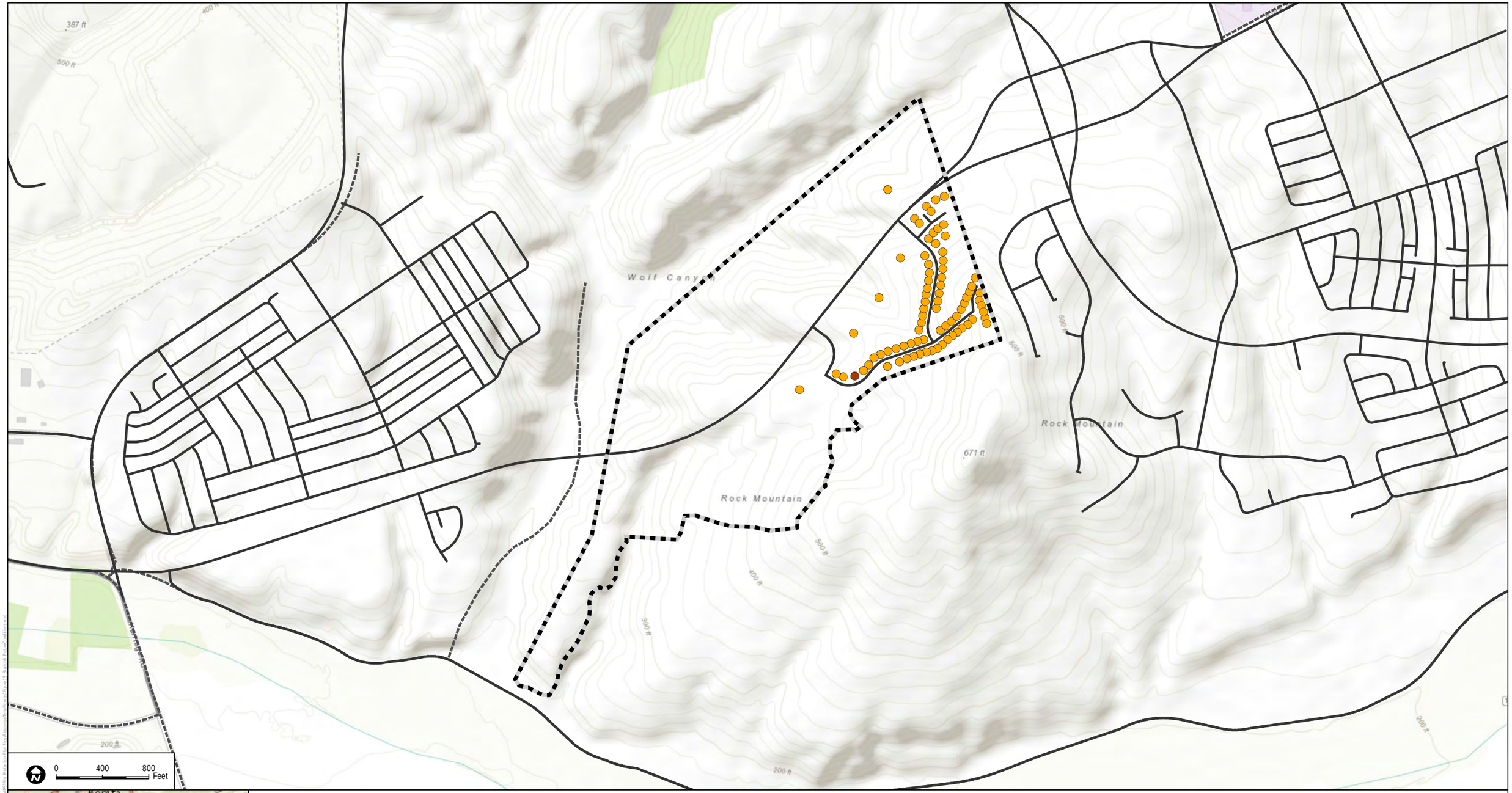

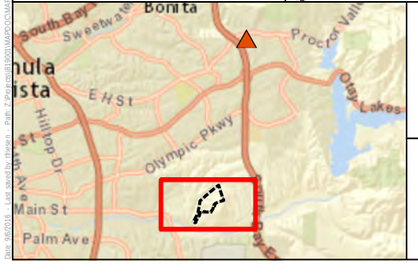

Village 4 Boundary
Fire Station Location
Study Area Future Road Network
Other Streets (SanGIS)

Lot Point - Station 6 Response Times

9-10 minutes Travel Time
> 10 minutes Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 13

Proposed Road Network - FS-06 Fire Station Response Times

Fire Protection Plan - Village 4 South

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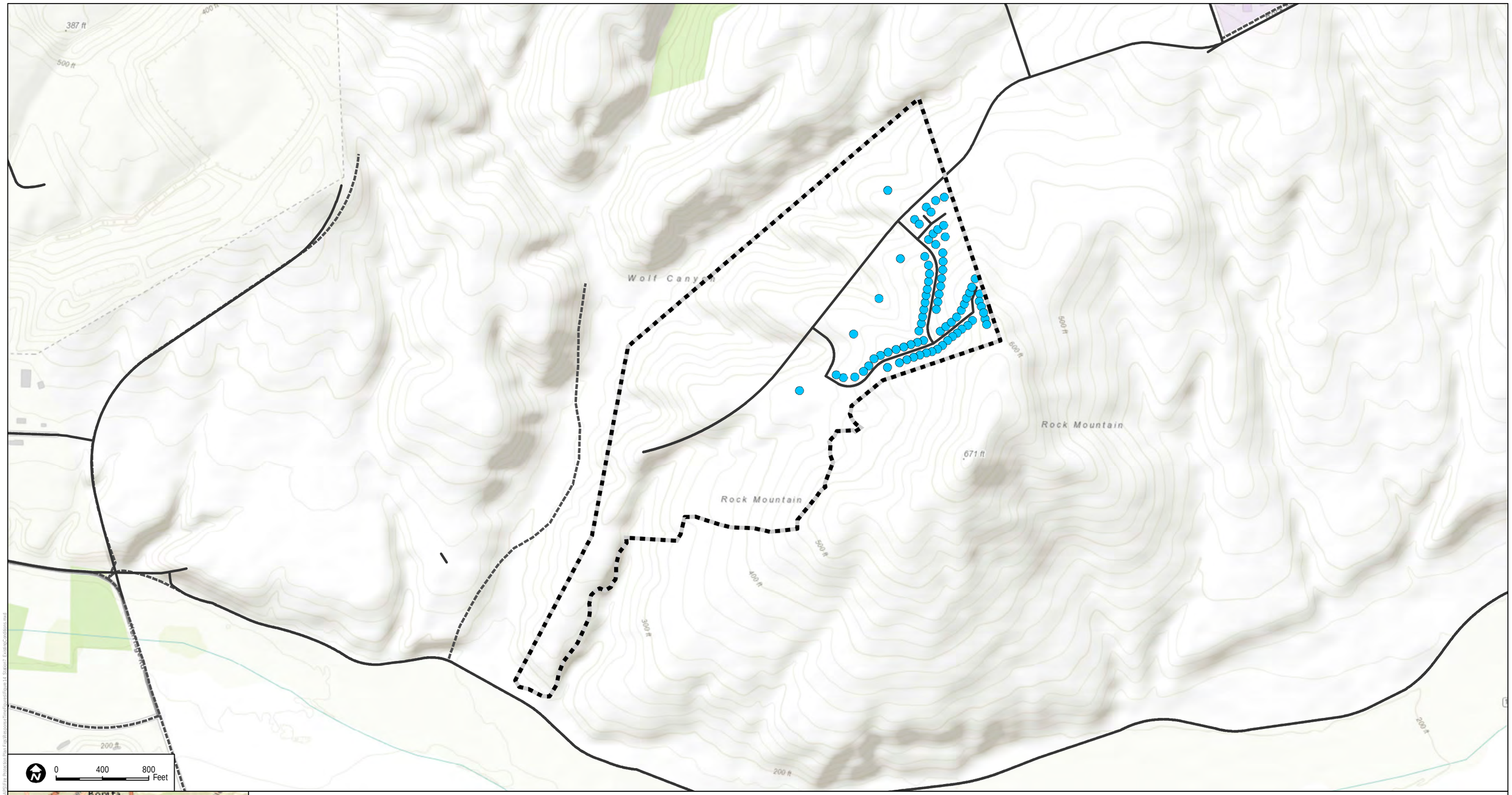

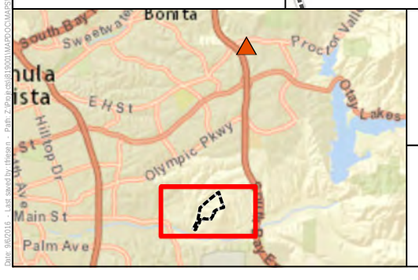

Village 4 Boundary
Fire Station Location
Study Area Road Network
Other Streets (SanGIS)

Lot Point - Station 7 Response Times
3-4 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

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FIGURE 14
FS-07 Existing Fire Station Response Times

Fire Protection Plan - Village 4 South

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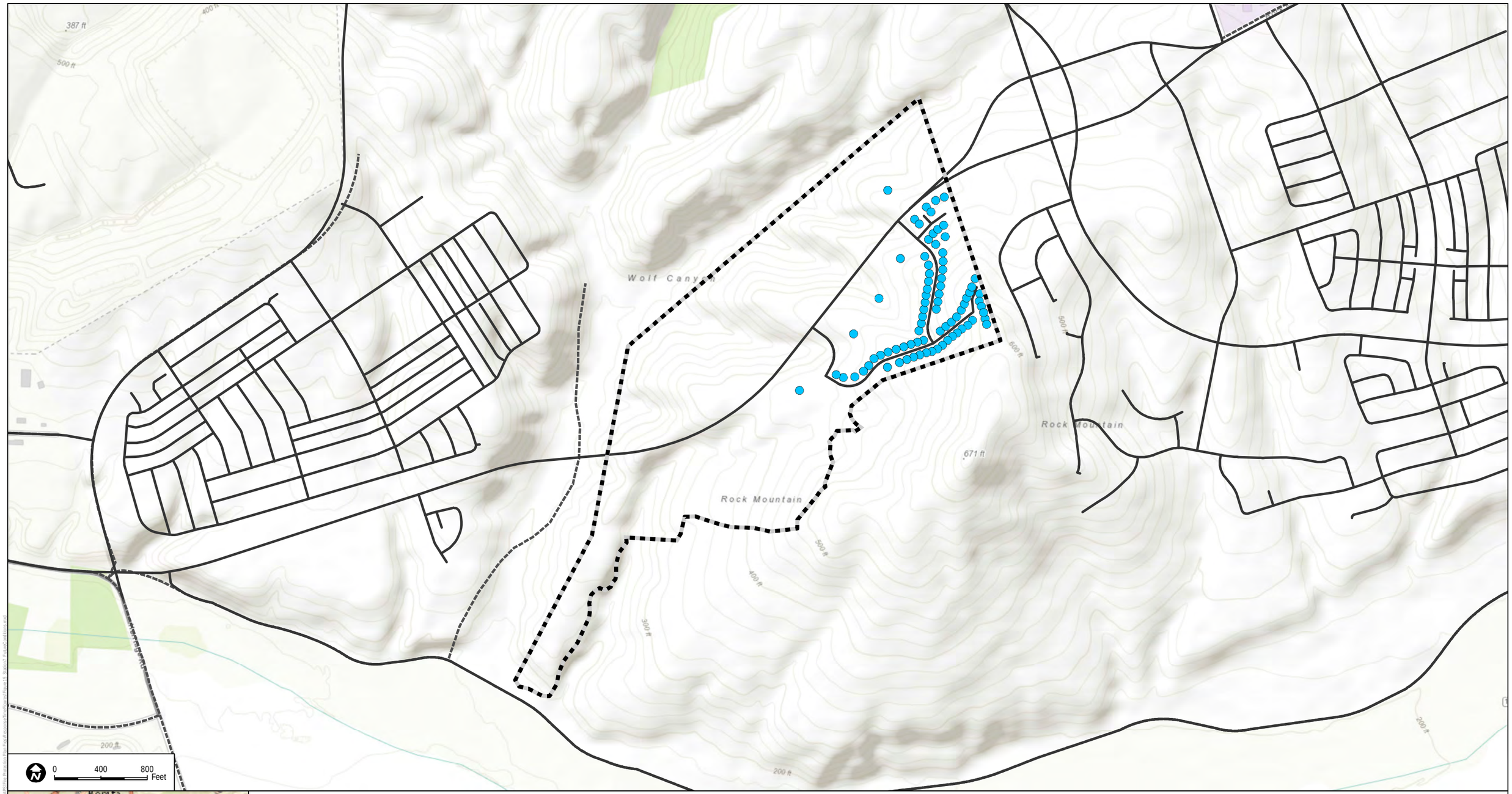

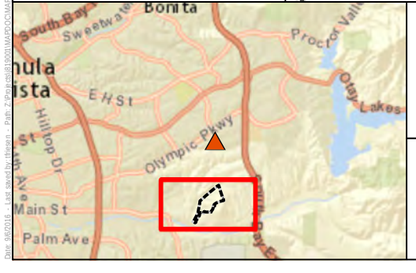

Village 4 Boundary
Fire Station Location
Study Area Future Road Network
Other Streets (SanGIS)

Lot Point - Station 7 Response Times
3-4 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 15

Proposed Road Network - FS-07 Fire Station Response Times

Fire Protection Plan - Village 4 South

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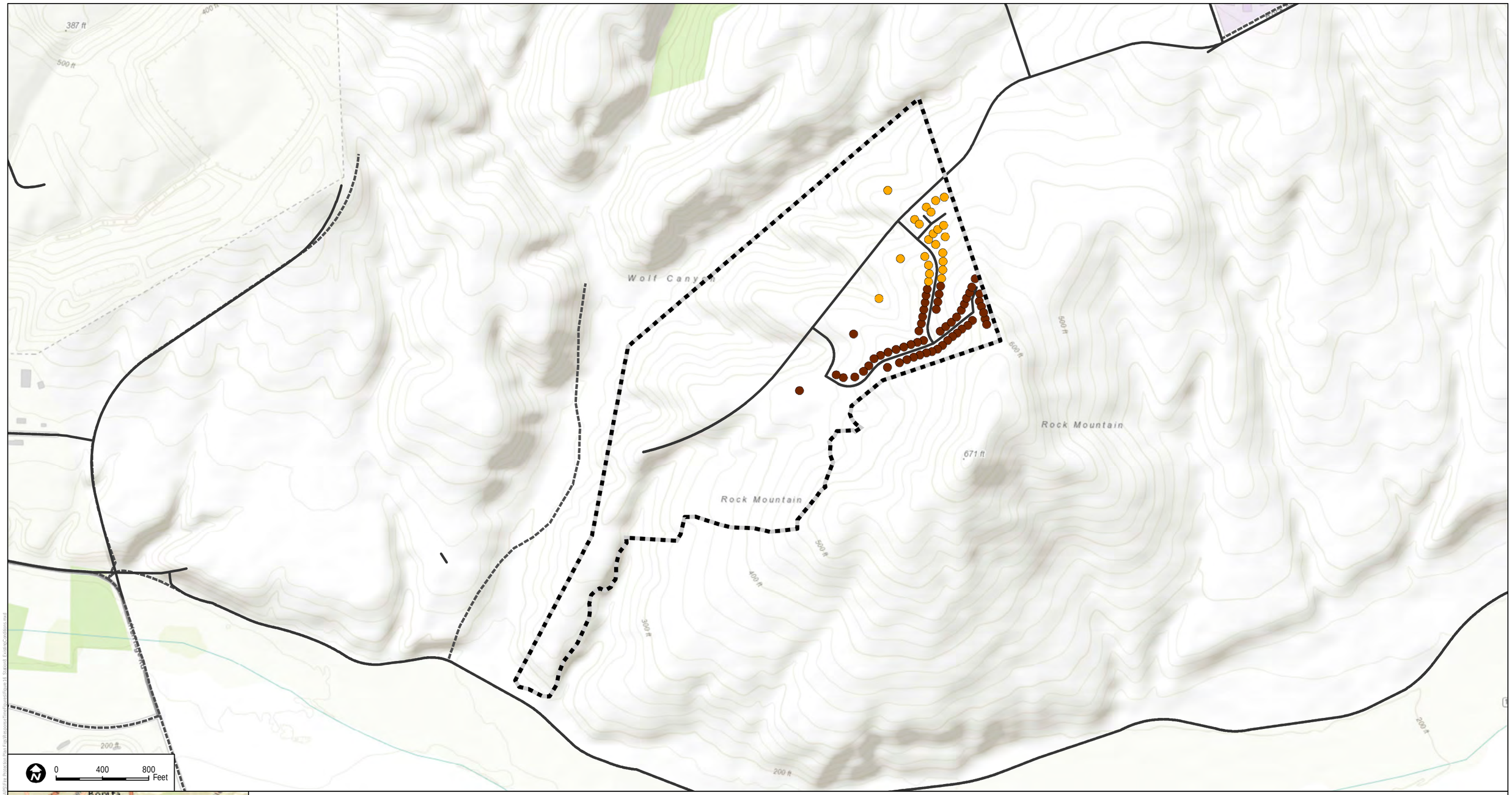

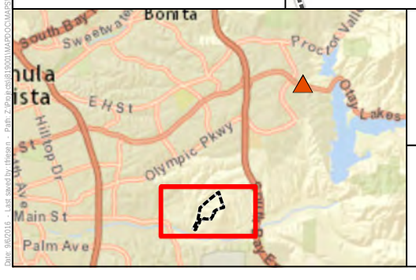

Village 4 Boundary
Fire Station Location
Study Area Road Network
Other Streets (SanGIS)

Lot Point - Station 8 Response Times
9-10 minute Travel Time
> 10 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 16
FS-08 Existing Fire Station Response Times

Fire Protection Plan - Village 4 South

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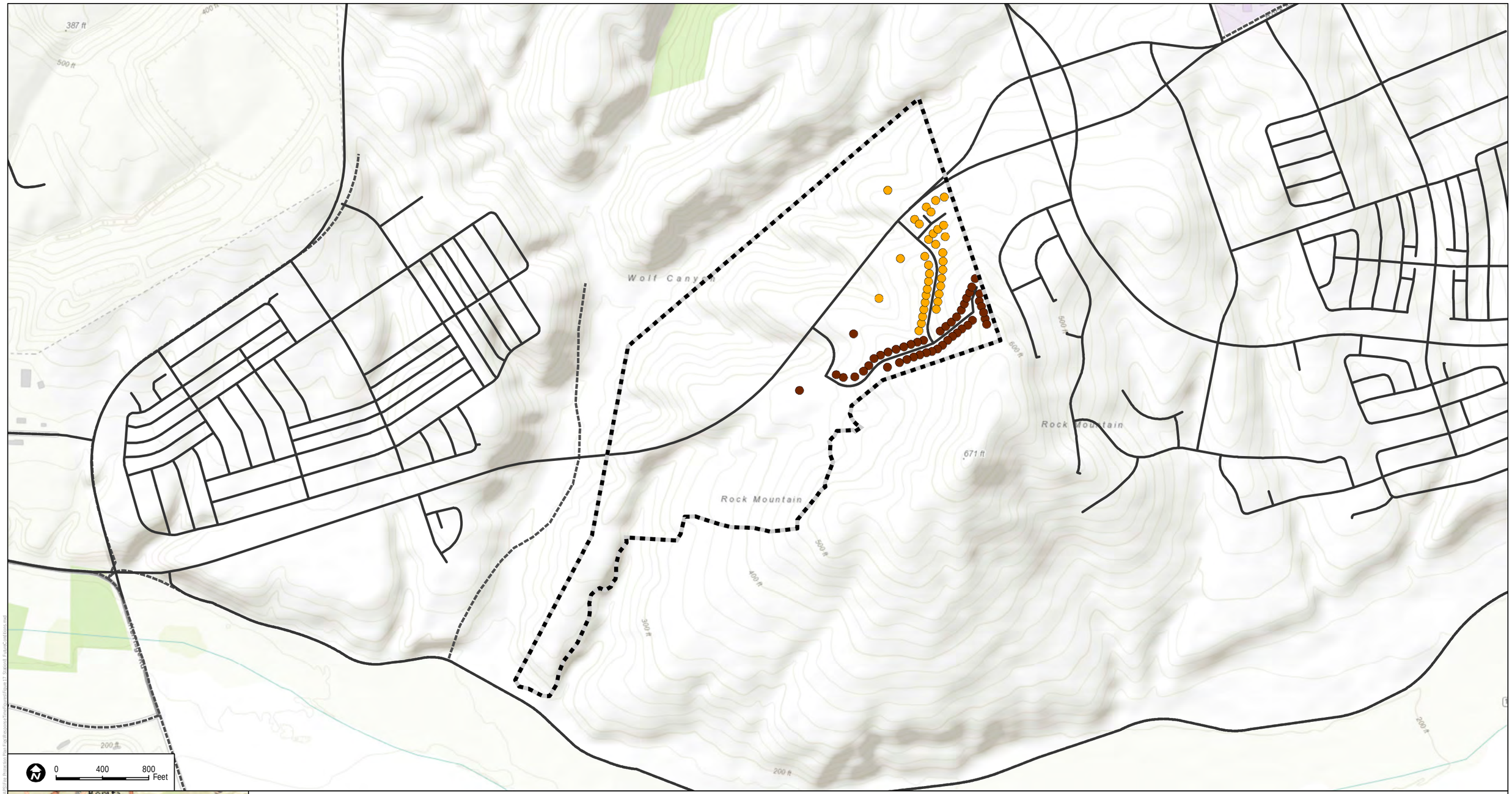

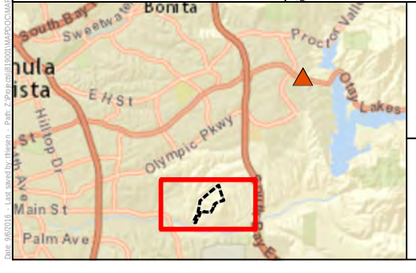

Village 4 Boundary
Fire Station Location
Study Area Future Road Network
Other Streets (SanGIS)

Lot Point - Station 8 Response Times

9-10 minute Travel Time
> 10 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 17

Proposed Road Network - FS-08 Fire Station Response Times

Fire Protection Plan - Village 4 South

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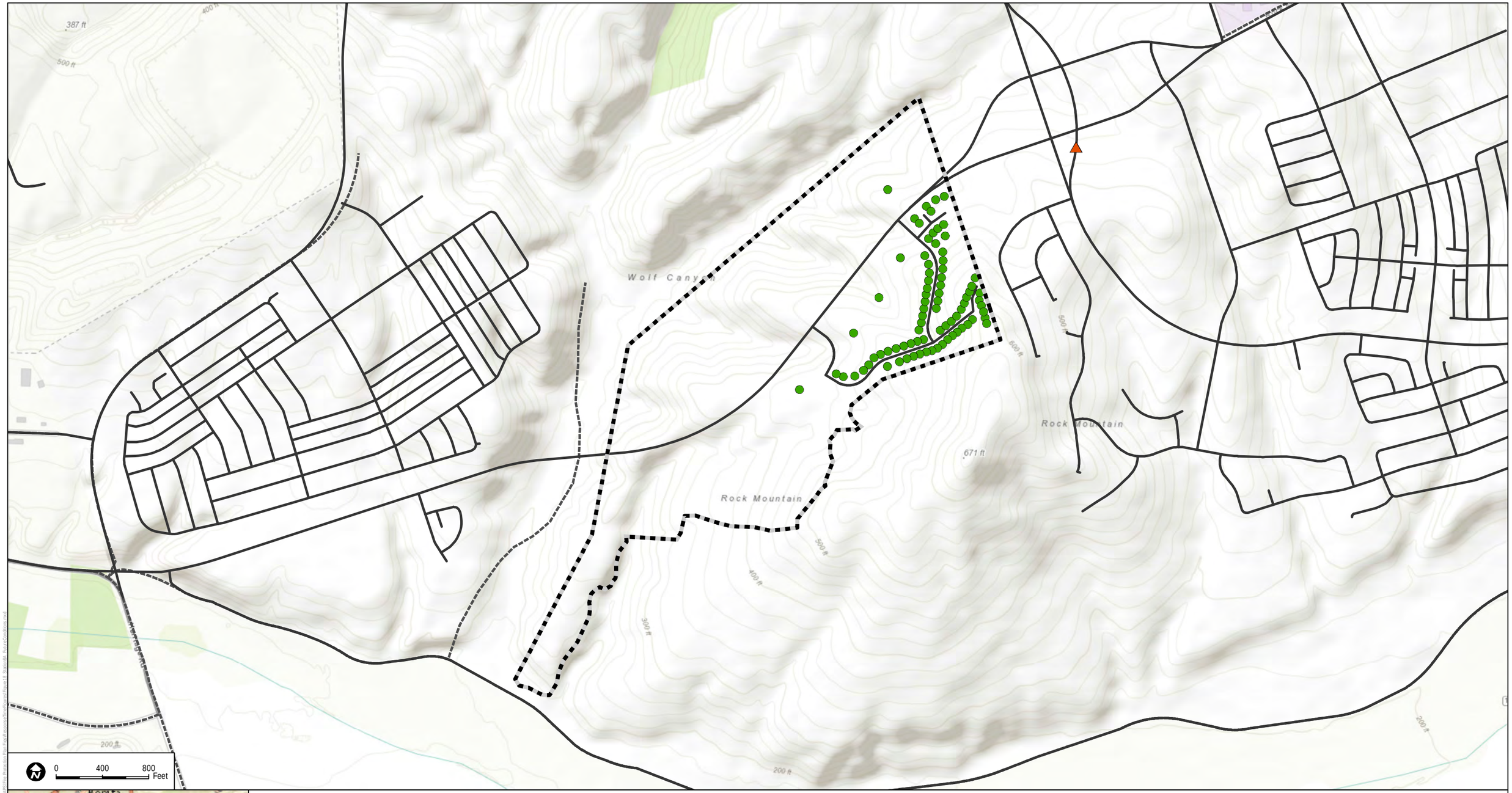

Village 4 Boundary
Proposed Fire Station Location
Study Area Future Road Network
Other Streets (SanGIS)

Lot Point - Station 8A Response Times
1-2 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

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FIGURE 18

New Fire Station 8 West - Proposed Road Network - Response Times

Fire Protection Plan - Village 4 South

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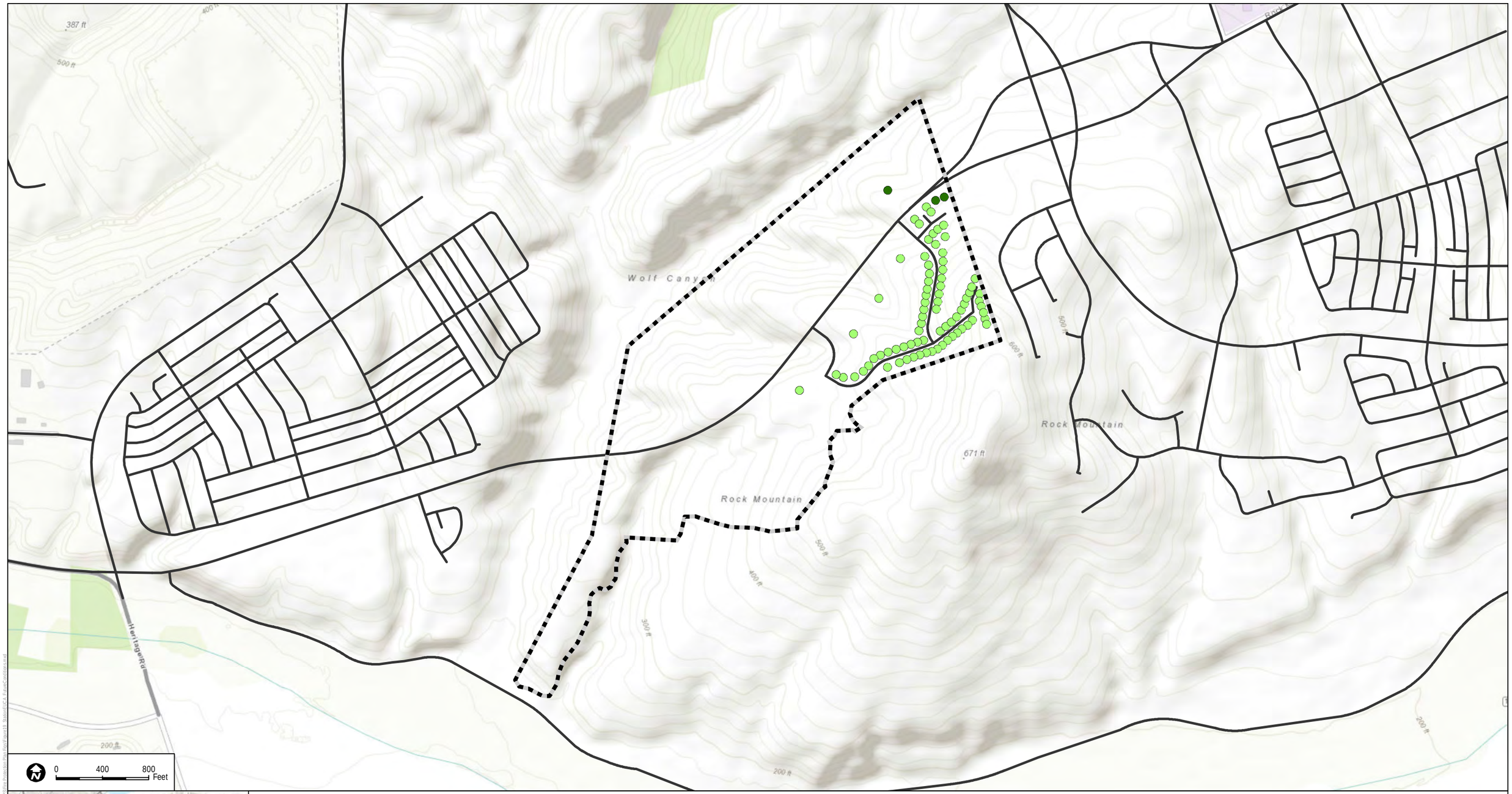

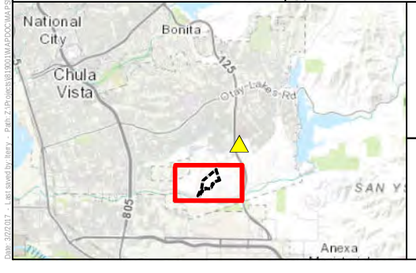

Village 4 Boundary
Proposed Millenia Fire Station
Study Area Future Road Network

Millenia FS Response Times
3-4 minute Travel Time
4-5 minute Travel Time

SOURCE: SanGIS 2015, Hunsaker 2016

DUDEK

FIGURE 19
Proposed Millenia Fire Station - Proposed Road Network - Response Times

Fire Protection Plan - Village 4 South

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Call volume at Stations 7, 3, 6, and 8 are currently estimated at 1,905, 1,639, 972, and 1,090 per year, respectively (CVFD 2016 Annual Stats Report[6]). The additional 0.23 call per day expected to be generated by Village 4South would not significantly stress existing emergency response capabilities of existing stations, but when considered cumulatively with surrounding development and related calls, would have the potential to result in a significant impact.

3.3 Impacts and Mitigation

3.3.1 Fire Response

The Village 4 South Project includes an increased number of new single- and multi-family housing units and up to 1,141 people. Service level requirements could, in the absence of additional fire facilities and resources improvements, cause a decline in the CVFD response times and capabilities. The requirements described in this FPP are intended to aid fire-fighting personnel and minimize the demand placed on the existing emergency service system.

Cumulative impacts from this type of project can cause fire response service decline and must be analyzed for each project. The Village 4 South Project represents an incremental increase in service demand due to the number of new structures and people living in or using the community. Based on the calculations presented in the preceding sections, and the estimated calls per day generated by the project, Village 4 South is anticipated to have a low impact on the response capability of the existing CVFD Fire Stations.

A second potential impact resulting from development in a WUI setting is related to the potential for increased exposure of residents to wildland fire. More people in a given area results in more opportunity for fire starts and subsequent exposure to dangerous conditions. The inclusion of homes adjacent to preserved open space areas and the potential for wildfire indicates the need for measures to minimize the likelihood of fire ignition and specialized wildland firefighting apparatus nearby should wildland fire occur.

The potential impacts to the firefighting and response resources and to the residents residing within this area are considered insignificant with respect to wildland fire. The project's inclusion of the most recent fire safety codes and a layered fire protection system, designed to reduce demands placed on the fire responders while minimizing exposure of humans to potentially harmful fire environments, will result in wildfire exposure levels that are below the significant threshold. The fact that the area has not been placed in a high or

[6] Call volumes include Engine 57 and Truck 57 (Station 7); Urban Search & Rescue 53 (Station 3); Engine 56 and Brush 56 (Station 6); and Engine 58 (Station 8).

very high fire hazard severity zone indicates that CVFD agrees that the fuels and terrain present lower risk of wildfire.

Features which are required and are therefore typically not considered mitigation, but that are relatively new Code requirements and play a critical role in minimizing structure ignition are; ignition resistant construction including roofs, walls and decks, vent restrictions, interior fire sprinklers, windows (dual pane/tempered), and fuel reduction areas. Although fire agencies do not provide "credit" for these features since they are required in the code, they do provide measureable safety improvements when used and are in the Code because they are so effective. Among other features that provide fire protection to Village 4 South are:

1. Specialized firefighting apparatus within the CVFD fleet for wildland and structure fires along with highly trained firefighters;
2. Customized fuel modification zones that will be managed and maintained throughout the year; The term "customized fuel mod zone" refers to fuel modification zones that are customized to this project based on results of fire behavior, ignition sources, weather, and fire risk.
3. Highly restrictive Fire and Building Codes for both residential and commercial/industrial buildings; and
4. Robust mutual and automatic aid agreements that provide a large arsenal of firefighters, and ground- and aerial- based firefighting apparatus.

Even with these fire protection features, the project and the Otay Ranch Subarea will require construction, staffing and equipping of the two proposed fire stations discussed above to meet the demands created by build out of the Otay Ranch and enable CVFD to respond within the new CVFD goal of 5-minute travel timeframe to 90% of incidents (first unit) and to assemble an EFF within 8 minutes. Overall phasing of the project and nearby projects (which all provide funding to these stations on a fair-share basis) will determine when additional fire stations are constructed. The Project must comply with the approved Chula Vista FFMP (2012), including fire facility siting, as approved by the Chula Vista City Council. With the two proposed fire stations within the Otay Ranch Subarea, construction of which will be supported on a fair share basis by the Project through property tax and payment of the Chula Vista Public Facility Development Impact Fee, the City's goal of 5 minutes driving time to 90% of all structure fires and medical emergency calls will be conforming.

Timing of the construction of the Project vs. the operational availability of the Fire Station 8 West will determine the appropriate action of the Project. Should the Station 8 West be operational prior to construction of the 121st dwelling unit, including either detached single family or attached

multi-family residential units within the Project, then no additional measures will be necessary as there will be two responding engines that can provide under 5 minutes travel time response to all structures in the project and result in 7 firefighters on scene, meeting the OSHA two-in, two-out standard. However, if the Project will proceed with construction of the 121st dwelling unit before Station 8 West is operational, the Project will coordinate with the CVFD and provide funding for a fourth firefighter position (three firefighters covering three shifts) until the Station 8 West is operational.The 121st unit as the trigger point for funding the 4th firefighter is proposed because it provides a financial base for the development and would be anticipated to trigger a call volume threshold approaching one call per week from the project.Additional fair-share funding will be provided by the Project according to standard City fees and assessments. An appropriate trigger will be negotiated and included in the Village 4 South Public Facilities Finance Plan with regard to fair-share funding for fire service.

3.3.2 Medical Response

The number of estimated EMS calls per day represents an incremental impact on current response capabilities and to the people who could require fast medical response for a variety of emergency medical situations. Response times will increase, given the potential for up to 0.23 calls per day associated with Village 4 South and especially with build-out of the greater project vicinity, without additional resources. The combination of two additional fire stations with paramedic units, as proposed by CVFD, along with ambulance service unit increases is anticipated to result in sufficient resources to respond throughout the Otay Ranch Subarea, including Village 4 South at build out.

Medical emergency response times cannot be mitigated for the most serious medical emergencies such as cardiac related emergencies. Advanced life support provided by paramedics on responding engines must arrive as quickly as possible, within 5.5–6 minutes to improve survivability (8 minutes if basic life support can be provided sooner). Six minutes includes the time to notify 911, for 911 to dispatch the closest engine, for the firefighters to "turnout", travel to the incident, locate the victim and engage medical treatments. It is common to require 60–90 seconds for dispatch and another 60–90 seconds for turnout. Travel times vary, but for Village 4 South, would be less than 4 minutes with the existing station 7 and under 2 minutes, once Village 8 West station is in operation, resulting in good response coverage and anticipated minimal impacts on the CVFD and emergency medical response provisions.

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

The Chula Vista area experiences periodic conditions that can result in wildfire and there are dedicated preserve areas that provide wildland fuels adjacent Village 4 South. Although the project site has not burned during the recorded fire history period, it is expected that wildfire could burn or spot onto the site. Additionally, structural fires and medical emergencies occur in urbanized areas and require response. As such, this FPP provides a summary of proposed and required infrastructure and special measures to provide fire protection.

4.1 Fuel Modification

WUI fire protection requires a systems approach, which includes the components of infrastructure and water, structural safeguards, and adequate fuel modification areas. This section provides standard Chula Vista Fire Department FMZ requirements while specific Village 4 South FMZ details are provided in following sections.

4.1.1 Standard Chula Vista Fuel Modification Zone Requirement

Definition

Fuel Modification Zone: A brush management area that is measured on a horizontal plane from the rear lot line extending outwards towards Preserve land or Vulcan quarry mining area. All brush management zones and related fuel modification activities shall occur either outside of the Preserve, except for Main Street and emergency secondary access roadside fuel modification, or within quarry lands. Fuel modification zones (FMZ) shall be a minimum of 100 feet in width. A 150-foot-wide FMZ will be installed for lots abutting designated Preserve Lands. To ensure long-term identification and maintenance, each respective FMZ shall be identified by a permanent marker system meeting the approval of CVFD.

General Criteria

1. Vegetation included on the Prohibited Plant List (Appendix C) is prohibited in any Fuel Modification Zone.
2. Prior to approval of any landscape and irrigation plans for areas designated FMZs, the Applicant shall provide proof to the City of Chula Vista that a Fire Protection Planning Consulting Firm has reviewed and confirmed that the plans are in conformance with the requirements of the FPP, Otay Ranch Village Four South.

3. All plant and seed material in Zones 1 to be locally sourced to the greatest extent possible to avoid genetically compromising the existing Preserve Vegetation.
4. Plant 50%–70% of the overall fuel modification zone with deep rooting plant material.
5. Maintain all plant material in irrigated zones in a hydrated condition.
6. Remove debris and trimmings produced by thinning and pruning from the site, except for larger woody debris that may be chipped and left on site for weed and erosion control.
7. There shall be no hedging of shrubs so that they do not form a means of rapidly transmitting fire from the native growth to the structures.
8. All mature trees must be limbed to six feet or 3x the height of understory plants, whichever is greater.
9. Plant shrubs in clusters not exceeding a total of 400 square feet.
10. Provide a distance of no less than the width of the largest shrub's mature spread between each shrub cluster.
11. Provide "Avenues" devoid of shrubs a minimum width of 6 feet and spaced a distance of 200 linear feet on center to provide a clear access route from toe of slope to top of slope.
12. Combustible materials, including chipped biomass, bark, wood chips, should be no closer than 5 feet to structures unless of size and type shown to reduce potential ignitions.
13. Provide a minimum 30-foot distance between mature canopies on slopes that exceed 40%.
14. Provide fire department access every 1,000 lineal feet along portions of the development adjacent to the Preserve areas or WUI.

Zone 1 (0–50 feet from rear lot line)

Zone 1 – Definition:

All public and private areas located between lot line and 50 feet outward. These areas may be located on public slopes, private open-space lots, or public streets, as illustrated on the landscape fuel modification exhibits.

Zone 1 – Specific Criteria:

1. Provide a permanent irrigation system within this irrigated wet zone.
2. Only those trees on the Approved Plant List (Appendix B) and those approved by the Development Services Director as not being invasive are permitted within this zone.

3. Tree limbs shall not encroach within 10 feet of a structure or chimney, including outside barbecues or fireplaces.
4. Provide a minimum of 30 feet between tree canopies.
5. Additional trees (excluding prohibited or highly flammable species) may be planted as parkway trees on single loaded streets.
6. Limit 75% of all groundcover and sprawling vine masses to a maximum height of 18 inches.
7. 25% of all groundcover and sprawling vine masses may reach a maximum height of 24 inches. Ground covers must be of high-leaf moisture content.
8. Shrubs shall be less than 2 feet tall and planted on 5-foot centers.
9. Randomly place approved succulent type plant material may exceed the height requirements, provided that they are spaced in groups of no more than three and a minimum of five feet away from described "clear access routes."
10. Vegetation/Landscape Plans shall be in compliance with this FPP.

Zone 2 (51–100 feet from lot line or 51 to 150 feet from lot line adjacent to Designated Preserve Lands)

Zone 2 – Definition:

All public and private areas located between the outside edge of Zone 1 and 50 feet outward to 100 feet, per this FPP. These areas may be located on public slopes, private open-space lots, public streets, as defined in the landscape fuel management exhibits.

Zone 2 – Specific Criteria:

1. Utilize temporary irrigation to ensure the establishment of vegetation intended to stabilize the slopes and minimize erosion.
2. Trees may be located within this zone, provided they are planted in clusters of no more than three. A minimum distance of no less than 30 feet shall be maintained between the tree cluster's mature canopies.
3. Only those trees on the Approved Plant List (Appendix B) and those approved by the Development Services Director as not being invasive shall be permitted within this zone.
4. 100% of all groundcover shall be limited to 50% at 24-inches and 50% at 36-inches.
5. Shrubs may be planted in clusters not exceeding a total of 400 sq. ft.

6. Provide a distance of no less than the width of the largest shrub's mature spread between each shrub cluster.
7. Provide “Avenue” devoid of shrubs a minimum width of 6 feet and spaced a distance of 200 linear feet on center to provide a clear access route from toe of slope to tope of slope.
8. When shrubs or other plants are planted underneath trees, the tree canopy shall be maintained at a height no less than three times the shrub or other plant's mature height (break up any fire laddering effect).
9. Hedging of shrubs is prohibited.

Village 4 South Specific FMZ Criteria

Fuel modification for Village 4 South (Figure 20) provides at least 100 feet of defensible space adjacent to non-Preserve areas and 150 feet adjacent to Preserve areas, as required. In addition, the fuel modification zones adjacent to many of the site’s structures will consist of non-traditional, but effective placement of low-flammability land uses that function as fuel modification (e.g., parking, swimming pools, tennis courts, irrigated green space, or roadways) on the perimeter of the development footprint.

Village 4 South FMZ Details follow:

1. Fuel modification will include at least 100 feet of modified fuels with a Zone 1 consisting of at least 50 feet of irrigated and restricted planting zone, and Zone 2, consisting of at least 50 feet of temporary irrigation reduced fuel and planting.
2. Fuel modification adjacent to Designated Preserve Lands (Figure 20) will be at least 150 feet wide, consisting of at least 50 feet wide Zone 1 and at least 100 feet wide Zone 2.
3. Fuel modification to the east of Village 4 South will tie into existing/proposed development area landscaping for Otay Ranch Village 8 West. If Village 4 South is constructed before Village 8 West, an interim, off-site 100-foot fuel modification zone will be installed per Zones 1 and 2 criteria. If needed, the project applicant will obtain a FMZ easement with the adjoining property owner. The FMZ easement will be recorded with the City.
4. Fuel Modification to the north of R-3 lot is adjacent to Preserve land. This multi-family residential lot will have 50 feetof irrigated and replanted manufactured slope and 100 feet of Zone 2 for a total of 150 feet. Fuel modification to the north of multi-family residential pads (R-2A and R-2B) consists of the 100-foot-wide Main Street with a planted median and 30 feet of irrigated and re-planted landscaping on both sides of the street. These lots face Preserve land, but will have a minimum of 150 feet of defensible space for structures built on the pads. Although seqments of Main Street and the north

side of fuel modification occur within the Preserve, the MSCP Subarea Plan allows for Planned Facilites, including Main Street and associated roadside fuel modification.

5. Some lots located along the southern edge of property and south side of Main Street are adjacent to Preserve open space area (Figure 20). Lots 22and the southern portion of Lot R-2B (multi-family housing) will be constrained to a minimum of 100 to 130 feet of FMZ due to adjacent, protected natural open space. Lot 22 will have 130 feet of FMZ consisting of the Community Purpose Facility (CPF) area with ball courts and passive areas in addition to a 24-foot wide, asphalt street. Lot R-2B will have a minimum of 100 feet FMZ consisting of a portion of the CPF area or a Zone 2 FMZ. Structures on Lot R-2B will also be setback to afford the full 100 feet FMZ.Additionally,a six-foot high heat deflecting wall, as described in Section 6.1 and presented on Figure 20, will be constructed at the top of slope to augment proposed fuel modification for Lots 22 and R-2B.
6. Lots 23 through 38 are adjacent to the Vulcan Quarry property, not a designated Preserve open space area. Lots 23 through 32 have 14 to 81 feet of a Zone 1 located on the Project site with the additional approximately 19 to 85 of a Zone 2 on quarry land for a total of 100 feet. Lots 33 through 38 have a full 100 feet inside the Project boundary. For those portions of FMZ extending onto Vulcan-owned property, the project applicant will obtain an FMZ easement with the adjoining property owner. The FMZ easement will be recorded with the City.
7. The Project must comply with the landscape and fuel modification plant palette contained in Appendix B, Suggested Plant List for a Defensible Space.

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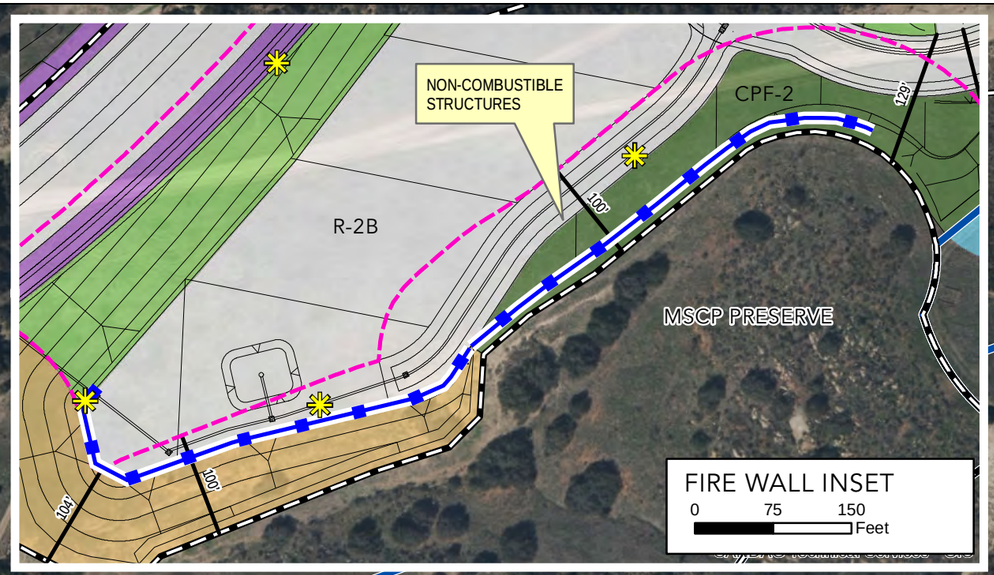
Fuel Modification Zones

- FMZ Zone 1 (irrigated)
- FMZ Zone 2 (50% thinning)
- 30-Ft Roadway Zone
- Off-Site FMZ Zone 2 (mowed vegetation)
- Interim Offsite 100-Ft FMZ (if needed)
- Community Purpose Facility
- HOA Maintained Interior Landscape Area
- FMZ Maintenance Access Points
- Fire Wall
- Preserve Edge (100-ft Offset from MSCP)
- Village 4 TM Boundary
- MSCP Preserve (Ultimate)
- On-Site FMZ Measurement
- Off-Site FMZ Measrement

NOTE: All FMZs are measured along a horizontal plane.



FUTURE VILLAGE 8 WEST

FUTURE MAIN STREET EXTENSION

EMERGENCY SECONDARY ACCESS SEE FIGURE 21A

0 300 Feet

SANDAG Technical Services - GIS

SOURCE: HUNSAKER & ASSOCIATES 2017

FIGURE 20

Fuel Modification Zone Exhibit

DUDEK

8190

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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4.1.2 Other Vegetation Management

A. Construction Period Vegetation Management

Vegetation management requirements will be implemented at commencement and throughout the construction phase. Vegetation management will be performed pursuant to CVFD requirements on all lots or areas prior to the start of work and prior to any import of combustible construction materials. Adequate fuel reductions will occur through thinning, mowing, or blading 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:

1. All new power lines will be underground, for fire safety during high wind conditions or during fires on a right-of-way which can expose aboveground power lines. Temporary overhead power/utility lines are permitted within construction zones.
2. Fuel modification zones will not extend into biological open space or other sensitive biological areas, or other areas controlled by the City and/or resource agencies.
3. Caution must be used to avoid 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.
4. Vegetation management activities associated with facilities under construction within the MSCP Preserve shall be limited to the impact area identified and analyzed in the Village 4 South EIR. No vegetation management activities are permitted within the Preserve, except for roadside fuel modification for Main Street and emergency secondary access roadway as described in Section B. Emergency brush management activities within the MSCP Preserve must comply with the Chula Vista MSCP Subarea Plan, Section 7.4.4.3 Emergency Brush Management.
5. All structures will be in strict, ongoing compliance with all Fire and Building Code requirements.

B. Roadside Fuel Modification Zones (Including Driveways)

1. High BTU producing flammable vegetation including shrubs and trees shall be 50% thinned or removed and replanted with approved fire resistive plant material within roadside FMZs

2. All roads in the development will have the following FMZs widths as follows:
   a. Fire Access Roads – 30 feet from edge of pavement, but not within MSCP Preserve.
   b. New roads/driveways – 30 feet from edge of pavement, but not within MSCP Preserve.
   c. Existing roads/driveways – 20 feet from edge of pavement, but not within MSCP Preserve.

   Exceptions:

   1. The 30 feet wide roadside FMZ for Main Street will occur within the MSCP preserve. This required brush management as a Planned Facility is allowed by the City's MSCP Subarea Plan.

   2. Fuel modification on both sides of the proposed emergency secondary access roadway will have 30 feet of 50% thinned brush or grasses cut to 4 inches in height.
3. Tree and shrub canopies shall be spaced such that interruptions of tree crowns occur and horizontal spacing of 30 feet between mature canopies of trees or tree groups is maintained.
4. Mow/trim grass to 4 inches.
5. Single tree specimens, fire resistive shrubs, or cultivated ground cover such as green grass, succulents or similar plants used as ground covers may be used, provided they do not form a means of readily transmitting fire.
6. Trees are permitted within the Roadside Vegetation Management Zones, subject to following criteria:
   a. Provide 20 feet between mature tree canopies (30 feet if adjacent to a slope steeper than 41%).
   b. Limb mature trees up to one-third the height of mature tree or 6 feet, whichever is greater.
   c. Tree canopies lower than 13 feet 6 inches are prohibited over roadways.
   d. Tree trunks may not intrude into roadway width.
   e. Comply with the Prohibited Plant List (Appendix C) .
   f. Remove flammable understory beneath trees.
   g. Maintain vegetation under trees to 2 feet in height or below, and no more than one third the height of the lowest limb/branch on a mature tree, in order to keep the area fire resistive.

C. Open Space, Parks, etc.

1. Parks, if applicable, and open space landscape areas must comply with the guidelines in this FPP.
2. Remove flammable vegetation.
3. Maintain and mow/trim grasses to 4 inches.
4. Trees, plants, and shrubs must comply with the criteria in the FPP and the Sugeested Plant List for a Defensible Space (Appendix B).
5. Comply with the Prohibited Plant List (Appendix C) .
6. Remove down and dead vegetation as observed.
7. Properly plant and maintain trees consistent with this FPP.

D. Vacant Parcels and Lots

1. Vegetation management will not be required on vacant lots until construction begins. However, perimeter Vegetation Management Zones must be implemented prior to commencement of construction utilizing combustible materials.
2. Vacant lots adjacent to active construction areas/lots will be required to implement vegetation management if they are within 30 feet of the active construction area. Perimeter areas of the vacant lot shall be maintained as a Vegetation Management Zone extending 30 feet from roadways and adjacent construction areas.
3. Prior to issuance of a permit for any construction, grading, digging, installation of fences, etc., the 30 feet at the perimeter of the lot is to be maintained as a Vegetation Management Zone. However, this 30 foot vegetation management zone may not extend into the MSCP Preserve.
4. In addition to the establishment of a 30-foot-wide vegetation management zone prior to combustible materials being brought on site, existing vegetation on the lot shall be reduced by at least 60% upon commencement of construction.
5. Dead fuel, ladder fuel[7] , and downed fuels shall be removed and trees/shrubs shall be properly limbed, pruned and spaced per this plan.

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

E. Preserve Areas

At the time of this FPP, there is no anticipated need to conduct vegetation management within adjacent Preserve areas. However, should conditions arise due to unforeseen or uncontrollable circumstances that leads to unsafe conditions, emergency brush management activities within the MSCP Preserve must comply with the Chula Vista MSCP Subarea Plan, Section 7.4.4.3 Emergency Brush Management.

F. Alternative Methods

As fire protection technology continues to evolve and application of fire protection and suppression systems, materials, and methods become acceptable to fire agencies, this FPP provides an alternate means of providing defensible space. Builders or private lot owners may submit a site specific risk assessment and detailed Vegetation Management Plan (VMP) with an Alternative Materials and Methods justification, to the CVFD proposing alternative methods of fire protection and providing justification for any variance from the recommended vegetation management zones, if there is a practical difficulty, or environmental constraint, in providing the entire size of the necessary vegetation management zone detailed herein. The VMP will need to fully justify any alternative means and methods/mitigation measures proposed for reductions in the fuel modification areas and the CVFD Fire Marshal shall have full authority to approve or deny the requested variance.

G. Private Lots

This FPP provides direction for selecting lower flammability plant material along with planting and maintenance requirements. The 100 or 150 feet fuel modification zones are required to use low flammability plantings consistent with this FPP. In addition, it is recommended that none of the plant materials listed in the "Prohibited Plant List" (Appendix C) in this plan or otherwise known to be especially flammable be planted on private lots. This FPP or a summary of its key points will be provided to all buyers in a private property owner's guide to living in a fire environment. Deed restrictions will be recorded indicating the fuel modification zones on each private lot, as appropriate. Deed restrictions shall run with the land and be conveyed to any subsequent owner of the private lot. In addition, the project Codes, Covenants, and Regulations (CC&Rs) shall include a reference to the FPP to ensure compliance with the FPP.

All subsequent landscape plans and associated plant pallets prepared for areas located adjacent to the preserve are subject to the review and approval of the MSCP Section of the Development Services Department.

4.1.3 Maintenance

Vegetation management shall be completed annually by May 1 of each year and more often as needed for fire safety, as determined by the CVFD. Homeowners and private lot owners shall be responsible for all vegetation management on their lots, in compliance with this FPP which is consistent with CVFD requirements. The "Approved Maintenance Entity" shall be responsible for and shall have the authority to ensure long term funding, ongoing compliance with all provisions of this FPP, including vegetation planting, fuel modification, vegetation management, and maintenance requirements on all private lots, multifamily residences, parks, common areas, roadsides, and open space under their control (if not considered biological open space). Any water quality basins, flood control basins, channels, and waterways should be kept clear of flammable vegetation, subject to Section 4.1.2.D. The Approved Maintenance Entity shall obtain an inspection and report from a CVFD–authorized Wildland Fire Safety Inspector, in May of each year, certifying that vegetation management activities throughout the Project Site have been performed pursuant to this FPP and CVFD standards. This report will be funded by the Approved Maintenance Entity and submitted to CVFD Fire Marshal for approval.

4.2 Infrastructure

4.2.1 Access

Site access, including fire lane, driveway, and entrance road widths, primary and secondary access, gates, turnarounds, dead end lengths, signage, aerial fire apparatus access, surface, and other requirements will comply with the requirements of the 2016 California Fire Code and CVFD Standards. Fire access will be reviewed and approved by CVFD prior to construction.

Open Space/Canyon Access for firefighters will be provided every 1,000 lineal feet on the perimeter of the project adjacent Preserve areas.

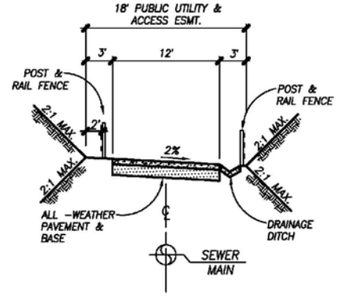
4.2.2 Roads

1. **Primary Access Road**. Primary access to the project site will be provided via La Media Road to Main Street.
2. 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.
3. Cul-de-sac bulbs are required on dead-end roads in residential areas where roadways serve more than two residences and per City standards.

4. Road infrastructure improvements shall accommodate fire department apparatus turning capabilities per CVFD's Auto Turn detail, which can be downloaded at http://www.chulavista.ca.gov/home/showdocument?id=2844.
5. The longest dead-end road (cul-de-sac) allowed by the 2016 California Fire Code is 800 feet for this community. The project includes dead-end cul-de-sac lengths that will exceed 800 feet, but is proposed for a modification based on provision of an emergency secondary access road that resolves this issue.
6. **Emergency Secondary Access Road**. Because the project may be constructed prior to the completion of the Main Street Extension, which would negate the long dead end road on site, the project proposes exiting Wiley Road as an emergency secondary egress route (Figures 2, 21a, and 21b). The road would be improved to 18 to 25 feet, provided a 12 feet wide, all weather surface that will be approved by CVFD, and maintained in a passable condition. The road will also be over access and utility line easement. The road includes a short section that exceeds 12% up to 19%, but does not exceed 20%. This section will be provided a concrete, deep broom finish surface to enhance traction.
7. Roadways and/or driveways will provide fire department access to within 150 feet of all portions of the exterior walls of the first floor of each structure.
8. Roadway design features (e.g., speed bumps, humps, speed control dips, planters, fountains) that could interfere with emergency apparatus response speeds and required unobstructed access road widths will not be installed or allowed to remain on roadways. Traffic Calming features (i.e., raised intersections, intersection neck downs, roundabouts and parallel bay parking with landscape pop-outs) shall be allowed, subject to approval by the CVFD.
9. Vertical clearance of vegetation along roadways will be maintained at 13 feet, 6 inches. Vertical clearance in the commercial, school, and multi-family structure areas to be clear to the sky to allow aerial ladder truck operation. There shall be no power or utility lines over roadway at build out.
10. Angle of driveway/roadway approach/departure will not exceed 7° (12%) per CVFD.
11. Road grades will not exceed 10%, unless approved by the Fire Chief.
12. Developer will provide information illustrating the new roads, in a format acceptable to the City, for updating of City maps.
13. Any roads that have traffic lights shall have Fire District–approved traffic preemption devices (Opticom) compatible with devices on the Fire Apparatus.

4.2.3 Gates

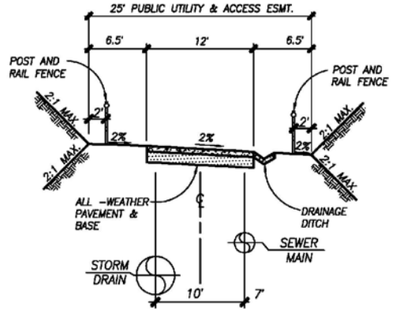
Access gates will comply with CVFD Standards applicable at the time of building plan approval.



NOTES:
1. ALL WEATHER UTILITY ACCESS ROAD FOR ONE UTILITY.

UTILITY ACCESS ROAD

NOT TO SCALE



NOTES:
1. ALL WEATHER UTILITY ACCESS ROAD FOR TWO UTILITIES.

UTILITY ACCESS ROAD

NOT TO SCALE

FUTURE MAIN STREET BRIDGE

OPEN SPACE PRESERVE

VILLAGE 4

18' ACCESS & UTILITY EASEMENT WITH 18' GRADED WIDTH & 12' ALL WEATHER ACCESS ROAD (1 UTILITY-Sewer)

TRIPLE BOX CULVERT 2-4'X5'&1-4'X6' (TO BE VERIFIED AT FINAL ENGINEERING)

HAMMERHEAD TURNAROUND FOR MAINTENANCE VEHICLES (18' x 90')

201.5 FS

25' ACCESS & UTILITY EASEMENT WITH 25' GRADED WIDTH & 12' ALL WEATHER ACCESS ROAD (2 UTILITIES-Sewer & Storm Drain)

OFFSITE SEWER/STORM DRAIN ALIGNMENT

15' UTILITY EASEMENT (1 UTILITY-Storm Drain)

HAMMERHEAD TURNAROUND FOR MAINTENANCE VEHICLES

EMERGENCY SECONDARY ACCESS

18' ACCESS & UTILITY EASEMENT WITH 18' GRADED WIDTH & 12' ALL WEATHER ACCESS ROAD (1 UTILITY-Sewer)

25' ACCESS & UTILITY EASEMENT WITH 25' GRADED WIDTH & 12' ALL WEATHER ACCESS ROAD (2 UTILITIES-Storm Drains)

290.0

Proposed Access & Utility Easement

12-Ft All-Weather Access Road

30-Ft Roadway Zone

Village 4 TM Boundary

0 60 120 Feet

DUDEK

8190

BASE SOURCE: HUNSAKER 2017

FIGURE 21A

Emergency Secondary Access

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

Z:\Projects\8190\100\MAPPOC\MAPS\FIRE\VILLAGE4\Revision_March2014\Figure12-FuelModification.mxd

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EMERGENCY SECONDARY ACCESS

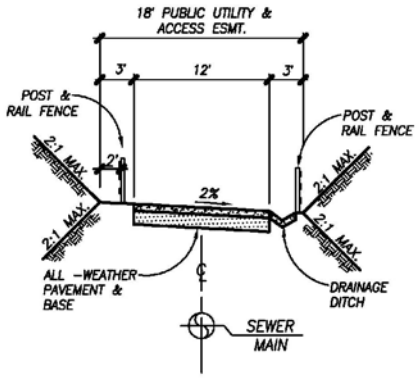
TURNAROUND AT BOTTOM OF BASIN FOR MAINTENANCE VEHICLES

WATER QUALITY BASIN

OPEN SPACE PRESERVE

18' ACCESS & UTILITY EASEMENT WITH 18' GRADED WIDTH & 12' ALL WEATHER ACCESS ROAD (1 UTILITY-Sewer)

WILEY ROAD



NOTES:
1. ALL WEATHER UTILITY ACCESS ROAD FOR ONE UTILITY.

UTILITY ACCESS ROAD

NOT TO SCALE

Proposed Access & Utility Easement

12-Ft All-Weather Access Road

30-Ft Roadway Zone

Village 4 TM Boundary

0 60 120 Feet

DUDEK

8190

BASE SOURCE: HUNSAKER 2017

FIGURE 21B

Emergency Secondary Access

FIRE PROTECTION PLAN - OTAY RANCH VILLAGE 4 SOUTH

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4.2.4 Driveways

Any structure that is 150 feet or more from a common road in the development shall have a paved driveway meeting CVFD requirements as follows:

1. Grades 10% or less with surfacing and sub-base consistent with CVFD.
2. Approved fire apparatus turnaround with inside radius no less than 40 feet, except for a mini-bulb (30 feet radius) on Street E, which is only 90 feet from center of bulb to the centerline of Street D.
3. Driveways serving two houses or fewer will be 16 feet wide unobstructed with a fire apparatus turnaround. Driveways serving more than two houses will be a minimum 20 feet wide, unobstructed.
4. Courtyard driveways, if applicable, shall be designated as fire lanes and identified in accordance with CVFD Fire Lane Identification Standards.
5. Lighted house addresses shall be posted at the entrance to each driveway if house numbers are not visible from the street.

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

1. All structures required to be identified by street address numbers at the structure. Numbers to be minimum 6 inches high with 1-inch stroke (0 to 50 feet from face of curb), 10-inches high with 1.5-inch stroke (51 to 150 feet from face of curb), or 16 inches with 2-inch stroke (greater than 150 feet from face of curb). Numbers will contrast with background.
2. Multiple structures located off common driveways will include posting addresses on structures, on the entrance to individual driveways, and at the entrance to the common driveway for faster emergency response.
3. Proposed roads within the development will be named, with the proper signage installed at intersections to satisfaction of the CVFD and the Department of Public Works.
4. Streets will have street names posted on non-combustible street signposts. Letters/numbers will be 4 inches high, reflective, on a 6-inch-high backing. Signage will be 7 feet above grade. There will be street signs at the entrances to the development, all intersections, and elsewhere as needed subject to approval of the Fire Chief.
5. Access roads to private lots to be completed and paved prior to issuance of building permits and prior to the occurrence of combustible construction.

4.3 Ignition Resistant Construction

All new structures within Village 4 South will be constructed to CVFD Fire Code standard. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the 2013 CBC (Chapter 7A) and Chapter 5 of the Urban-Wildland Interface code.. 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.

While these standards will provide a high level of protection to structures in this development, and should reduce the potential for ordering evacuations in a wildfire, there is no guarantee that compliance with these standards will prevent damage or destruction of structures by fire in all cases.

4.3.1 Additional Requirements and Recommendations Based on Occupancy Type

All California Fire and Building requirements for higher occupancy structures will be provided to Village 4 South buildings that include higher occupancies. Included in the high occupancy category are multi-family residences over three units, attached condominiums, and multi-story buildings over two stories.

4.4 Fire Protection System Requirements

4.4.1 Water Supply

Water service will be provided by the Otay Water District. Water supply requirements specified in the California Fire Code (Section 404 of the Wildland-Urban Interface Code and Appendix B – Fire Flow Requirements for Buildings, Appendix C – Fire Hydrant Locations and Distribution {Chula Vista revisions – Sections 15.36.050 and 15.36.055}) including for hydrants and interior sprinklers will be provided for Village 4 South.

Hydrants shall be located along fire access roadways and cul-de-sacs as determined by the CVFD Fire Marshal to meet operational needs. Hydrants will be consistent with CVFD Design Standards and provided every 500 feet (on-center).

4.4.2 Fire Sprinklers

All structures within Village 4 South will include interior sprinklers, per code requirements (Section R313.3 of the 2013 California Residential Code, Chapter 9, Section 903 of the 2013 Chula Vista Fire Code, and Section 602 of the Urban-Wildland Interface Code). Sprinklers will be specific to each occupancy type and based on the most recent NFPA 13, 13R, or 13D, requirements.

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

As previously mentioned, due to environmental constraints (i.e., Preserve open space area) associated with portions of amulti-family lot (R-2B) and a single-family lot (Lot 22) located in the southwestern portion of the project (Figure 20), the available area for FMZ is limited. These lots achieve a minimum of 100 feet to the nearest biological open space boundary. 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 150 feet wide fuel modification zone adjacent to designated Preserve land.

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 south of these lots, a large area of fuel conversion has occurred related to Vulcan Materials Company's Chula Vista Rock Quarry 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 toward a 100 feet wide, irrigated landscaped manufactured slope. A heat-deflecting wall will be positioned at the top of slope/pad edge for the two affected lots.

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 2016 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 Strucutre Ignition Assessment Model (SIAM) results indicate that a 20-foot high flame has minimal radiant heat to ignite a structure (bare wood) beyond 33 feet (horizontal distance). Whereas, a 70-foot high flame may require about 130 feet of clearance to prevent structure ignitions from radiant heat (Cohen and Butler 1996). This study utilized bare wood, which is more combustible than the 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 grass fires in the off-site areas below Lots 23 and R-1B would result in roughly 10-foot flame lengths under summer conditions. Extreme conditions may result in longer flame lengths, approaching 34 feet in coastal sage scrub plant community. However, extreme fire conditions typically include Santa Ana winds which would tend to push flames away from the project site on this southwestern 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 (150 feet in width) for structures adjacent to Preserve designated land. 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.

5.1 Heat Deflecting Walls

The project's slopes in the areas of concern along with the elevated lots/pads provide an opportunity to place a non-combustible, six foot tall, heat-deflecting wall (lower 1 to 2 feet block wall and upper 4 to 5 feet dual pane, one pane tempered glazing or a six feet high concrete block wall) to provide additional deflection for these lots to compensate for the reduced fuel modification zones and top of slope setbacks (Figure 20).

When buildings are set back from slopes, and a wall is placed at the top of slope, flames spreading up those slopes are deflected vertically and over the structure where cooling occurs, reducing the effects of convective heat on the structure. Walls like these have proven to deflect heat and airborne embers on numerous wildfires in San Diego, Orange, Los Angeles, Ventura, and Santa Barbara County. Rancho Santa Fe Fire Protection District, Laguna Beach Fire Department, Orange County Fire Authority, and others utilize these walls as Alternative methods based on observed performance during wildfires. This has lead to these agencies approving use of non-combustible landscape walls as mitigations for reduced fuel modification zones and reduced setbacks at top of slope. These walls are consistent with NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3 and International Urban Wildland Interface Code (ICC 2012). NFPA 1144, A.5.1.3.3 states: "Noncombustible walls and barriers are effective for deflecting radiant heat and windblown embers from structures." These walls and barriers are usually constructed of noncombustible materials (concrete block, bricks, stone, stucco) or earth with emergency access openings built around a development where 30 feet (9 meters) of defensible space is not available.

Figure 22. Example of Heat Deflecting View Wall

Heat-deflecting view walls of masonry construction with fire-rated glazing at minimum meeting Chapter 7A of the 2016 CBC (20 minute rating), that are six feet in height (roughly lower two feet masonry construction and upper four feet dual pane, one pane tempered glazing or equivalent) will be incorporated at top of slope for southwestern portion of lots 22 and R-2B, as depicted in Figure 20.

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6 WILDFIRE EDUCATION

Village 4 South residents will be provided on-going education regarding wildfire, evacuation plans, and this FPP's requirements. This educational information will be prepared by the community HOA, reviewed by the CVFD, and will support the fire safety and relocation features/plans designed for this community. Informational handouts, community Web-site page, mailers, fire safe council participation, inspections, and seasonal reminders, are some methods that will be used to disseminate wildfire and relocation awareness information. CVFD will review and approve all wildfire educational material/programs before the HOA printing and distribution.

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7 MAINTENANCE AND LIMITATIONS

In order to ensure that the proposed improvements and uses are provided suitable fire protection that will minimize risks associated with fire, all components of the fire protection system must be maintained and in place. This FPP, when approved, provides the direction and nexus for that maintenance to occur. Specifically, the HOA or other funded management entity will be funded and authorized to ensure that at least annual inspections of the fuel modification areas, construction features, fire protection systems, and infrastructure to ensure that they meet the requirements specified in this FPP.

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8 CONCLUSION

This FPP for the proposed Village 4 South complies with the requirements of Chula Vista Fire Department and its adopted Fire Codes (2016 California Fire Code and 2000 Urban-Wildland Interface Code) and 2016 Building Codes (Chapter 7A).

This FPP utilizes a "systems approach" for specifying fire protection measures. The measures consist of the components of fuel modification, structural protection, water supply, fire protection systems, access (ingress/egress), and well-planned emergency response. This FPP provides details regarding the general fire protection features as well as the site specific, restrictive policies that will govern Village 4 South with regards to fire protection. In addition, this FPP incorporates and relies on the proposed fire station locations outlined in the 2014 Council-approved, Chula Vista FFMP. Village 4 South must comply with this plan.

The requirements and recommendations provided in this FPP have been designed specifically for the proposed improvements adjacent to the wildland urban interface zone at Village 4 South.

Ultimately, it is the intent of this FPP to guide the fire protection efforts for Village 4 Southin a comprehensive manner. Implementation of the measures detailed in this FPP will reduce the risk of wildfire at this site, will improve the ability to safely relocate people from the area during wildfire events or temporarily shelter them under emergency conditions, and will improve the ability to fight fires on the properties and protect property and neighboring resources irrespective of the cause or location of ignition.

It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and minimizing actions identified in this report are designed to reduce the likelihood that fire will impinge upon Village 4 South assets or threaten its residents or visitors. Additionally, there are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the fuel modification requirements provided in this FPP will reduce the site's vulnerability to wildfire. It will also help accomplish the goal of this FPP to assist firefighters in their efforts to defend existing structures and reduce overall fire risk.

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APPENDIX A

Photograph Log

Photograph log

Otay Ranch Village 4 South

Photograph 1. View of eastern portion of property on right-hand side of dirt road up to Rock Mountain. Red arrow illustrates mowed grass fuel type on adjacent property that was modeled for fire run #1.

Photograph 2. View of fuel types in the eastern and central portions of property. Majority of site is short grasses with patches of Diegan coastal sage scrub. Short grasses and sage scrub were modeled in fire runs #1 and #2, respectively.

Photograph 3. Photograph of fuel types (short grasses and sage scrub) adjacent to northern edge of project site. Red arrows indicate Fire run #4.

Photograph 4. View of disturbed grasslands and off-road activity just north of the project site near La Media Road.

Photograph 5. Photograph looking up Wolf Canyon from southwestern portion of project site. The fuel types shown (grasses and sage scrub) were modeled in fire run #3.

Photograph 6. Coastal sage scrub (off-site fuels) and narrow strip of riparian located west and south of project area. Fuels modeled for fire run #3.

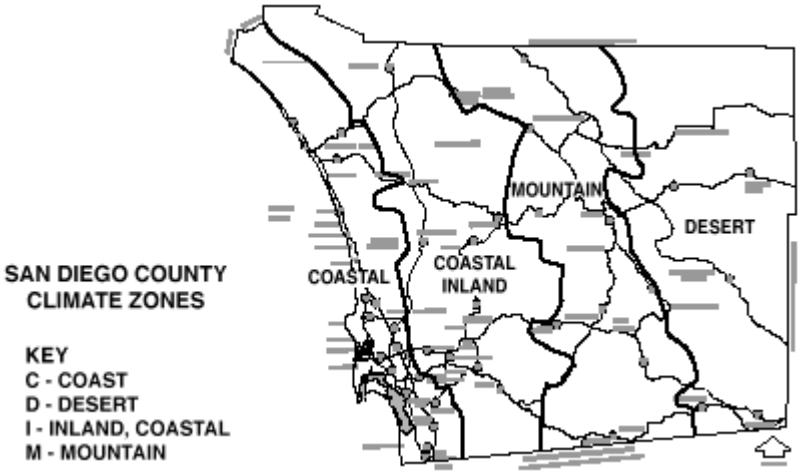
Photograph 7. Photograph of coastal sage scrub habitat and rocky terrain that occurs on south side of Rock Mountain and adjacent to the project area. Fuels modeled for fire run #2.

APPENDIX B

Suggested Plant List for a Defensible Space

SUGGESTED PLANT LIST FOR A DEFENSIBLE SPACE[1]

All plants on the following list are considered drought-tolerant in the climate zone indicated. Remember, however, that no plant is totally fire resistant. Drought- tolerant plants are trees, shrubs, groundcovers, and other vegetation that can grow and reproduce with only natural moisture such as rainfall. Occasional irrigation is necessary only in extreme drought situations.



Plants that are indicated by the **"R"** are the least drought-tolerant plants on the list. These plants grow best in riparian areas. Riparian areas can be described as areas where the water table is very near the surface of the ground. Although the ground may be dry, the plants growing there will be green and lush all year around.

When first planting drought-tolerant plants, you need to water deeply to encourage the roots to find natural moisture in the soil. This type of watering needs to continue for at least three years. More water should be provided in summer and less (if any) in the winter. After three years, you should be watering the plants less and depending more on the natural rainfall to provide moisture.

Plants on the list which are noted with ** are San Diego County native or naturalizing plant species. These are types of plants native to or brought into the San Diego County area. These plants are able to grow and reproduce in the local climate and the natural rainfall is enough moisture.

[1] Source: County of San Diego, Department of Planning and Land Use, Building Division. *Fire, Plants, Defensible Space and You*.

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

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

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

Heteromeles arbutifolia**	Toyon	C/I/M
Lantana spp.	Lantana	C/I/D
Lotus scoparius	Deerweed	C/I
Malacothamnus		
clementinus	San Clemente Island Bush Mallow	C
fasciculatus**	Mesa Bushmallow	C/I
Melaleuca spp.	Melaleuca	C/I/D
Mimulus spp.**	Monkeyflower	C/I (R)
Nolina		
parryi	Parry's Nolina	I
parryi ssp. wolfii	Wolf's Bear Grass	D
Photinia spp.	Photinia	All Zones
Pittosporum		
crassifolium		C/I
rhombifolium	Queensland Pittosporum	C/I
tobira 'Wheeleri'	Wheeler's Dwarf	C/I/D
viridiflorum	Cape Pittosporum	C/I
Plumbago auriculata	Cape Plumbago	C/I/D
Prunus		
caroliniana	Carolina Laurel Cherry	C
ilicifolia**	Hollyleaf Cherry	C
lyonii**	Catalina Cherry	C
Puncia granatum	Pomegranate	C/I/D
Pyracantha spp.	Firethorn	All Zones
Quercus		
dumosa**	Scrub Oak	C/I
Rhamus		
californica*	Coffeeberry	C/I/M
Rhaphiolepis spp.	Rhaphiolepis	C/I/D
Rhus		
integrifolia**	Lemonade Berry	C/I
ovata**	Sugarbush	I/M
trilobata**	Squawbush	I
Ribes		
viburnifolium	Evergreen Currant	C/I
speciosum**	Fuschia-Flowering Gooseberry	C/I/D
Rosa		
californica**	California Wild Rose	C/I
minutifolia	Baja California Wild Rose	C/I

	Sambucus spp.**	Elderberry	C/I/M
	Symphoricarpos mollis**	Creeping Snowberry	C/I
	Syringa vulgaris	Lilac	M
	Teucrium fruticans	Bush Germander	C/I
	Xylosma congestum	Shiny Xylosma	C/I

GROUNDCOVERS		
Aptenia cordifolia	Apteria	C
Ceanothus spp.**	California Lilac	C/I/M
Cerastium tomentosum	Snow-in-Summer	All Zones
Cotoneaster spp.	Redberry	All Zones
Drosanthemum hispidum	Rosea Ice Plant	C/I
Dudleya		
brittonii	Brittonis Chalk Dudleya	C
pulverulenta**	Chalk Dudleya	C/I
virens	Island Live Fore-ever	C
Eschscholzia californica**	California Poppy	All Zones
Euonymus fortunei		
'Carrierei'	Glossy Winter Creeper	M
'Coloratus'	Purple-Leaf Winter Creeper	M
Ferocactus viridescens**	Coast Barrel Cactus	C
Helianthemum spp.**	Sunrose	All Zones
Lantana spp.	Lantana	C/I/D
Lasthenia		
californica**	Common Goldfields	I
glabrata	Coastal Goldfields	C
Lupinus spp.**	Lupine	C/I/M
Myoporum spp.	Myoporum	C/I
Pyracantha spp.	Firethorn	All zones
Rosmarinus officinalis	Rosemary	C/I/D
Santolina		
chamaecyparissus	Lavender Cotton	All Zones
virens	Santolina	All Zones
Viguiera laciniata**	San Diego Sunflower	C/I

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

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

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

APPENDIX C

Prohibited Plant List

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Prohibited Plant List

Prohibited Trees

Botanical Name	Common Name	Resource
Abies species	Fir trees	S
Acacia species	Acacia	HS
Agonis juniperina	Juniper myrtle	S
Araucaria species	Norfolk island Pine	S
Callistemon species	Bottlebrush	H
Cedrus species	Cedar	HS
Chamaecyparis species	False cypress	S
Cinnamomum camphora	Camphor tree	H
Conifers	Evergreen trees	H
Cryptomeria japonica	Japanese cryptomeria	S
Cupressocyparis leylandii	Leylandii cypress	S
Cupressus forbesii	Tecate cypress	S
Cupressus glabra	Arizona cypress	S
Cupressus sempervirens	Italian cypress	S
Cupressus species	Cypress	H
Eucalyptus species	Eucalyptus	HS
Eucalyptus	Eucalyptus species	K
Juniperus species	Juniper	H
Larix species	Larch	S
Olea europea	Olive tree	H
Palmae species	Palms	HS
Parkinsonia aculeata	Mexican palo verde	K
Pinus species	Pine	HS
Pittosporum undulatum	Victorian box	K
Podocarpus species	Fern pine	S
Prunus caroliniana	Carolina cherry laurel	K
Prunus lyonil	Catalina cherry	K
Pseudotsuga menziesii	Douglas fir	S
Quercus engelmannii	Engelmann oak	K
Quercus suber	Cork Oak	K
Schinus molle	California Pepper Tree	H
Tamarix species	Tamarix	C
Taxodium species	Cypress	S
Taxus species	Yew	S
Tsuga species	Hemlock	S
Washingtonia filifera	California Fan Palm	H

Prohibited Groundcovers, Shrubs, and Vines

Botanical Name	Common Name	Resource
Acacia species	Acacia	HS
Achillea millefolium	Common yarrow	K
Adenostoma fasciculatum	Chamise	HS
Adenostoma sparsifolium	Red shanks	HS
Aeonium decorum	Aeonium	K
Aeonium simsii	NCN	K
Ajuga reptans	Carpet bugle	K
Anthemis cotula	Mayweed	H
Aptenia cordifolia x 'red apple'	Red apple	K
Arbutus menziesii	Madrone	H
Arctostaphylos species	Manzanita	H
Artemisia pycnocephala	Beach sagewort	K
Artemisia californica	California sagebrush	HS
Artemisia caucasica	Caucasica artemisia	H
Artemisia pycnocephala	Sandhill sage	H
Artemisia species	Sages	H
Arundo donax	Giant cane	C
Atriplex species	Saltbush	H
Atriplex canescens	Four-wing saltbush	K
Atriplex lentiformis ssp. *breweri*	Brewer saltbush	K
Baccharis pilularis consanguinea	Chaparral bloom	H
Baccharis pilularis var. *pilularis*	Twin peaks	K
Baccharis species	Coyote bush	H
Bambusa species	Bamboo	S
Bougainvillea species	Bougainvillea	H
Brassica nigra	Black mustard	H
Brassica rapa	Yellow mustard	H
Cardaria draba	Hoary cress, perennial peppergrass	H
Carpobrotus species	Ice plant, hottentot fig	H
Carpobrotus chilensis	Sea fig ice plant	K
Chrysanthemum leucanthemum	Oxeye daisy	K
Cirsium vulgare	Wild artichoke	H
Conyza canadensis	Horseweed	H
Coprosma pumila	Prostrate coprosma	S
Cortaderia selloana	Pampas grass	HC
Crassula lactea	NCN	K
Crassula multicava	NCN	K
Crassula ovata	Jade tree	K
Crassula tetragona	NCN	K
Cytisus spp.	Scotch broom, French broom, etc.	HC
Delosperma 'alba'	White trailing ice plant	K

Prohibited Groundcovers, Shrubs, and Vines

Botanical Name	Common Name	Resource
Dodonaea viscosa	Hopseed bush	S
Drosanthemum floribundum	Rosea ice plant	K
Drosanthemum hispidum	NCN	K
Drosanthemum speciosum	Dewflower	K
Eriogonum fasciculatum	Common buckwheat	H
Eriogonum species	Common buckwheat	HS
Eschscholzia mexicana	Mexican poppy	K
Fremontodendron species	Flannel bush	H
Gaillardia x grandiflora	Blanketflower	K
Gazania hybrids	South African daisy	K
Gazania rigens leucolaena	Trailing gazania	K
Hedera helix	English ivy	H
Helix canariensis	English ivy	K
Heterotheca grandiflora	Telegraph plant	HS
Hypericum calycinum	Aaron's beard	K
Juniperus species	Juniper	S
Lactuca serriola	Prickly lettuce	H
Lampranthus aurantiacus	Bush ice plant	K
Lampranthus filicaulis	Redondo creeper	K
Lampranthus spectabilis	Trailing ice plant	K
Limonium pectinatum	NCN	K
Limonium perezii	Sea lavender	K
Lonicera japonica	Japanese honeysuckle	S
Lonicera japonica 'halliana'	Hall's Japanese honeysuckle	K
Lotus corniculatus	Bird's foot trefoil	K
Mahonia species	Mahonia	H
Malephora luteola	Trailing ice plant	K
Miscanthus species	Eulalie grass	S
Muhlenbergia species	Deer grass	S
Nerium oleander	Oleander	K
Nicotania bigelovii	Indian tobacco	H
Nicotania glauca	Tree tobacco	H
Ophiopogon japonicus	Mondo grass	K
Osteospermum fruticosum	Trailing African daisy	K
Penstemon spectabilis	Beard tongue	K
Pennisetum setaceum	Fountain grass	C
Perovskia atriplicifolia	Russian sage	H
Pickeringia 'montana'	Chaparral pea	S
Plantago sempervirens	Evergreen plantain	K
Portulacaria afra	Elephant's food	K
Potentilla tabernaemontani	Spring cinquefoil	K

Prohibited Groundcovers, Shrubs, and Vines

Botanical Name	Common Name	Resource
Rhamnus alaternus	Italian buckhorn	K
Rhus diversiloba	Poison oak (worker/firefighter safety)	H
Rhus laurina	Laurel sumac	H
Rhus lentii	Pink flowering sumac	H
Ricinus communis	Castor bean	H
Romneya coulteri 'white cloud'	White cloud matilija poppy	K
Rosmarinus species	Rosemary	S
Salsola australis	Russian thistle	H
Salvia mellifera	Black sage	S
Salvia species	Sage	H
Sedum acre	Goldmoss sedum	K
Sedum album	Green stonecrop	K
Sedum confusum	NCN	K
Sedum lineare	NCN	K
Sedum x rubrotinctum	Pork and beans	K
Senecio serpens	NCN	K
Solanum xantii	Purple nightshade (toxic)	H
Silybum marianum	Milk thistle	H
Tamarix spp.	Tamarisk	K
Tecomaria capensis	Cape honeysuckle	K
Thuja species	Arborvitae	S
Trifolium hirtum 'hyron'	Hyron rose clover	K
Trifolium fragiferum 'o'connor's	O'Connor's legume	K
Urtica urens	Burning nettle	S
Verbena species	Verbena	K
Vinca major	Periwinkle	H
Vinca minor	Dwarf periwinkle	K
Vulpia myuros 'zorro'	Zorro annual fescue	K
Yucca species	Yucca	K

Exceptions:

1. The use of palm trees is prohibited within any Vegetation Management Zones, however Palm trees may be permitted within the interior of the development (in moderation), with prior approval from the CVFD. Proper spacing, irrigation and maintenance required.
2. Bougainvillea species may be used in certain interior areas (in very moderate amounts), with prior approval from the CVFD.

Notes:

1. Various documents are referenced as sources for plant material information in this list of prohibited plant material. The titles of some of those reference documents suggest that some of the plant materials may be somewhat "Fire Retardant." It must be understood that under various fire conditions, all plant materials will burn. Accordingly, some seemingly "Fire Retardant" plants appear in this Prohibited Plant List.
2. Plant species included on this Prohibited Plant List that also occur on the Landscape Concept Plan may be used in limited quantities in interior locations, with approval of the CVFD."Fire Resistant." Others are documented as "High Fire Risk." Notwithstanding any other descriptors, the preparers of this document have determined that plants in this Prohibited Plant List shall not be used within the Brush Management Zones within this project.
3. All vegetation used in Vegetation Management Zones and elsewhere in this development shall be subject to approval of the CVFD's Fire Marshal.
4. Any deviations from the Prohibited Plant List must be submitted to the CVFD's Fire Marshal for approval

Sources:

C: City of Chula Vista, Fire Retardant and/or Drought Tolerant Plant List, Landscape Manual, November 1994
H: Hunt Research Corporation Report, Otay Ranch, Village 7/2 - Fire Protection Plan, June 14, 2005
S: County of San Diego, Suggested Plant List for Defensible Space, http://www.sdcounty.ca.gov/dplu/dos/UndesirablePlants.pdf
K: Appendix K, City of Chula Vista MSCP Subarea Plan: San Diego County Fire Chief's Association Fuel Modification Zone Plant List, July 15, 1997

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