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# MEMORANDUM

| | |
|---|---|
| **To:** | Justin Gibson, Fire Division Chief: Director of Fire Prevention and Support Services, Chula Vista Fire Department |
| **From:** | Michael Huff, Principal Fire Protection Planner |
| **Subject:** | Village 8 West Fire Protection Plan Addendum and Figures Updates |
| **Date:** | October 25, 2019 |
| **Attachment (s):** | Attachment 1 – *Updated Figure 4 – Parcel P Cross Section A-A Profile of Village 8 West Fuel Reduction Technical Analysis Report* |
| | Attachment 2 – *Updated Figure 5 – Parcel V Cross Section B-B Profile of Village 8 West Fuel Reduction Technical Analysis Report* |
| | Attachment 3 – *Fuel Modification Reduction Technical Analysis Report for Village 8 West, Chula Vista, California (May 2018)* |
| | Attachment 4 – *Updated Figure 10 – Village 8 West Fuel Modification Zones of Approved Village 8 West Fire Protection Plan* |

The Otay Ranch Village 8 West Sectional Planning Area Plan and Tentative Map Final Environmental Impact Report (FEIR) (State Clearinghouse No. 2010062093) (City of Chula Vista 2013) for the Otay Ranch Village 8 West project was approved by the City of Chula Vista City Council in December 2013 and included the Village 8 West Fire Protection Plan (FPP) prepared by RC Biological Consulting, Inc. dated December 2013. Subsequent to this approval, HomeFed Village 8, LLC (Applicant) asked Dudek to analyze the feasibility of reducing the fuel modification zone (FMZ) along the southern portion of the project. (See Attachment 3 – *Fuel Modification Reduction Technical Analysis for Village 8 West (July 2018)*). The Chula Vista Fire Department accepted the analysis and approved the reduced FMZ from 150 feet to 100 feet. The FMZ reduction has been implemented on the approved Village 8 West Phase 1 Grading Plan and Landscape Master Plan.

The Applicant has filed an application with the City of Chula Vista to amend the Village 8 West SPA and Tentative Map. Proposed changes include minor revisions to single family lots within the southern portion of Village 8 West, and modifications to off-site fuel modification areas. The Applicant asked Dudek to review the revised Village 8 West Tentative Map to determine if the proposed project complies with the requirements in the 2013 FPP as well as the Fuel Modification Reduction Technical Analysis Report (May 2018).

Dudek compared the approved FPP by RC Biological Consulting, Inc. dated December 2013 with the revised Tentative Map (TM) and grading plans for Otay Ranch, Village 8 West. (October 2019). Based on the evaluation of both documents, it was determined that the findings of the approved 2013 FPP remain applicable and valid with

some minor changes. First, the fire and buildings codes have been updated since the FPP was prepared in 2013. Second, the new TM shows minor road alignment changes and single family lot re-configurations, primarily in the southwestern portion of Parcel P at the end of Corte Botanicas. And last, FMZ reductions from 150 feet to 100 feet would occur adjacent to a Multiple Species Conservation Program (MSCP) Preserve boundary along the southern edge of parcels P and V, consistent with the approved Fuel Modification Reduction Technical Analysis Report (May 2018). Items 1, 2 and 3 address each revision. Additionally, Attachment 4 - *Figure 10 – Village 8 West Fuel Modification Zones* of Approved 2013 FPP has been updated to reflect the revised Village 8 West TM and reduced FMZs.

Item 1. Fire Protection Plan ADDENDUM- CURRENT CODES. The approved FPP shall include the application of the current 2016 California Fire Code and Chapter 7A of the 2016 California Building Code for the entire Village 8 West Project Site.

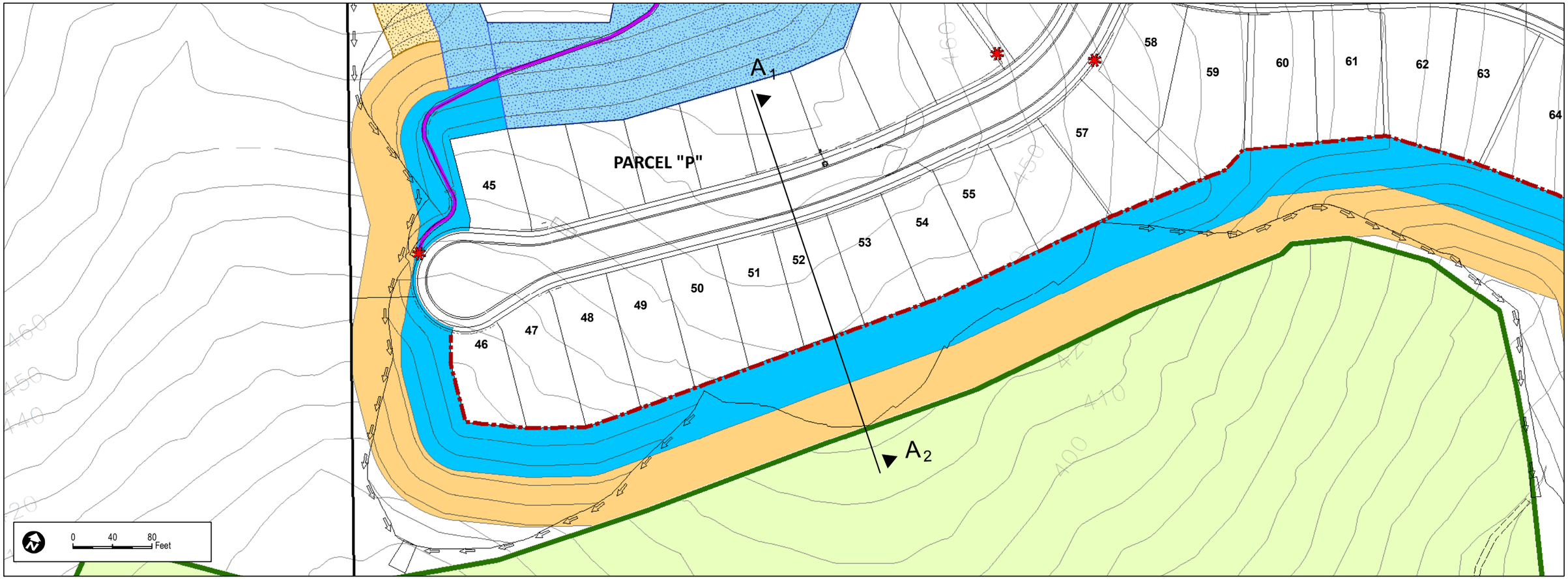
Item 2. Fire Protection Plan ADDENDUM-FUEL MODIFICATION ZONE REDUCTION. Fuel Modification Zones and Fire Protection Planning Areas (FPPA) will remain the same throughout the Village 8 West community, except for the previously approved reduced FMZ areas/setbacks for the on- and off-site FMZs adjacent to a MSCP Preserve boundary along the south-southwestern portion of the project site as described in *Attachment 3.* Per the amendment to the Village 8 West SPA and TM, lot numbers have changed along the south-southwestern boundary, but the reduced FMZ is still achieved and has not changed. Lots that were previously numbered 50 through 61 within Parcel P have been renumbered Lots 45 through 57 and lots that were previously numbered 11 through 29 within Parcel V have been renumbered Lots 12 through 33. Attachment 1 and Attachment 2 present the re-numbered lots for Parcels P and V and the approved 100-foot wide FMZ.

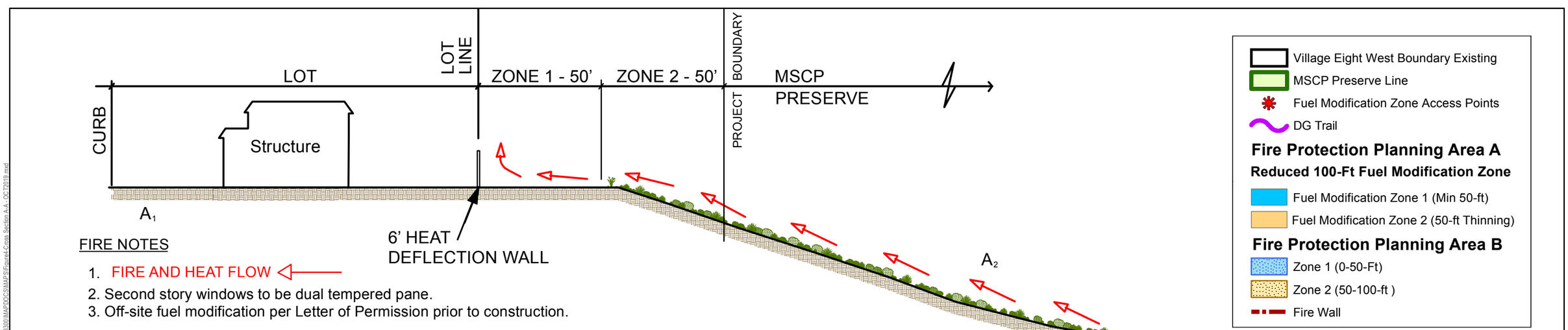
Task 3. Fire Protection Plan ADDENDUM-FPPA Area C Clarification. Per the approved FPP, FPPA Area C includes the interior, steep manufactured slopes (2:1 slope) which achieve Fuel Modification Zone 2 criteria and are consistent with the approved Village 8 West, Phase 1 Landscape Master Plan. Per prior discussions with the CVFD, the approved Village 8 West, Phase 1 Landscape Master Plan indicates that all interior slopes would be required to be permanently irrigated (FMZ Zone 1) and planted with approved City plant material; meet the required tree spacing of 20 feet from trunk to trunk; and provided FMZ access points to allow the entry of fire fighters and FMZ maintenance workers.

Please feel free to contact me at (619) 992-9161, if you have any questions or require any additional information.

# Attachment 1

## Updated Figure 4 – Parcel P Cross Section A-A of Village 8 West Fuel Reduction Technical Analysis Report




SOURCE: AERIAL-SANGIS 2017; DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES); MSCP-CITY OF CHULA VISTA

DUDEK

**FIGURE 4**

**Cross Section A-A Profile of Parcel P Reduced Fuel Modification Area**

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS

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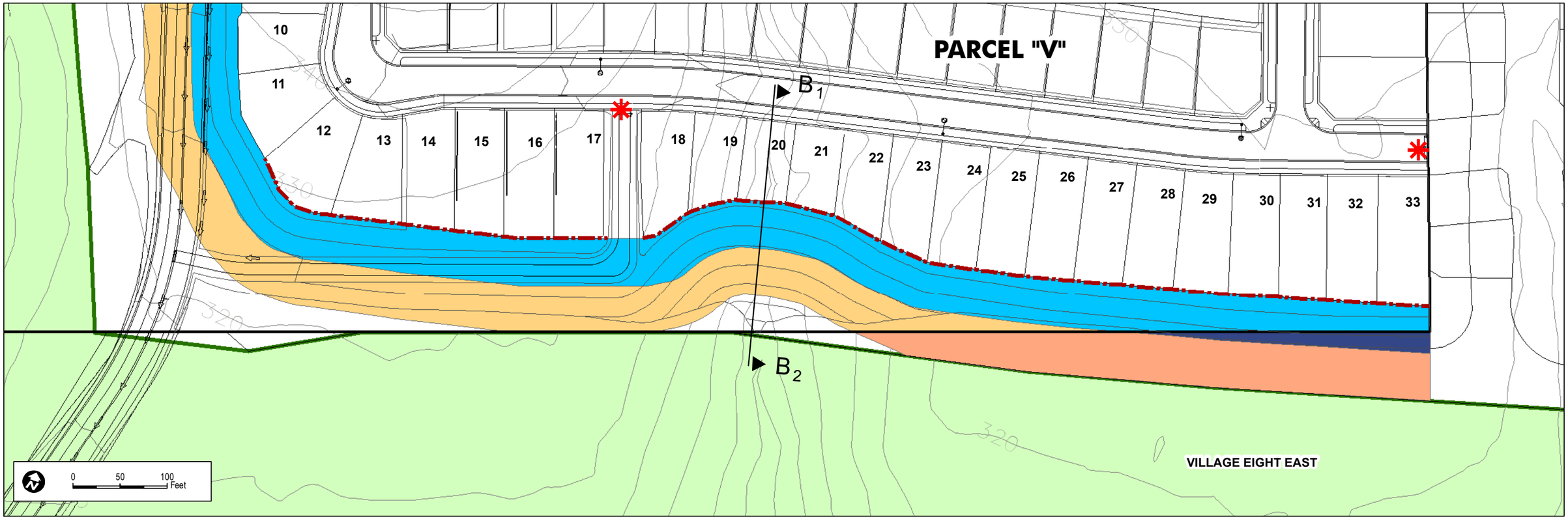
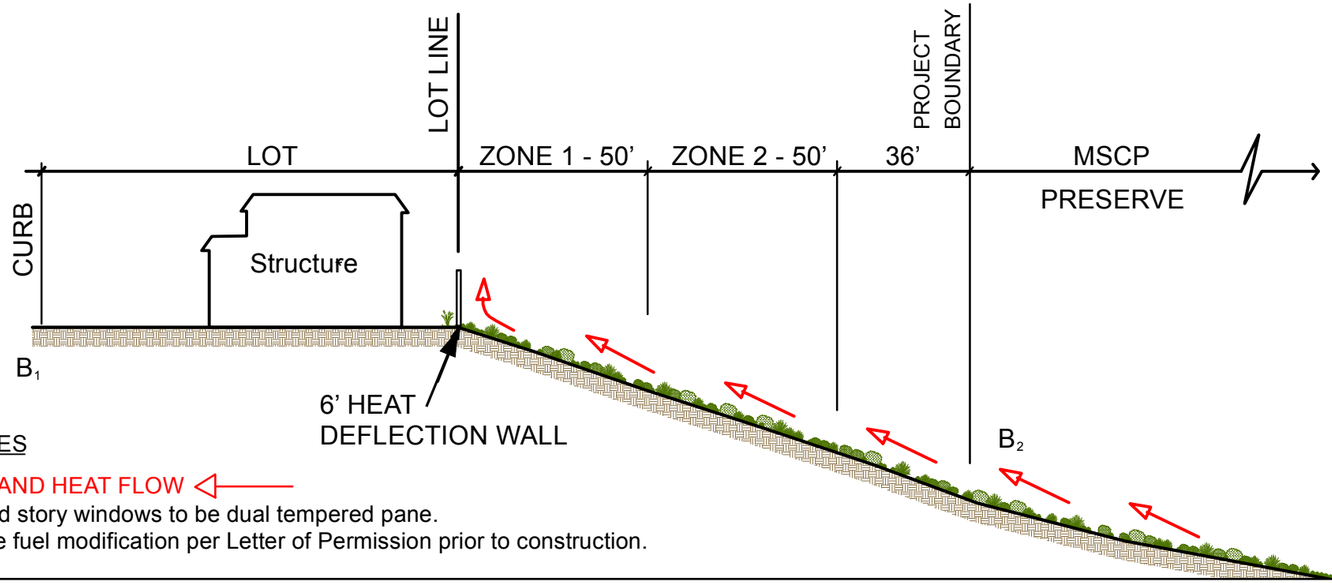
# Attachment 2

## Updated Figure 5 – Parcel V Cross Section B-B of Village 8 West Fuel Reduction Technical Analysis Report




FIRE NOTES

1. FIRE AND HEAT FLOW
2. Second story windows to be dual tempered pane.
3. Off-site fuel modification per Letter of Permission prior to construction.

Village Eight West Boundary
Existing MSCP Preserve Line
Fuel Modification Zone Access Points

**Fire Protection Planning Area A**

Fuel Modification Zone 1 (Min 50-ft)
Fuel Modification Zone 2 (50-ft Thinning)
Off-Site Fuel Modificaton Zone 1 (Min 50-ft)
Off-Site Fuel Modification Zone 2 (50-ft Thinning)
Fire Wall

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SOURCE: AERIAL-SANGIS 2017; DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES); MSCP-CITY OF CHULA VISTA

**FIGURE 5**

**Cross Section Profile B-B of Parcel V Reduced Fuel Modification Area**

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS

Document Path: Z:\Projects\11693000\MAPDOCS\MAPS\Figure5-Cross Section B-B - OCT2019.mxd

# Attachment 3

## Fuel Modification Reduction Technical Analysis Report for Village 8 West (July 2018)

DUDEK

MAIN OFFICE
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July 10, 2018 11020

Mr. Curt Smith
HomeFed Corp.
1903 Wright Pl #220
Carlsbad, California 92008-6584

***Subject:*** ***Fuel Modification Reduction Technical Analysis for Otay Ranch Village 8 West, Chula Vista, California***

Dear Mr. Smith:

In response to HomeFed's request (April 2018), we have provided this technical analysis as a stand-alone document to evaluate the proposed reduction of fuel modification zone (FMZ) areas/setbacks from 150 feet to 100 feet. This FMZ width reduction would occur adjacent to a Multiple Species Conservation Program (MSCP) Preserve (Preserve) boundary along the southern edge of the Otay Ranch Village 8 West Project (Project) within single-family parcels P and V. This technical analysis provides a summary of modeled fire behavior and additional fire protection measures for minimizing fire risk in lieu of a full 150 feet FMZ adjacent to Preserve land.

## PROJECT INFORMATION

The Project property is located in the City of Chula Vista, San Diego County, California (Vicinity Map; Figure 1). Specifically, the approximately 320-acre property is located in the southwest quadrant of Otay Ranch at the southern terminus of La Media Road. The project site is located in an area of existing development, future development, agriculture, and undeveloped lands. The property is bounded on the north by portions of Village 7, the balance of Village 8 to the east (this area is known as Village 8 East), the Otay River Valley, and a portion of the MSCP Preserve to the south, and Village 4 South, Vulcan Materials Company's Chula Vista Rock Quarry, and an additional portion of the Preserve lands to the west (Future Land Uses, Figure 2). The terrain is generally characterized as gently sloping to the south, with steeper slopes including rock outcrops in the southwestern portion of the Project. Elevations at the project site range from approximately 300 feet above mean sea level (amsl) to 600 feet amsl.

The proposed Village 8 West includes construction of mixed-use dwelling units, multi-family dwelling units, single-family residential, retail/commercial, schools, parks, a community purpose facility, and open space areas. The Project property and adjacent open space areas primarily support Diegan coastal sage scrub and non-native grasslands. Related to on-site fire risk, the growth of

vegetation types/fuel models is influenced by aspect (orientation), soil constituents, soil depth, soil moisture, and weather. The vegetation occurring adjacent the southern and western borders of the property represents the greatest potential threat. The southern edge of the development is the area that is addressed in this fire analysis. Attachment 1 provides photographs of the southern edge of the site in its current condition.

Per the recorded fire history that was obtained from CALFIRE's FRAP database[1], the Village 8 West property has not been subject to wildfire. The nearest wildfires to the Village 8 West site include the 1994 Otay #4 Fire (approximately 1.0 mile to the east of Village 8 West), an un-named 1979 fire (approximately 2.0 miles to the northeast of Village 8 west), and an un-named 1945 fire (approximately 2.5 miles to the north of Village 8 west). The lack of fire history does not suggest that fire cannot occur in the vegetation that will be adjacent the Project. However, it does suggest that due to physical landscape features, vegetation, and ignition sources, amongst other variables, fire starts are fewer and/or larger fires have been stopped before they spread into the area.

The entirety of the Village 8 West property lies within the local responsibility area (LRA) Non-Fire Hazard Severity Zone, as designated by the Chula Vista Fire Department (CVFD) and CAL FIRE. Therefore, the requirements in Chapter 7A of the California Building Code would not typically be implemented for this development. However, the proposed fire protection measures as described in the Fire Protection Plan (FPP)[2] for the Project will meet or under certain circumstances, exceed all applicable fire and building codes requirements. The area is provided fire protection by CVFD.

## PROJECT UNDERSTANDING

The purpose of this technical analysis is to address the effectiveness of a 100-foot-wide fuel modification zone (FMZ) buffer instead of the proposed 150-foot-wide FMZ setback adjacent to the Preserve boundary along the southern edge of the Project. A FPP for the Project was prepared by RC Biological Consulting, Inc. in December 2013. This FPP addressed two fuel management and fire protection planning areas (FPPA): FPPA A and FPPA B. FPPA A provides a minimum of 150 feet of fuel management adjacent to the Preserve. As required by the City of Chula Vista Final MSCP Subarea Plan, Section 7.4.4, Brush Management (2003), the 150-feet of fuel management would be divided into three 50-foot-wide zones starting from the structures

[1] California Department of Forestry and Fire Protection (CALFIRE). 2018. Fire Resource and Assessment Program (FRAP) Maps. Obtained GIS database at http://frap.fire.ca.gov/data/frapgismaps-subset.

[2] Fire Protection Plan for Otay Ranch, Village 8 West, City of Chula Vista, San Diego County, California, Prepared by RC Biological Consulting, Inc. December 17, 2013.

with "Zone 3 extending up to 50 feet at the discretion of the Fire Marshal." Per Chula Vista MSCP Subarea Plan, Section 7.4.7.1, Brush Management in the Otay Ranch Preserve Management Area, "a 100-foot edge will be created between development and the Otay Ranch Preserve, within which brush management may occur." No brush management would occur within the Preserve. FPPA B would occur along the western edge of the Project and consists of two, 50-foot-wide zones, totaling 100 feet of fuel management. As currently approved, a portion of FMZ 1 for 31 lots along the southern edge of the development is on the private residential lot.

To complete the reduced FMZ analysis, Dudek Fire Protection Planners evaluated the FPPAs, native vegetation, and their fire behavior on the slopes along the southern edge of the Project to determine if a reduction in the currently proposed and approved 150 feet wide FMZ for FPPA A to a minimum of 100 feet would provide an acceptable level of fire protection. Dudek did not analyze the FMZ for FFPA B, since this area already receives 100 feet of fuels management per the Project FPP (2013) and does not abut Preserve land. The proposed Village 8 West 100 feet wide FMZ would be consistent with the neighboring Village 8 East's FMZ that was approved by CVFD. All FMZs are off the private lots and will be maintained by the Village 8 West HOA. This technical letter report has been prepared to address this request and presents a summary of fire behavior modeling efforts. Additionally, this report provides recommendations to augment the proposed 100 feet of FMZ in order to minimize fire risk. This report addresses only the proposed, reduced FMZs for lots #50 through #61 on Parcel P (12 lots) and Lots #11 through #29 on Parcel V (19 lots). The remaining 18 lots found on Parcel P and Parcel V will retain the 150-foot wide FMZ on HOA-maintained lots. The analysis summarized herein is based on project-related information provided by HomeFed, a field assessment, and the Project FPP.

## TECHNICAL ANALYSIS

In order to evaluate potential fire behavior along the southern edge of the project site, Dudek conducted the following tasks:

1. Analyzed historical wind and weather data from remote automated weather stations (RAWS) using the FireFamily Plus software package.
2. Modeled potential fire behavior based on an assumed mature sage scrub condition using the BehavePlus fire behavior modeling software package. Fire behavior modeling outputs included those for surface fires (flame length, fireline intensity, spread rate, spotting distance).

The following sections present a background on fire behavior modeling, our technical approach (including identification of assumptions and data sources), and the results of our modeling efforts.

***Note:*** *This analysis is based on a specific site fuel assessment, on- and off-site topographic features; proposed Otay Ranch Village 4 South, Village 8 East, and Village 8 West site plan designs; Project FPP review; and historical fire regimes for the Otay River Valley area. Assumptions of wildfire behavior are based on Dudek's experience evaluating natural landscapes, conducting technical analyses and assessments, and preparing fire protection planning documents for residential development projects for Otay Ranch Villages 3, 4 South, 8 East, 10, and University Innovation District in the City of Chula Vista, California.*

## FIRE BEHAVIOR MODELING

### Fire Behavior Modeling Background

Although fire behavior models have some limitations, they can still provide valuable estimated fire behavior predictions, which can be used as a tool in the decision-making process. In order to make reliable estimates of fire behavior, and interpret fire spread models, one must understand the relationship of fuels to the fire environment and be able to recognize the variations in these fuels, and have experience with wildland fires or applicable knowledge of how fire reacts in similar fuels. Natural fuels are made up of the various components of vegetation, both live and dead, that occur on a site. The type and quantity will depend upon the soil, climate, geographic features, and the fire history of the site. The major fuel groups of grass, shrub, trees and slash are defined by their constituent types and quantities of litter and duff layers, dead woody material, grasses and forbs, shrubs, regeneration, and trees. Fire behavior can be predicted largely by analyzing the characteristics of these fuels. Fire behavior is affected by topography (slope, aspect, and elevation), weather (wind, air temperature) and seven principal fuel characteristics: fuel loading, size and shape, compactness, horizontal continuity, vertical arrangement, moisture content and chemical properties.

The seven fuel characteristics help define the 13 standard fire behavior fuel models[3] and the more recent custom fuel models developed for Southern California[4]. According to the model classifications, fuel models used in BehavePlus have been classified into four groups, based upon fuel loading (tons/acre), fuel height, and surface to volume ratio. Observation of the fuels in the field (on site) determines which fuel models should be applied in modeling efforts. The following describes the distribution of fuel models among

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

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

general vegetation types for the standard 13 fuel models and the custom Southern California fuel models (SCAL):

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

In addition, the aforementioned fuel characteristics were utilized in the development of 40 additional fire behavior fuel models[5] developed for use in BehavePlus modeling efforts. These new models attempt to improve the accuracy of the standard 13 fuel models outside of severe fire season conditions, and to allow for the simulation of fuel treatment prescriptions. The following describes the distribution of fuel models among general vegetation types for the new 40 fuel models:

| | |
|---|---|
| Non-Burnable | Models NB1, NB2, NB3, NB8, NB9 |
| Grass | Models GR1 through GR9 |
| Grass/Shrub | Models GS1 through GS4 |
| Shrub | Models SH1 through SH9 |
| Timber Understory | Models TU1 through TU5 |
| Timber Litter | Models TL1 through TL9 |
| Slash Blowdown | Models SB1 through SB4 |

## Weather and Wind Analysis

Historical fuel moisture and wind speed data for the region was utilized in determining appropriate fire behavior modeling inputs for the project site. Specifically, 50th and 97th percentile values derived from the San Miguel Remote Automated Weather Station (RAWS)

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

were determined and utilized in the fire behavior modeling efforts conducted in support of this report. The San Miguel RAWS[6] is located at approximately 5.8 miles north of the Village 8 west development area.

RAWS fuel moisture and wind speed data were processed utilizing the FireFamily Plus software package to determine atypical (97th percentile (Santa Ana)) and typical (50th percentile (on-shore)) weather conditions. Data from the RAWS was evaluated from May 1 through November 30 for each year between 2002 and 2015. The 50th and 97th percentile wind speed and fuel moisture data were used in the BehavePlus fire behavior modeling runs, as described below.

## Fire Behavior Modeling Inputs

Dudek utilized BehavePlus software package (version 5.0.5) to analyze potential fire behavior for the southern edge of the project site, with assumptions made for the pre- and post-project slope and fuel conditions. The following summarizes the inputs, data sources, and assumptions for the fire behavior modeling effort:

**Weather:** As noted above, fuel moisture and wind speed data used in the BehavePlus modeling effort was derived from an analysis of RAWS data and considers 50th and 97th percentile weather conditions.

**Terrain:** Slope gradients for natural slopes range from 20% to 30% and for post-project are assumed to be 50% (2:1 manufactured slopes).

**Fuels:** Vegetation types, which were derived from the FPP and field assessment for the project site, were classified into a fuel model. This value was used in the modeling analysis for the fuel type adjacent to the site. The majority of the south-facing slopes adjacent to the site are vegetated with Coastal sage scrub interspersed with large rock outcropping and boulder areas. Based on the location of modeling scenarios, a fuel model SCAL 18 (dry climate shrub with sagebrush and buckwheat) was used for all BehavePlus fire behavior modeling runs for existing conditions. Further, while past disturbances (farming) have altered fuel beds on the property, modeling efforts presented herein assume sage scrublands to more mature stand conditions. As such, a fuel model representing mature Diegan coastal sage scrubland was used for fire scenarios. Fuel models were also assigned to the perimeter fuel management areas to illustrate post-project fire behavior changes. Based on the anticipated pre- and post-project vegetation conditions, three

[6] San Miguel RAWS: Latitude: 32.68611; Longitude: -116.97833; Elevation 425 feet amsl.

different fuel models were used in the fire behavior modeling effort presented herein. Fuel model attributes are summarized in Table 1.

**Table 1**
**Fuel Model Characteristics**

| Fuel Model | Description | Tons/acre; Btu/lb | Fuel Bed Depth (Feet) |
|---|---|---|---|
| SCAL 18 | Dry Climate Shrub (sagebrush/buckwheat) | 6.4 tons/acre; 9,200 Btu/lb. | 3.0 feet. |
| FM 8 | Fuel Modification Zone 1 – irrigated | 5.0 tons/acre; 8,000 Btu/lb. | <3.0 feet. |
| Sh1 | Fuel Modification Zone 2 – 50% thinning | 2.0 tons/acre; 8,000 Btu/lb. | 3.0 feet. |

Table 2 summarizes the weather, terrain, and fuels variables used in the BehavePlus fire behavior modeling effort.

**Table 2**
**BehavePlus Fire Behavior Inputs**

| Model Variable | 50th Percentile Weather | 97th Percentile Weather |
|---|---|---|
| *Weather* | | |
| 1 h fuel moisture | 8% | 2% |
| 10 h fuel moisture | 10% | 3% |
| 100 h fuel moisture | 15% | 7% |
| Live herbaceous moisture | 62% | 30% |
| Live woody moisture | 121% | 92% |
| 20 ft. wind speed | 8 mph (sustained winds) | 12 mph (sustained winds)<br>50 mph (peak gusts) |
| Wind direction | Uphill | Uphill |
| Wind adjustment factor | 0.4 | 0.4 |
| *Terrain* | | |
| Natural Slope | 15% to 20% | 15% to 30% |
| Post-Project Perimeter 2:1 Slope | 50% | 50% |
| *Fuel Model* | | |
| Fuel Models | 8, Sh1, SCAL 18 | 8, Sh1, SCAL 18 |

## Fire Modeling Scenarios

Focused fire behavior modeling utilizing BehavePlus 5.0.5 was conducted for the southern Project area. Based on field analysis, three different fire modeling scenarios were evaluated for the project site.

- **Scenario 1:** Extreme fire weather with off-shore wind (97th percentile weather conditions) and fire burning in preserved open space upslope from Otay River Valley onto mesa top towards the southeast corner of the property. This fire scenario will no longer exist after future Village 8 East is built out.
- **Scenario 2:** Extreme fire weather with off-shore Santa Ana winds (97th percentile weather conditions) and fire burning in the preserve open space in Otay River Valley towards the southern edge of the project site.
- **Scenario 3:** Fire weather with on-shore wind (50th percentile weather conditions) and fire burning in preserve open space along the southwestern boundary of the project site.

## Fire Behavior Modeling Results

Following site evaluation and vegetative fuels data collection efforts, fire behavior modeling was conducted to document the type and intensity of fire that would be expected on this site given characteristic site features such as topography, vegetation, and weather. To objectively predict flame lengths, intensities, and spread rates, the BehavePlus 5.0.5 fire behavior modeling system[7] was used in three modeling scenarios and incorporated observed fuel types, measured slope gradients, and wind and fuel moisture values derived from RAWS data. Modeling scenario locations were selected to better understand different fire behavior that may be experienced in Otay River Valley and along the southern edge of the site. The results of fire behavior modeling efforts for pre- and post-project conditions are presented in Tables 3 and 4 respectively. Identification of modeling run (fire scenarios) locations is presented graphically in Figure 3, BehavePlus Fire Behavior Analysis.

[7] Andrews, Patricia L., Collin D. Bevins, and Robert C. Seli. 2004. BehavePlus fire modeling system, version 3.0: User's Guide. Gen. Tech. Rep. RMRS-GTR-106 Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.

**Table 3**
**Village 8 West BehavePlus Fire Behavior Model Results**
**Existing Conditions**

| Fire Scenarios | Flame Length (feet) | Fireline Intensity (BTU/feet/second) | Spread Rate (mph) | Spotting Distance (miles) |
|---|---|---|---|---|
| *Scenario 1: Coastal sage scrub on south-facing, 30% slope* | | | | |
| Santa Ana (97th percentile with 50 mph gusts) | 35.4 | 13,214 | 2.1 | 2.1 |
| *Scenario 2: Coastal sage scrub on south-facing, 20% slope* | | | | |
| Santa Ana (97th percentile with 50 mph gusts) | 35.7 | 13,450 | 2.1 | 2.1 |
| *Scenario 3: Coastal sage scrub on southeast-facing, 20% slope* | | | | |
| On-shore (50th Percentile) | 10.9 | 1,012 | 0.22 | 0.3 |

**Table 4**
**Village 8 West BehavePlus Fire Behavior Model Results**
**Post-Project Conditions**

| Scenario | Flame Length (feet) | Fireline Intensity (BTU/feet/second) | Spread Rate (mph) | Spotting Distance (miles) |
|---|---|---|---|---|
| *Scenario 1: Fuel treatments on south-facing, 50% slope, Santa Ana (97th percentile with 50 mph gusts)* | | | | |
| Fuel modification zone 1 (FM8) | 2.6 | 46 | 0.13 | 0.3 |
| Fuel modification zone 2 (Sh1) | 1.6 | 16 | 0.08 | 0.2 |
| *Scenario 2: Fuel treatments on south-facing, 50% slope, Santa Ana (97th percentile with 50 mph gusts)* | | | | |
| Fuel modification zone 1 (FM8) | 2.6 | 46 | 0.13 | 0.3 |
| Fuel modification zone 2 (Sh1) | 1.6 | 16 | 0.08 | 0.2 |
| *Scenario 3: Fuel treatments on south-facing, 50% slope, On-shore (50th Percentile)* | | | | |
| Fuel Modification zone 1 (FM8) | 0.4 | 1 | 0.004 | 0 |
| Fuel Modification zone 2 (Sh1) | 0.3 | 1 | 0.005 | 0 |

The results presented in Tables 3 and 4 depict values based on inputs to the BehavePlus software and are not intended to capture changing fire behavior as it moves across a landscape. Changes in slope, weather, or pockets of different fuel types are not accounted for in this analysis. For planning purposes, the averaged worst-case fire behavior is the most useful information for conservative fuel modification design. Model results should be used as a basis for planning only, as actual fire behavior for a given location would be affected by many factors, including unique weather patterns, small-scale topographic variations, or changing vegetation patterns.

## Fire Behavior Summary

As presented, wildfire behavior in non-treated, Coastal sage scrub fuel bed, presented as a Fuel Model SCAL 18, varies based on timing of fire. A worst-case summer fire (50th Percentile-onshore wind flow) would result in a fire spreading at a rate less than 1.0 mile per hour (mph) with 11 feet high flames. During the fall when there are gusty Santa Ana (97th Percentile) winds and low fuel moistures, a wildfire is expected to be moving at 2.1 mph with highest flame length values reaching approximately 36 feet in specific portions of the property. Spotting is projected to occur at 0.3 mile during a summer fire and nearly 2.1 miles during a fall fire.

As previously mentioned, Dudek conducted modeling of the site for post-fuel modification zones. Fuel modification includes establishment of irrigated (Zone 1) and thinned (Zone 2) zones on the periphery of the project's neighborhoods and roads. For modeling the post-FMZ treatment condition, the fuel model assignment for Coastal sage scrub was re-classified according to the specific fuels management (e.g., irrigated vs, 50% thinned brush) treatment as described in the Project FPP (2013). As depicted in Table 4, the FMZ areas experience a significant reduction in flame length and intensity. The 36-foot flame lengths predicted during pre-treatment modeling are reduced to two feet at the outer edges of the FMZ and to three feet by the time the inner portions of the FMZ are reached. During summer weather conditions, a fire approaching from the west would be reduced from 11-foot tall flames to less than 1.0-foot tall with low fire intensity due to the higher live and dead fuel moisture contents.

## FUEL MODIFICATION ZONES

The Project FPP (2013) provides general information on fuel modification zone widths, zone distances, plant species, plant spacing, and locations for the Village 8 West site. This section provides details pertaining to a proposed reduction in fuel modification for approximately 31 lots along the southern edge of the project site. The fuel modification along the northwest and east sides will either tie into future developments (Village 4 South and Village 8 East) area landscaping or are consistent with Chula Vista's requirements for 100 feet of fuel treatment for areas not adjacent to Preserve lands.

Fuel modification to the south- southwest of Village 8 West is constrained by the adjacent MSCP area for a majority of its extent. This Preserve area represents a potential wildfire risk to the upslope structures and ignition of fuels within the Preserve could result in convective heat and flame encroachment on structures at the top of slope. Modeled flame lengths in this area are 11 feet during summer fire events and up to 36 feet during extreme weather events, where the area could experience a cross-slope wind funneled along the Otay River Valley.

Based on the fire behavior modeling results, Dudek considers a reduction in the managed FMZ is justified. A total of 31 structures are proposed for reduced FMZs. The FMZ proposed is 100 feet wide, a 33% reduction from the FPP's 150 feet wide FMZs. FMZ would begin at the rear lot lines and extend toward the MSCP hardline.

Fire intensity and flame lengths are reduced once the Project's 100 feet wide FMZs are installed. This reduction is considered sufficient to setback structures from the modeled flame lengths, as presented and supported by structure ignition research. Cohen[8] performed structure ignition studies that suggest, as a rule-of-thumb, larger flame lengths and widths require wider fuel modification zones to reduce structure ignition. For example, valid Structure Ignition Assessment Modeling (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 requires about 130 feet of clearance to prevent structure ignitions from radiant heat[9]. This study utilized bare wood, which is more combustible than the ignition resistant exterior walls for structures built today. For this project, assuming 36-foot flame lengths, a minimum 100-foot-wide fuel modification zone would be appropriate. However, the land use to the south beyond the fuels management area is expected to remain native, Coastal sage scrub, so will continue to represent a potential wildfire hazard. Based on these site characteristics, the 31 structures adjacent to this native vegetation will be potentially exposed to wildland fire heat, flames and windblown embers with ignition in the native fuels.

Obstacles, including steep terrain and 6-foot-tall non-combustible walls (view walls) can block all or part of the radiation and windblown embers, thus making fuel modification distances even narrower and more effective. The combination of rock outcrops that are a prominent landscape feature within the fuels adjacent the Project and strategically placed heat deflecting walls reduce the potential exposure to acceptable levels.

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8 Cohen, J.D. 1995. Structure ignition assessment model (SIAM). In: Weise, D.R.; Martin, R.E., technical coordinators. Proceedings of the Biswell symposium: fire issues and solutions in urban interface and wildland ecosystems. 1994 February 15–17; Walnut Creek, California. Gen. Tech. Rep. PSW-GTR-158. Albany, California: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 85–92.

9 Cohen, J.D. and Butler, B.W. [In press]. 1996. Modeling potential ignitions from flame radiation exposure with implications for wildland/urban interface fire management. In: Proceedings of the 13th conference on fire and forest meteorology. October 27–31; Lorne, Victoria, Australia. Fairfield, Washington: International Association of Wildland Fire.

## CONCLUSIONS AND RECOMMENDATIONS

The following fuels management and fire protection measures have been provided to reduce fire spread potential, structure exposure and to minimize the likelihood of structure ignition where FMZ reductions are proposed.

1. Thirty-one lots (lots #50 through #61 within Parcel P) and (lots #11 through #29 within Parcel V) located along the southern edge of property are adjacent to MSCP Preserve open space area. These lots will be provided a 50-foot, irrigated zone (Zone 1) and a 50-foot, thinning zone (Zone 2). Lots #23 through #29 (Parcel V) and Lot #50 (Parcel P) will require 30 and 33 feet of Zone 2, respectively, off-site for fuel management to achieve 100 feet. The Village 8 West HOA will maintain all FMZs within separate open space lots.
2. To further block rising convective heat and windblown embers, a 6-foot-tall, non-combustible wall (or view wall) meeting CVFD specifications will be constructed at the top of slope. This fire wall augments the reduced fuel modification adjacent to the Preserve. The terrain adjacent to these structures is sloped, which aids in keeping the flames directed into the walls and deflected back toward the fire or vertically, where cooling and dissipation occurs. A non-combustible wall will provide an initial level of protection for deflecting heat and flame from the structures, especially during typical weather conditions. Walls like these have proven to deflect heat and airborne embers and are consistent with National Fire Protection Administration (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." Figures 4 and 5 provide a profile view of the typical slope, structure location, and fire view wall location and the expected deflection provided from a fire burning upslope.
3. Windows on second story of all structures facing the MSCP Preserve shall be upgraded to dual pane, both panes tempered. Dual pane, one pane tempered glass has been shown during testing and in after fire assessments to significantly decrease the risk of breakage and ember entry into structures. Therefore, requiring code-exceeding dual pane, both panes tempered is anticipated to be an important safety measure that provides enhanced structure protection and provides mitigation for reduced fuel modification zones. The window upgrade also exceeds the requirements of Chapter 7A of the CBC and providing additional protection for the structure's most vulnerable, exterior side.

## LIMITATIONS

This analysis and its fire protection recommendations are supported by fire science research, results from previous wildfire incidents, and fire agencies that have approved these concepts. However, this study does not provide a guarantee that all Village 8 West residents and visitors will be safe at all times. There are many variables that may influence overall safety. This analysis provides recommendations based on proposed post-project conditions, modeled fire behavior, and currently available research. It is recommended that the Village 8 West development maintain a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards described in the Project FPP. Wildfire is a dynamic and somewhat unpredictable occurrence and it is important for anyone living in wildland urban interface areas to educate themselves on practices, including the Ready, Set, Go! Wildfire Preparedness Program[10] that will improve safety.

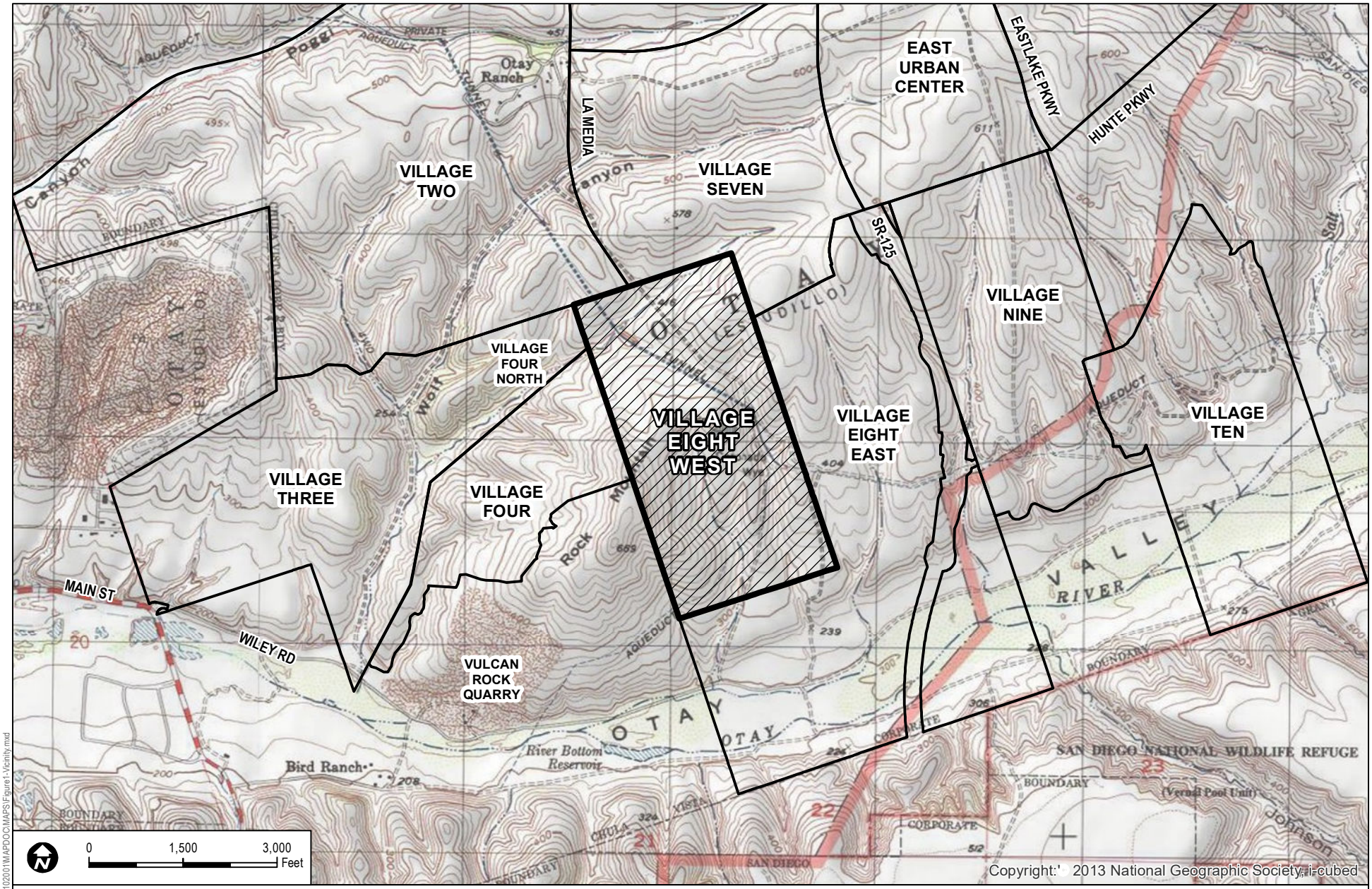
If you have any questions regarding this Fuel Modification Reduction Technical Analysis, please contact me at 619.992.9161.

Sincerely,

Michael Huff
Principal/Senior Fire Protection Planner

*Att.: Figures 1–5*
*Attachment 1 – Photograph Log*

[10] http://www.chulavistaca.gov/departments/fire-department/ready-set-go




SOURCE: BASE MAP-USGS 7.5 MINUTE SERIES QUADRANGLE

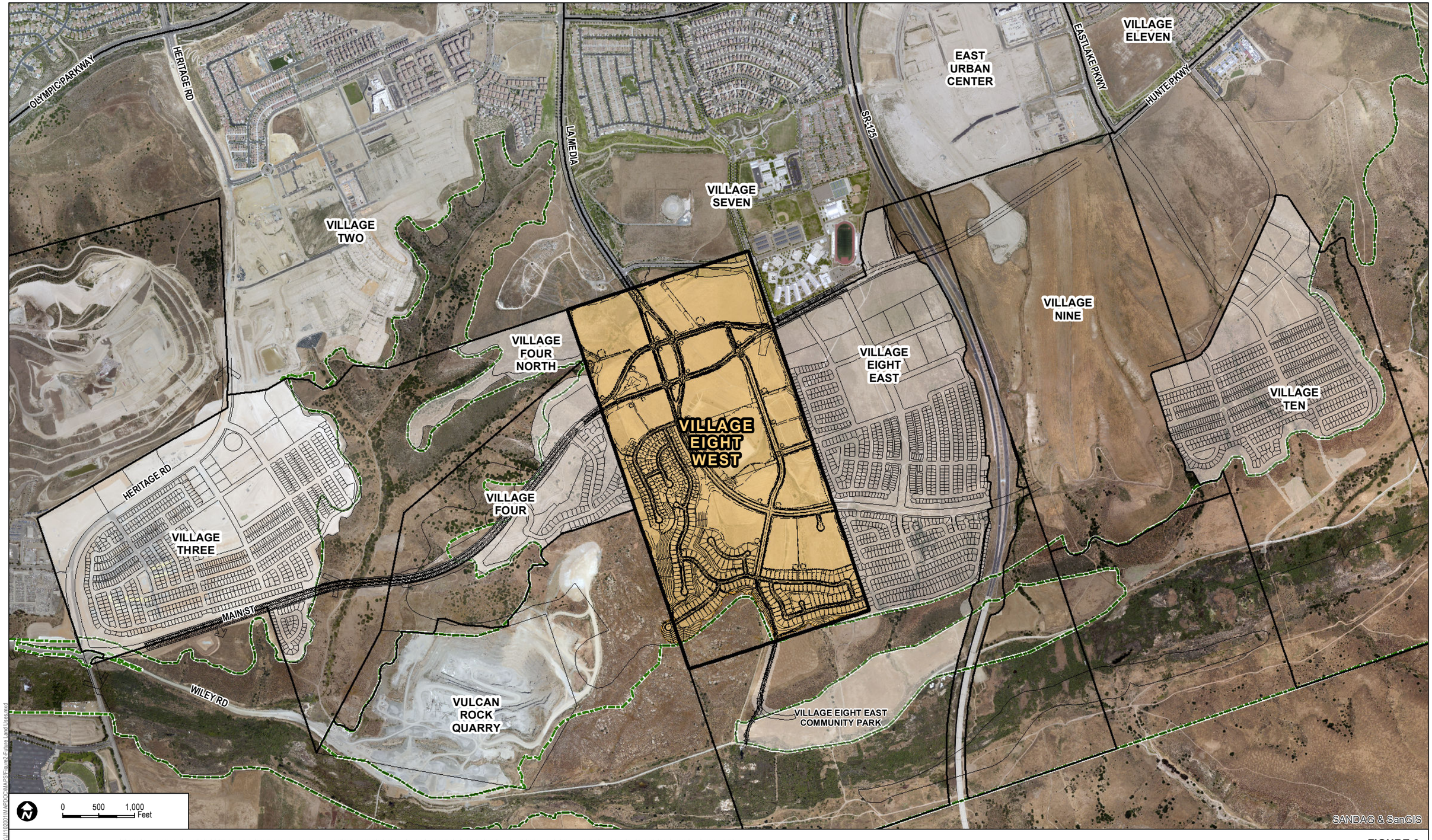
DUDEK

**FIGURE 1**

**Vicinity Map**

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS

Document Path: Z:\Projects\J1102001\MAPDOC\MAPS\Figure1-Vicinity.mxd




SOURCE: AERIAL-SANGIS 2017; DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES); MSCP-CITY OF CHULA VISTA

Document Path: Z:\Projects\J110000\MAPDOC\MAPS\Figure2-Future Land Uses.mxd

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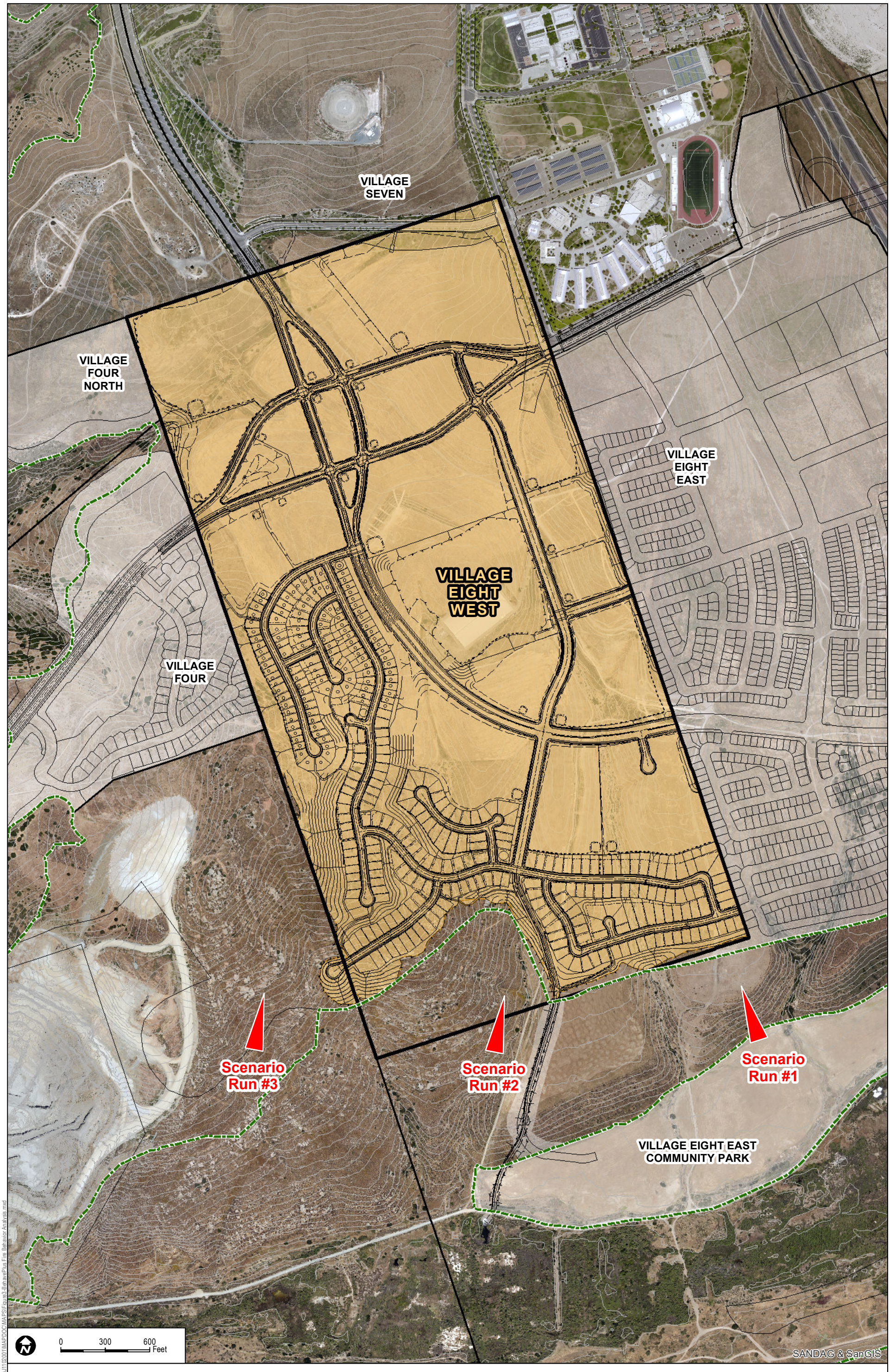
**FIGURE 2**

## Future Land Uses

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS




Document Path: Z:\Projects\J11\02001\MAPDOC\MAPS\Figure3-BehavePlus Fire Behavior Analysis.mxd

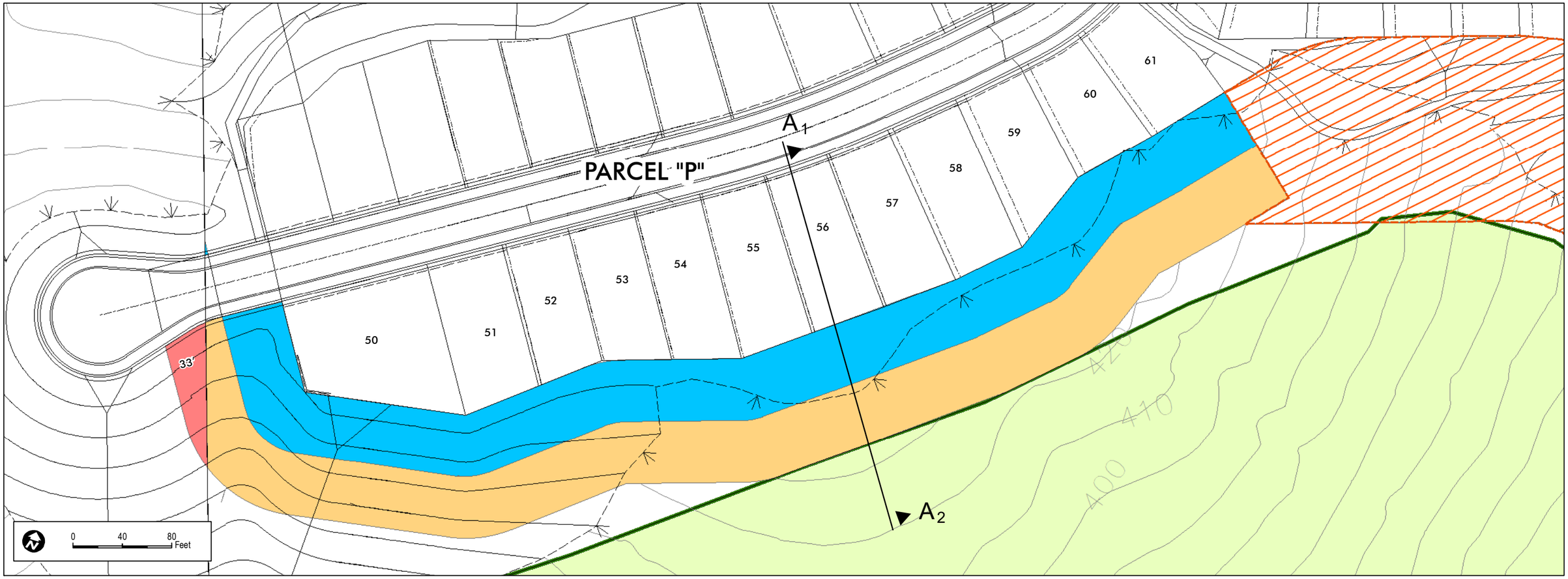
SOURCE: AERIAL-SANGIS 2017;MSCP-CITY OF CHULA VISTA;
DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES)

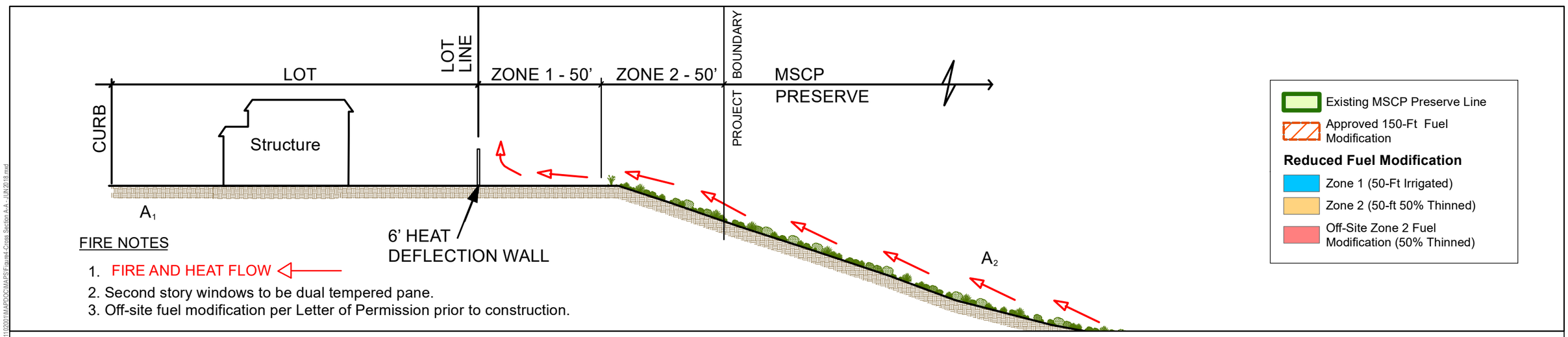
DUDEK

**FIGURE 3**

## BehavePlus Fire Behavior Analysis

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS




SOURCE: AERIAL-SANGIS 2017; DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES); MSCP-CITY OF CHULA VISTA

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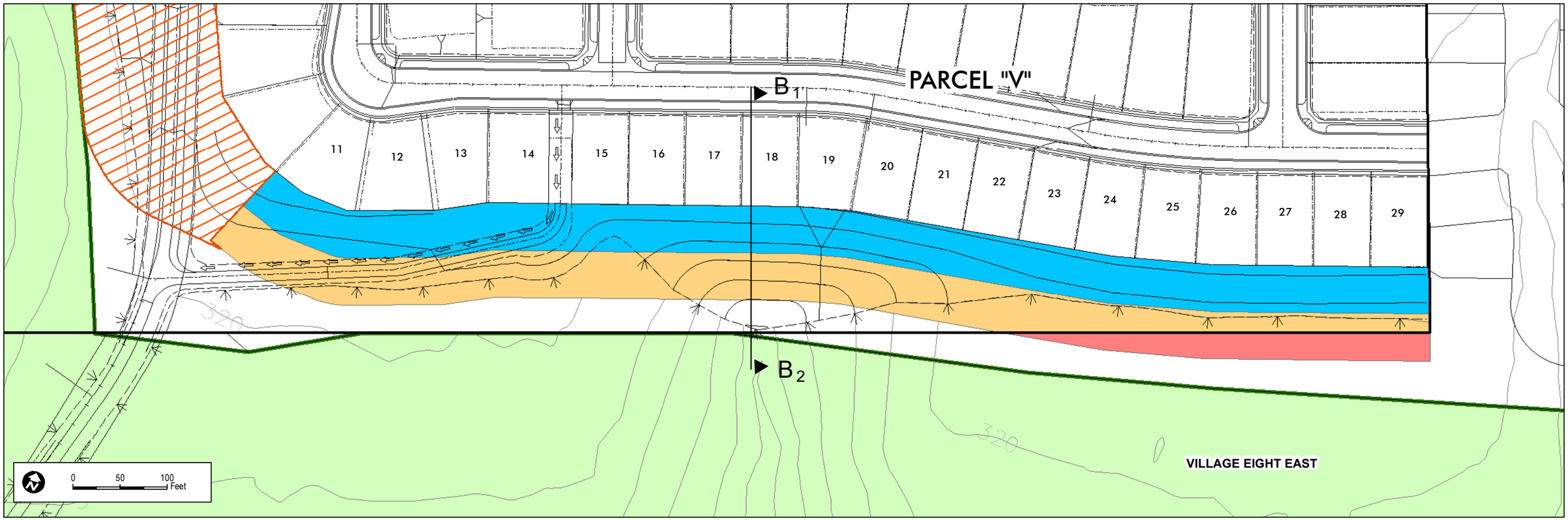
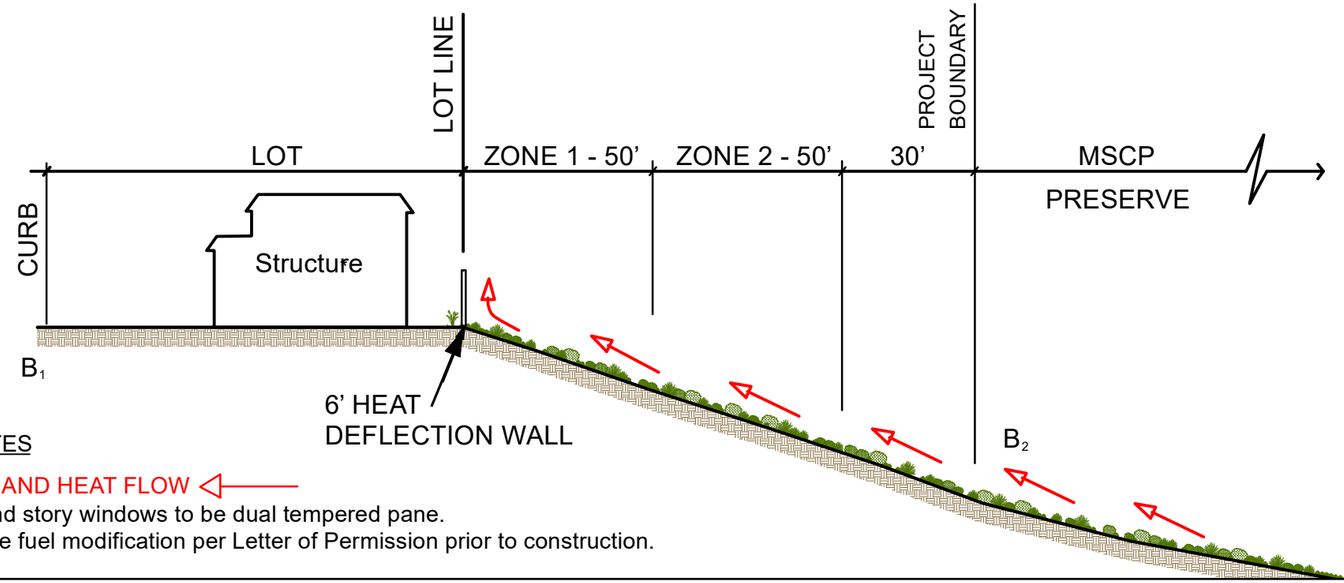
**FIGURE 4**

**Cross Section A-A Profile of Parcel P Reduced Fuel Modification Area**

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS

Document Path: Z:\Projects\J\11\00001\MAPDOC\MAPS\Figure4_Cross Section A-A_JUN2018.mxd




FIRE NOTES

1. FIRE AND HEAT FLOW ←
2. Second story windows to be dual tempered pane.
3. Off-site fuel modification per Letter of Permission prior to construction.

Existing MSCP Preserve Line

Approved 150-Ft Fuel Modification

**Fuel Modification Zones**

Zone 1 (50-ft Irrigated)

Zone 2 (50-ft 50% Thinned)

Off-Site Zone 2 Fuel Modification (50% Thinned)

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SOURCE: AERIAL-SANGIS 2017; DEVELOPMENT PLAN- HALE ENGINEERING (VILLAGE EIGHT WEST); HUNSAKER & ASSICIATES (REMAINING VILLAGES); MSCP-CITY OF CHULA VISTA

**FIGURE 5**

**Cross Section Profile B-B of Parcel V Reduced Fuel Modification Area**

VILLAGE EIGHT WEST FUEL REDUCTION TECHNICAL ANALYSIS

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# ATTACHMENT 1

*Photograph Log*

# Attachment 1
## Representative Photographs

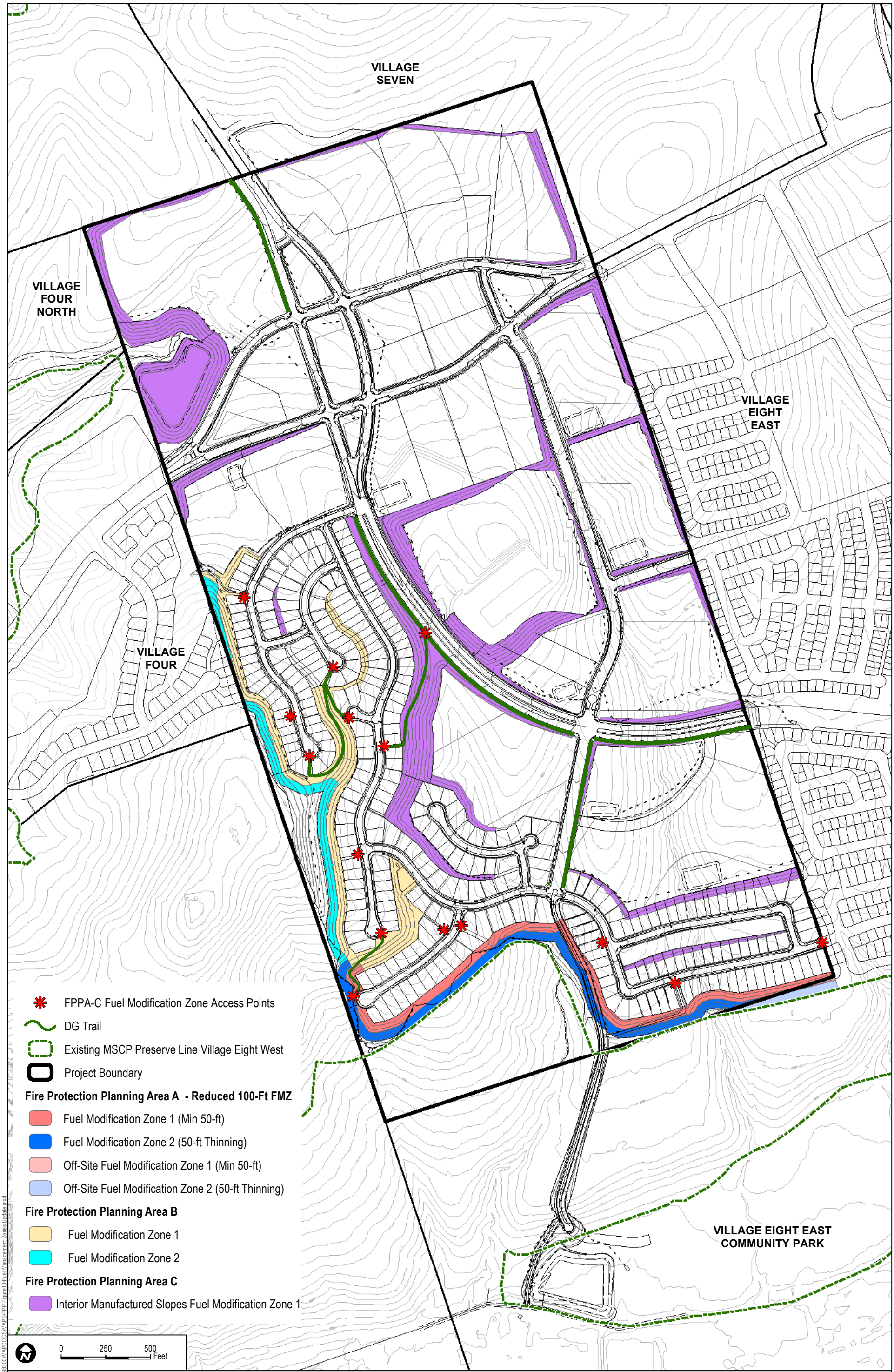

**Photograph 1**


**Photograph 2**

Photographs 1 and 2 (facing to the South) show the typical fuel type (Coastal sage scrub (CSS)) and fuel loading adjacent to the south side of the project site. This fuel type presents the greatest fire threat to the proposed structures. Both photographs illustrate the relatively steep terrain with rock outcroppings and fuel type (Fuel Model SCAL 18) modeled in BehavePlus scenarios for existing conditions.

# Attachment 4

## Updated Figure 10 – Village 8 West Fuel Modification Zones of Approved FPP (December 2013)




SOURCE: MSCP-CITY OF CHULA VISTA; DEVELOPMENT PLAN- HALE ENGINEERING 2019

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October 2019

**FIGURE 10**

**Fuel Modification Zones, Perimeter and Managed Spaces**

VILLAGE EIGHT WEST APPROVED FPP (2013)

Document Path: Z:\Projects\11983300\MAPDOCS\MAPS\FPP Figure10-Fuel Management Zones Update.mxd