

OTAY RANCH VILLAGE RESORT Village 13

FIRE SERVICES OPERATIONAL ASSESSMENT



Prepared for the San Diego County Fire Authority, by:



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The Project

Otay Ranch Resort Village- Village 13 is a proposed planned community development, immediately north of Lower Otay Lake and east of the City of Chula Vista, California. This report collectively refers to the project as “Village 13”. The Project consists of a maximum of 1,938 residential units (1,881 single-family units and 57 multifamily units), 40,000 square feet of commercial uses, a 10.1-acre school site, 25.1 acres of public/private parks, a 6.1 acre homeowners’ association neighborhood facility, a 2.3-acre joint use site for fire station and sheriff storefront, 9.0 miles of multi-use community trails and pathways, 790.3 acres of preserve/open space land to be conveyed to Otay Ranch Resource Management Preserve, an additional 69.3 acres of biological open space, and 76.4 acres of internal open space.

Through the County’s planning process, “Alternative H” of the Final EIR is the preferred footprint for the development. A Fire Services Operational Assessment (draft) was completed regarding the project’s original design and Fire Protection Plan in January 2015. This revision updates that report, considers the implications of Alternative H, and assesses the proponent’s revised Fire Protection Plan (Dudek, 2019).

The 1,107-acre project site is located in unincorporated San Diego County, east of the City of Chula Vista and adjacent to Upper and Lower Otay Lakes. The project sits at the foot of the Jamul Mountains, which rise directly northeast of the project. Otay Mountain lies to the southeast and the Dulzura Creek drainage lies immediately east. The site is currently rural and undeveloped in nature. It is adjacent to U.S. Fish and Wildlife Service lands of the San Diego National Wildlife Refuge, County of San Diego Open Space Preserve lands, and conservancy lands managed by the City of San Diego and California Department of Fish and Wildlife. New conservancy land dedications within the Otay Ranch Preserve of 1,089 acres will be dedicated as a result of the County and proponent’s developer agreement. Concurrent development is also occurring within the 23,000-acre Otay Ranch by the City of Chula Vista and in the Village 14 area in upper Proctor Valley. Evaluation of these sites is included in separate reports.

Analysis Approach

Rohde & Associates of Orange County, CA (Consultants) has been retained by the SDCFA to conduct a fire services operational review of the Village 13 proposal. The firm assigned four team members to this project with over 130 years of collective fire service experience in Southern California, including a nationally recognized wildfire behavior analyst. This team conducted an analysis in two parts:

1. Development of a Fire Services Operational Review for the greater Otay Village 13 proposed community

2. Development of an internal Wildland Urban Interface Fire Emergency Response Plan for the proposed site using the County-wide standard assessment process and planning tools.

On-site reviews were performed by the team on multiple dates in September 2018, and during the period December 2019- January 2020.

Since wildfire has been determined by SDCFA to be the predominant natural hazard to the development site, the consultants have been tasked to conduct a wildland fire focused study. The analysis of related data has included:

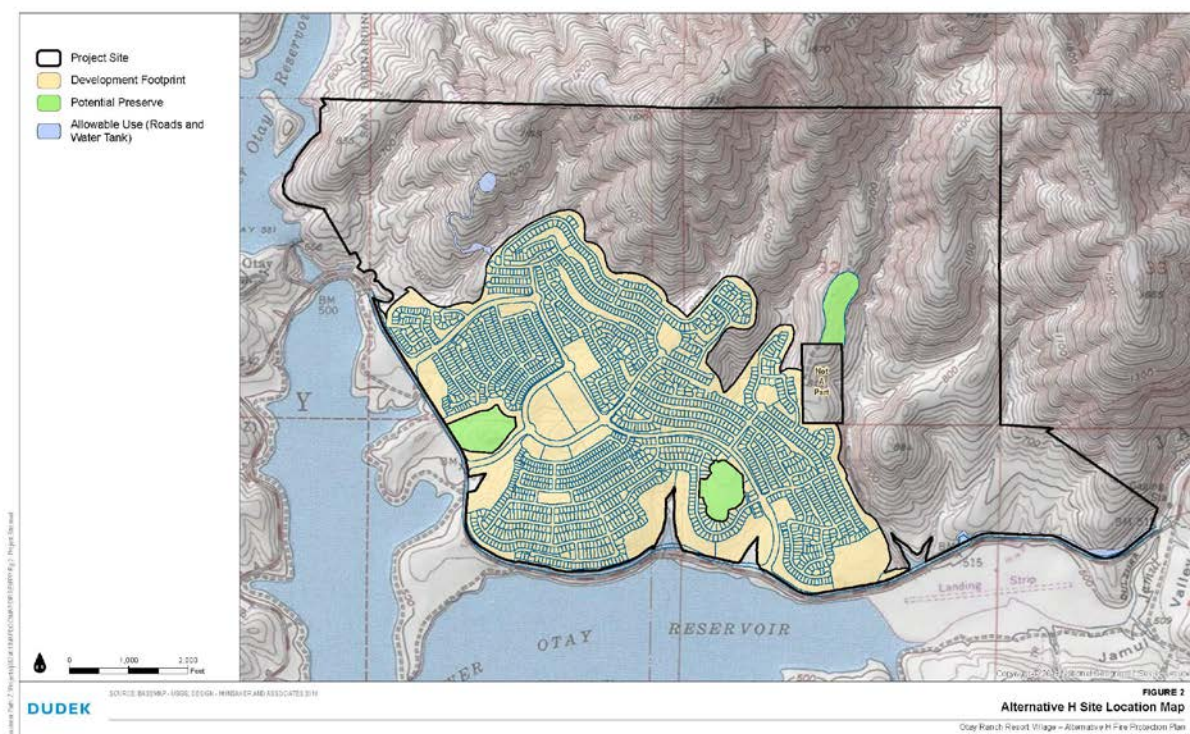
- a. Draft Fire Protection Plan (and appendices), prepared on behalf of the project proponent by Dudek of Encinitas, CA. Original version: January 2015, and as updated in January 2019.
- b. County of San Diego High/Very High Fire Hazard Severity Zone data.
- c. San Diego County fuels and topographic mapping.
- d. State of California Forest Resource and Protection Program (FRAP) data.
- e. Fire history map data for the Proctor Valley/Chula Vista region.
- f. Potential Fire behavior data produced by BehavePlus, FlamMap, and LANDFIRE applications.
- g. Wildland Urban Interface Fire Emergency Response Plans, San Diego County Fire Chiefs Association, 2015-2018 (Jamul West, Proctor Valley, Dulzura Plans).

Village 13 development site- Otay Lakes in the distance



The principal review of this report was of the project proponent's Fire Protection Plan (Dudek, 2019). This study has found that the Dudek report is complete and Accurate in most of its findings. Minor variations have been noted and explained in this report. The development mitigations proposed within the Fire Protection Plan will significantly mitigate community wildfire concerns.

The Otay Ranch Resort Village- Village 13 Project Site (Source: Dudek)



Site Characterization

The Village 13 project site is wholly within The San Diego County designated Very High Fire Hazard Severity Zone. It is positioned at the base of an historic wildfire corridor that has experienced high frequency-short interval return of wildfire.

Climate

The site is subject to a Mediterranean Climate with dry, warm summers, and brief, wet winters. This historically results in critical fire weather in the summer and fall on the project site. Critical fire weather periods have occurred in every month of the year, although a fall through winter foehn wind condition, known locally as Santa Ana winds, historically leads to the most critical fire weather episodes. Climate change has caused uncertainty with historical fire weather patterns, and periods of prolonged drought has increased wildfire intensity and severity, total burned acreage, and extended a seasonal fire condition to a “year-round” risk condition.

Fire History

The proposed project site lies on the western edge of an historical fire corridor subject to repeated occurrence of northeast, Santa Ana wind-driven wildfires. Additionally, smaller fires affected by diurnal conditions are not uncommon within the area. Diurnal conditions are characterized by onshore/up-canyon winds during the day and lower intensity down-canyon winds at night. While the proposed development footprint will develop ignition and spread resistance to some fires through replacement of wildland with suburban conditions, the community's position within the historic fire corridor will ensure its exposure over time to large fires. Examples of large fires in this area include the 90,440-acre Harris Fire, which started on Oct. 21, 2007, and the 46,291-acre Otay Fire, occurring on Oct. 26, 2003. Both fires burned within, or immediately adjacent to the project site. The proponent's Fire Protection Plan (Dudek, 2019) identified five large historical fires within the Village 13 footprint. A large portion of the site has burned as many as four times in modern history, and at least 90 fires have affected the development site since 1910 (Dudek, 2019).

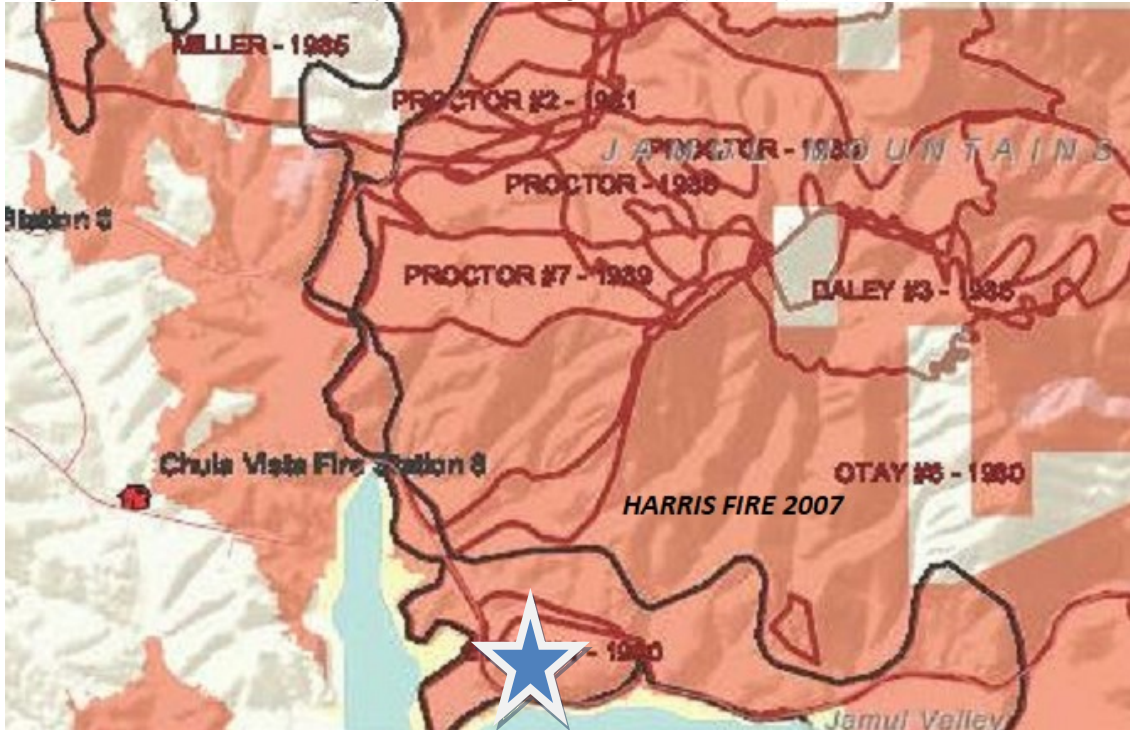
The most significant of these fires in contemporary times was the 2007 Harris Fire. The fire started on Oct. 21, 2007 and was not contained until Nov. 7, 2007. It burned under strong Santa Ana wind conditions, ultimately burning 90,440 acres, 253 residences, and killed 8 people. Proctor Valley Rd. leads north from the project site and was the location of a major containment effort, including placement of dozer lines and setting of backfires. According to fire officials familiar with this deployment, this specific location in Proctor Valley was selected as a containment point due to the change in fuels in this area from chaparral and sage to grass. The tactical ability to "anchor" a fire line to Proctor Valley Road, the wind sheltering effect of the Jamul Mountains and the ebb of the Santa Ana wind condition was also favorable to this firefighting tactic.

The Otay Fire near the project site, Oct. 26, 2003

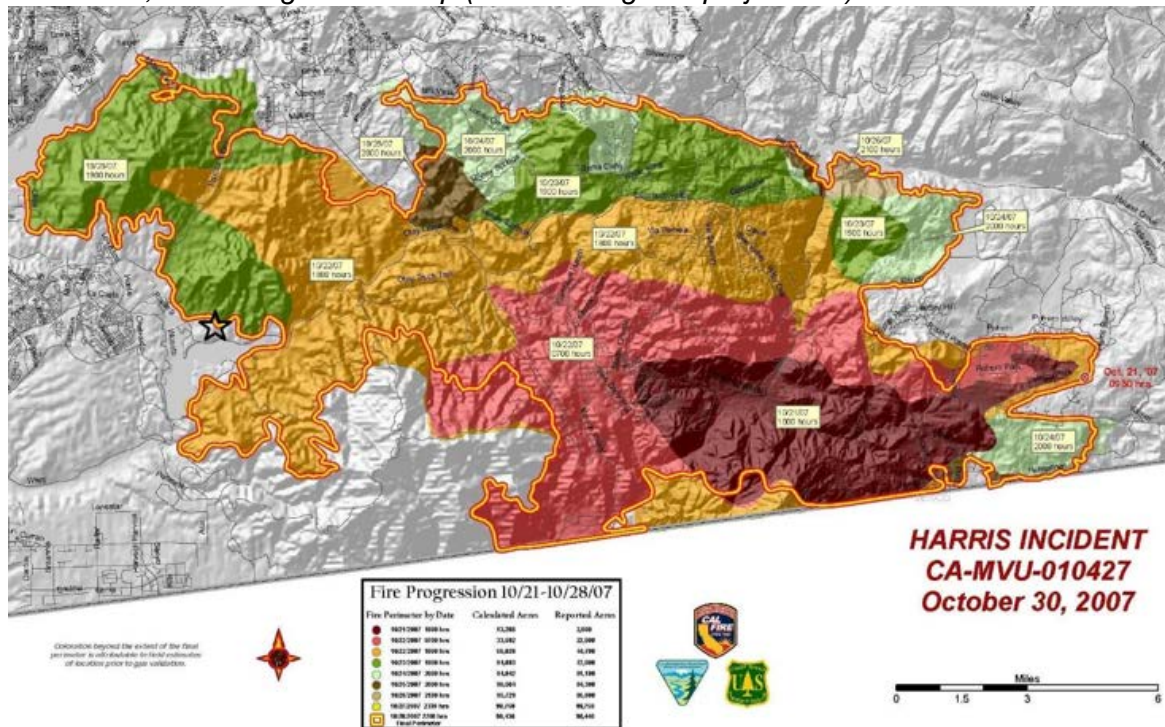


Historically, fires approaching from the north-east have posed the highest intensity and threat to the project site. The project site is buffered against large fire runs from the south by Lower Otay Lake.

Regional 50-year Fire History (Star is Village 13 project site)



Harris Fire, 2007 Progression Map (Star is Village 13 project site)



Wildfire Factors

Offshore winds

This site is subject to seasonal Santa Ana winds: a foehn wind type which characteristically critically dries vegetation, develops high wind speeds and low relative humidity and spawns' historic wildfires in the region. Annually, the most critical fire weather episodes are associated with Santa Ana wind events in the fall. Santa Ana winds have a directional flow in an offshore, east or northeast pattern and have occurred in every month of the year, but characteristically occur from September through April. Santa Ana winds can be influenced significantly by terrain, which locally funnels and intensifies winds. For the project site, the presence of the Jamul Mountains to the north-east may partially shelter Santa Ana winds but introduce roll-turbulence as the break over the mountain range. The Dulzura Creek corridor east of the project is in alignment with Santa Ana winds and will frequently funnel winds in alignment with topography and strengthen winds in this area. Peak burning conditions occurring with Santa Ana winds often produce fires with high thermal outputs, long-range spotting in excess of 1-mile, high rates of spread and other extreme fire behavior.

Average Santa Ana wind speeds within Village 13 historically range from 25-35 MPH with gusts to 60 MPH on exposed sites.

Village 13 Site average-Santa Ana wind conditions- 50-year record

Max. Temp.- offshore winds	Min. Relative Humidity (RH)- offshore winds	Average offshore wind speed	Average offshore gusts	Wind Azimuth
85-105 degrees F.	<10%	25-35 MPH	35-60 MPH	36-90 degrees

Onshore Winds

During normal diurnal conditions, predominant onshore winds of low to moderate intensity will likely affect the project site daily, beginning with solar heating early in the day, with onshore/up-canyon winds that diminish after sunset. Light down-canyon winds will be the routine condition after dark. Summertime critical fire weather events can episodically occur and are characterized by prolonged periods of hot temperatures, low relative humidity, low fuel moistures, seasonal drought, strong predominant high pressure and moderate diurnal/onshore winds. While fire behavior can become critical under these conditions, wind speeds are significantly less severe than during Santa Ana wind events. Fire trajectory approaching from the south and west will likely be thwarted by the position of Lower Otay Lake to the project.

The following average onshore wind conditions have been recorded historically for the late summer period:

Village 13 Site average- peak summer diurnal wind conditions- 50-year record

Max. Temp.- Onshore winds	Min. Relative Humidity (RH)- on-shore winds	Average onshore wind speed	Average onshore gusts	Wind Azimuth
85-100 degrees F.	<30%	7 MPH	12 MPH	270 degrees

Fuels

The project area is largely composed of vegetation typical of Southern California coastal and interior chaparral communities. In addition to mixed chaparral and coastal sage scrub, small areas of riparian vegetation, coastal live oak woodland, eucalyptus and both native and non-native grasslands exist on or near the project site. Grazing has occurred periodically on portions of the site. The spatial area of each habitat type is adequately reflected in maps included within the proponent's Fire Protection Plan. (Dudek, 2019).

Grass and coastal sage scrub dominate the site. Fuel loading for the project site is estimated to be 2-3 tons per acre for light grass, 4-5 tons per acre for heavy grass, and 8-10 tons per acre for Coastal Sage Scrub and mixed chaparral.

Current fuel conditions are sub-climax and recovering from the effects of the 2003 and 2007 wildfires. This sub-climax condition allows domination by herbaceous fuels which enhances wildfire ignition potential and causes rapid rates of spread and may develop large wildfires under wind-driven or extreme burning conditions. As fuel conditions continue to age to maturity, fires will burn with higher energy release rates and increased long-range spotting potential but may also slow in rate of spread. Coastal sage and mixed chaparral fuels should achieve climax conditions within 25-30 years post-fire. As fuel beds age, they also add a dead fuel component which is largely absent in the early wildfire recovery condition. The dead fuel component increases annually as fuels age to maturity, and increases thermal output of wildfires, and contributes to spotting and difficulty in fire control.

Topography

Elevations range within the Village 13 project from around 500 feet on the southern end of the proposed development adjacent to Lower Otay Lake, to 900 feet at the highest streets to the northeast within the development. The project site includes relatively flat mesa areas near lakeside to more sloping topography near the foothills. Slopes near foothills approach 44%. Dulzura Creek Canyon to the east of the project is topographically aligned with easterly Santa Ana winds, which may funnel fires towards the east side of the project.

Fire Behavior

In discussion of fire behavior potential, potential flame lengths are the chief indicator of expected fire line intensity. Flame length potential is dependent upon fuel, slope, and wind conditions, but is often expressed as an average value for flat terrain as a comparison. In the following discussion, values are expressed in these average terms with the lower range most likely during onshore wind scenarios and the upper range more likely during an offshore/Santa Ana wind or critical burning period scenario. Potential flame lengths were determined by onsite analysis of fuels present and modeling which will be explained in later sections.

Two types of shrub fuels dominate upper slopes and patchy areas of lower mesas on the project site. Mixed chaparral is the heavier of the two fuels and may generate flame lengths in the range of 35-45 feet (the Dudek 2019 report sights maximum calculated flame lengths from this fuel at 46 feet). Broader coverage is provided by Coastal Sage Scrub, and flame length potential in these fuels' ranges from 15-25 feet. Other areas are covered primarily by grass with flame length potential of 8-15 feet. All flame lengths presented here assume fully mature fuels. Shrub fuels flame length potential may exceed dangerous thresholds for fire line intensity under either onshore wind or Santa Ana wind wildfire scenarios. Grass fueled wildfires are more situational and may be subject to a greater range of fire intensity based upon daily weather factors.

Since much of the fuels present on the project site are recovering from past wildfires are in a sub-climax condition, fire line intensity may currently be experienced at about 1/3 of the fire line potential of these fuels at maturity.

In discussion of a vernal pool site to be maintained in its natural condition in the southeast corner of the development, this site is proposed for mowing of annual grasses and reduction of vegetative flame lengths from this site could range from 14 feet during typical summer conditions to 20 feet during critical fire weather periods,

These findings are generally consistent with the findings of the project proponent in their Fire Protection Plan (Dudek, 2019) and validate the conclusions of this plan. Any differences between this report's findings and those of the proponent's Fire Protection Plan are likely due to the source of fire behavior modeling, with this study utilizing higher resolution data to determine its conclusions.

Rate of Spread

Average Santa Ana winds in this area may be expected to accelerate wildfires to a 3-8 MPH rate of spread in grass and mixed shrub fuels, including coastal sage scrub and mixed chaparral. This is a critical and rapid rate of spread. Highest rates of spread may be expected in grass fuels and in locations where fuel, topography and winds are in alignment. This rate of spread may also be accelerated 3 to 5 times on slopes. Additionally, spread will be enhanced by spotting and fire branding ahead of the main fire front.

Looking across Otay Lakes and the project site



Worst-Case Fire Trajectory

Worst-case wildfire scenarios for the project likely will be characterized by fire crossing the Jamul Mountains from the north-east, or by fire traveling Dulzura Creek from the east under Santa Ana winds. Spotting from major fires in these cases may be affected by topographic “roll-eddy” influences either from ridgelines or canyon features. Winds may also be turbulent due to geographic obstruction of the Santa Ana wind flow. Fires approaching from the south and west may be less severe due to flatter terrain and the fire barrier of Lower Otay Lake.

Spotting and Fire Branding

Spotting may be extensive in a wind-driven fire and when heavier shrub or riparian fuels are involved. Spotting distances in typical Santa Ana winds for the project site have been calculated with potential to reach 1 to 2.5 miles ahead of the fire in worst case conditions.

National fire research by Cohen (2008) and Manzello (2014) has identified fire brand casting as a principal factor in ignition of structures in the Wildland-Urban Interface. This

factor supports the Fire Protection Plan's conclusion that all structural development within the project be subject to California Building Code 7A standards.

Chapter 7A Building Code enhancements harden structural design against wildfire, particularly from spotting. Use and placement of ornamental vegetation, placement and design of structural features such as decks, gazebos and external structures, setbacks from natural vegetation near perimeter structures, modification of native fuels in internal community islands and other related actions to reduce ignition by fire brands will also be important to Village 13 development to protect against wildfire spotting potential, and are all included in the proponent's Fire Protection Plan (Dudek, 2019).

Fire Ignition Sources

Numerous studies have identified that human wildfire ignition is directly tied to population growth (CAL FIRE, Keeley, et. al.) and is an inescapable result of any development in the Wildland-Urban Interface. The project area has also been known in the past as a corridor for illegal immigration, which may be a continuing source for wildfire ignition in remote area adjacent to the project. Studies have determined that major transportation corridors such as Otay Lakes Rd., are a significant origin of wildland fire ignitions. Mitigation of potential wildfire ignitions on project area roads is proposed in the Fire Protection Plan and includes fuel modification for 20 feet exterior to roadbeds in all open space areas of the project.

Fire Modeling

Wildfire rate of spread has been modeled in this study using BehavePlus, LANDFIRE, and FlamMap fire behavior prediction programs. Mapping from this modeling has been included in the Wildland-Urban Interface Fire Emergency Response Plan for this site that depicts both onshore and offshore wind scenarios under average worst case fire weather conditions. Fifty years of historical fire weather and climax state fuel mapping have been calculated into these models. Rates of spread for sub-climax grass in post-wildfire recovery areas may exceed modeled rates of spread under high wind conditions.

Public Safety Actions

The Fire Protection Plan (Dudek, 2019) states that an evacuation plan will be prepared by the community in accordance with County standards prior to occupancy and that public safety will review the plan. Such a plan is recommended for completion by this study to confirm project evacuation assumptions and road carrying capacity. The community will also engage in an ongoing wildfire education effort.

Two options will be available for responders for protection of life within the Village 13 community, evacuation or temporary shelter-in-place. Selection of the appropriate alternative will be driven by assessment of experienced first responders based upon potential wildfire behavior and fire behavior threatening the community at the time of the incident.

Evacuation

Evacuation of the community should occur via one primary route: Otay Lakes Rd. Otay Lakes Road progresses from the planned development west into the City of Chula Vista and intersects with the South Bay Expressway (Hwy 125) in 2.5 miles. To the east, Otay Lakes Rd. intersects with Hwy. 94 in 5.7 miles.

Otay Lakes Road will be upgraded from the second entrance from the western edge of the development west into urban area of the City of Chula Vista to four traffic lanes. The project traffic study identifies as many as 27,000 Average Daily Trips on this west-bound route at community build-out. The proposed road development will improve the road to contemporary suburban standards like many modern communities of San Diego County and mitigate previous traffic congestion concerns for traffic evacuating west. This new capacity will accommodate both emergency vehicle access and public evacuation needs.

Given the improvements proposed Otay Lakes Road and relatively short distance of less than 1 mile to safety within adjacent urban area, this road west-bound will be the likely path for evacuation for either Santa Ana wind driven fires approaching the community from the east, or onshore wind driven fires approaching the community from the west. This road will also be enhanced with fuel modification of 20 feet from the edge of the roadway on both sides where it traverses open space.

Alternatively, Otay Lakes Road may also be used for evacuation east-bound for fires positioned south and west of the community or in the Proctor Valley. This route will continue to be rural in nature at community build-out and consists of two lanes. The route is exposed to wildlands on both sides the entire distance from Village 13 to Hwy. 94 in Dulzura. From here traffic may move north or south bound on Hwy. 94 as required. This route however is not recommended due to its potential for compromise by wildfire and potential vehicle entrapment, and for its limited safety zones should either traffic congestion or obstruction require traveler's emergency safe refuge during fire movement.

Nearly 7,000 residents and hotel guests will occupy the community at build-out. With effective notice and cooperation by residents, the community can be evacuated in approximately 1.5 to 2 hours, according to general evacuation estimates published for urban areas by the Federal Emergency Management Agency. Historical evacuation experience during past San Diego County wildfires has found limited participation by large percentiles of affected populations to evacuation warnings until late in evacuation periods. This leads to traffic congestion during peak threat times. It will be important to stress the dangers associated with delay of evacuation in emergency messaging and public outreach. A wildfire prevention and Ready-Set-Go public education outreach has been proposed by the project proponent in its Fire Protection Plan (Dudek 2019) for the community.

Temporary Safe Refuge

This community will also offer many opportunities for shelter-in-place to reasonably achieve temporary safe refuge within the development. Wildfire risks will be most apparent along the community perimeter, while areas within the development will be

reasonably absent of fire risks under all but the most serious wildfire conditions. Safe refuge opportunities will exist in most large public assembly areas including schools, shopping centers, churches, interior developed parks and in the community core. Public safety officials should consider the relative safety of the community under most conditions as opposed to the hazards of evacuation on roads with open space exposure when contemplating public safety actions due to wildfire threats.

Public Safety Action Points

The Following locations are recommended as action points when considering evacuation of the Village 13 community:

Public Safety Action Points

- Offshore (Santa Ana) wind-driven fire: Fire escaping initial attack, or with major fire characteristics, crossing south of Hwy 94 and progressing west of the Dulzura area, approaching Village 13 from the east with a rapid rate of spread.
- Onshore wind-driven fire: Significant fire approaching Village 13 from the east side of the City of Chula Vista or Otay Lakes. Evacuate homes on community perimeter facing the involved canyon or drainage. Move into the Village 13 community interior using community centers, hotel, school or well protected parks for a shelter-in-place protection tactic.

Emergency Messaging

Detailed but succinct evacuation information should be broadcast to the media and via the Alert SD reverse 911 system, and the County's Wireless Emergency Alert system. Details for use of these systems should be included in the community evacuation plan. Evacuations should be directed to shelter facilities distant enough from the fire area or away from the fire trajectory to ensure complete removal of threat, as well as promote freedom of access by emergency responders. Evacuation information should include both human and large animal evacuation guidance.

Evacuation Center Locations

If the need does occur to evacuate the Village 13 community, the County of San Diego recognized evacuation centers nearest the project include:

- * Short Term: Chula Vista Elite Athlete Training Center, 2800 Olympic Pkwy., Chula Vista, CA
- * Long Term: San Diego County Credit Union Stadium, 9449 Friars Rd., San Diego, CA
- * Large Animal/Equestrian: Lakeside Rodeo Arena, 12584 Maplevue St., Lakeside, CA (short term staging: Monteville Community Center, 840 Duncan Ranch Road, Chula Vista)

This study has concluded that an equine/large animal evacuation of the Village 13 region could unnecessarily congest available roadways during public mass evacuation. To address this concern, it is recommended that animal rescue resources temporarily stage trailers and related equipment at a large park in the City of Chula Vista, immediately west of Village 13, and that local evacuations of large animals be brought to that location when possible. Deployment of animal rescue resources deeper into evacuation areas could also be coordinated and dispatched from this facility. This temporary evacuation staging area is:

Monteville Community Center, 840 Duncan Ranch Road, Chula Vista

Fire Services

Fire Service Providers

Structural fire and emergency medical service is provided to the proposed Village 13 by the San Diego County Fire Authority (SDCFA). The proponent's Fire Protection Plan (Dudek, 2019) identifies the San Diego Rural Fire Protection District (SDRFPD) as the principal protection agency. However, this agency has since been absorbed by SDCFA. Automatic aid agreements exist for the proposed Village 13 area that also utilizes services by the Chula Vista Fire Department (CVFD) to provide secondary response to the development. SDCFA will provide first-due fire and emergency services to Village 13 starting with the initial construction phase through a temporary facility until such time as a new fire station is developed within the community core. Wildland fire protection is provided by the California Department of Forestry and Fire Protection (CAL FIRE), who also contracts as the operational service provider for the SDCFA.

Fire Service Response

The SDCFA will operate a temporary fire station within Village 13 from project initiation. The project expects to build a permanent fire station in the Village core area within 5 years. At that time SDCFA will occupy this facility and close the temporary station. The SDCFA and the CVFD maintain automatic aid agreements that dictates agencies will provide a common, unified response by closest due resources. These agreements will provide for the secondary response of CVFD resources as backup to the Village 13 SDCFA station, or when multiple fire companies may be required such as during structural fire response.

Road widths within the Village 13 community will meet urban/suburban standards for lanes, intersections, cul-de-sacs, roundabouts, fire lanes, driveways, parking, and paving, and as such will accommodate the movement of minimum 75,000-pound emergency vehicles. All arterial and secondary roads proposed for Village 13 will support 35MPH response speeds. Three points of public entry are planned for the community. Where center medians are placed in roadways, access shall be placed for

emergency apparatus every 1,000 feet. Any access gating for private roads shall be subject to electric gating SDCFA standards. Structures must have visible addressing.

The project estimates a call load for the Village 13 fire station, using San Diego County standards, at 82 calls per year, per thousand residents. Given an estimated total of 7,800 residents and hotel guests, the average annual call load is expected to be 640 calls per year (1.8 calls per day) for the Village 13 Fire Station at project build-out. This is well within national standards of response by the proposed level of staffing.

The Fire Station Order (FSO) reflects the order of closest fire stations and resources. The chart below reflects the FSO for Village 13:

Area Fire Stations

SDCFA Proposed Fire Station- 3 firefighters	Central Village 13- <i>Temporary and permanent</i>	Type 1 engine, possible Type 3 cross staffed engine
Chula Vista FS8 – 3 firefighters	1180 Woods Dr., Chula Vista (1.6 miles away)	Type 1 Paramedic engine
Chula Vista FS 6- 3 firefighters	605 Mt. Miguel Rd. (3.5 miles away)	Type 1 engine, (Type 3 Eng. cross- staffed)
Chula Vista FS7- 9 firefighters	1640 Santa Venetia, Chula Vista (5.5 miles away)	Type 1 engine, Truck, Battalion Chief
SDCFA Proposed Fire Sta. 34- 3 firefighters	Village 14 Core- <i>To be built</i> (6.1 miles away)	Type 1 Paramedic Engine
SDCFA FS 36- 8 firefighters 2 EMT's	14024 Peaceful Valley Rd., Jamul (9.6 miles away)	Type 1 paramedic engine, Medic Truck/quint, Patrol,
SDCFA FS 38 4 firefighters 2 EMT's	446 Alta Rd., Bld, 32, San Diego (Temp. at SDFD FS 43) (10.4 miles away)	Medic Truck/Quint, (Type 1 & 3 cross-staffed Engines) Contract ambulance

Response Time Analysis

The County of San Diego maintains response time standards for the SDCFA jurisdiction. Response time is measured by the standard in terms of actual travel time, the time from which an emergency vehicle starts its response until the time that it arrives on-scene. According to the Dudek report, response travel time for the entire project from the Village 13 SDCFA station will be at or below the 5-minute travel time standard. The western side of Village 13 will also fall within a 5-minute response time from Chula Vista Fire Department (CVFD) Station 8. Rohde and Associates has validated Dudek's response times analysis and believe the reported times and findings to be accurate.

The proponent's fire Protection Plan's (Dudek, 2019) response time analysis for the project considered the Fire Station Order of existing fire stations and resources. They did not include the nearby proposed Village 14 SDCFA station (Fire Station 34) since it has

not yet been placed into service. They also did not consider SDCFA Fire Station 36 in Jamul or SDCFA Fire Station 38 in Otay Mesa because they were both determined to be outside of a 17-minute response time to the project site.

In consideration of response times, it is also important to compare response performance in the Village 13 area with the SDCFA jurisdictional response standard. That standard includes the following criteria:

The SDCFA response standard:

Response Type	Urban/Suburban Area	Rural Area
First Due Unit on-scene	5 min.	10 min.
Full First Alarm on-scene	19 min.	30 min.
Truck first due (where available)	8 min.	16 min.
First Alarm- Structure Fire Response (all areas): 4 engines, 1 truck (if available), 1 medic unit, 1 chief officer. Add 2 water tenders for rural areas		

In analysis of full first alarm response to structure fires, this study identifies that the planned first alarm response can be on-scene within SDCFA's 19-minute urban standard. It should be noted however that most of this response resources would be generated by the CVFD, the exception being the first due unit from the Village 13 SDCFA Station.

Additional analysis was conducted by Dudek for best placement of the Village 13 Fire Station. This analysis showed that placement of the permanent station in the Village core would best achieve a 5-minute initial response time to the entire Village 13 community.

In final analysis, proposed fire services response for Village 13 will meet the SDCFA standard for both first due and full first alarm response in an urban/suburban setting. Consultants also agree with the Dudek finding for best location of the proposed Village 13 fire station.

Compaction of Development

Through the County's development approval process, "Alternative H" was selected by the County of San Diego for final project approval. Benefits from the compaction of the development footprint will contribute to improved efficiency of fire services through improved response times, and improved strategic and tactical options for deployment of community wildfire protection during a major wildfire. Previously proposed development patterns were more dispersed and would have resulted in longer response times to outer

areas, and the more dispersed community would have created difficulties to deploy and protect homes over a broader and less contiguous area during large fires. Under Alternative H, development will also be more concentrated on the valley floor which is dominated by lighter fuel types posing lessened wildfire intensity, and flatter terrain with less topographic challenges, both which will serve to reduce wildfire threats.

Implications for Wildfire Operations

Structural defense and evacuation of the Otay Ranch Village 13 community from wildfire will be a dynamic and significant challenge for emergency services, but typical of challenges faced by many modern communities within San Diego County. Community fire resistive features including building construction, fuel modification, fire sprinklers and water systems, and related improvements will significantly reduce the potential risk to both civilians and public safety responders.

Among perimeter streets and homes, active structural defense will be necessary. Where adequate defensible space is provided and maintained, the chief risk will be from flying embers and spot fires developing among combustible yard improvements or ornamental vegetation. Left unchecked, such sources can contribute to significant structural loss. A main concern will be for homes at the head of the fire and for homes on the community perimeter above canyons or drainages. Locations with compromised fuel modification may offer increased vulnerability to ignition.

It is anticipated that community interior residential streets will generally offer temporary safe refuge for firefighters involved in structural defense and that withdrawal to these streets during assault by heat pulses from wildfire will be a successful alternative for responder safety. Following safety withdrawal, rapid re-engagement or fire-front-following as heat pulses subside would be a critical tactic to keep structural loss to a minimum.

Otay Lakes Road, the primary escape route, will have to be used concurrently for both civilian evacuation and emergency responder access.

Potential Worst-Case Loss

Worst case wildfire conditions for Village 13 include severe Santa Ana winds, critical fire weather and extreme fire behavior. The estimated loss from a short notice, worst case wildfire condition can be compared to previous loss experience during the 2007 Witch and Guejito Fires (Maranghides & Mell, 2009), and 2014 Poinsettia Fire (San Diego Co. OES, 2014). These studies found that structural loss in Building Code 7A compliant San Diego County communities typically range from 2-5%, which is strong evidence for the benefit of application of the standard to similar Wildland-Urban Interface fire threats. These studies also determined that structural loss would likely be concentrated on the community perimeters due to proximity to fire and fuels or fire branding.

Modern, fire resistive home burning during the Witch Fire, Rancho Bernardo, CA 2007



Sites with compromised or diminished defensible space may be at higher risk for fire ignition. This should be mitigated by Village 13's proposed fuel modification maintenance plan but is mentioned here for relevance. Community interior spot fires may also develop in ornamental vegetation, yard storage, or within structures. Once structures become involved, extension of fire to surrounding and exposed structures often results in a group loss in this community type due to structural density. Mitigations proposed for Village 13 against spot fires including attic venting, yard and deck construction restrictions, and similar mitigations reduce potential for spot fire ignition within community interiors.

In worst-case fire scenarios, fire resources may not achieve desired deployment levels due to reflex time or due to regional resource draw-downs due to multiple fires. Lesser fire conditions or availability of adequate emergency resources may alleviate worst case potential loss, especially where defensible space is robust.

Based upon proposed conditions for Village 13, worst case fire loss is estimated for severe wildfire conditions as follows:

Village 13 Estimated Potential Structural Loss:

Total number of homes = 1,881

Total number of perimeter homes: Approximately 250

Loss of 5% of perimeter homes (worst case fire condition) = 13

Loss of 2% of perimeter homes (worst case fire condition) = 5

Development Wildfire Resilience

Water Systems

The proposed project will be serviced by the existing Otay Water District. The District has indicated their ability and interest to continue service to the new development. The proponent's Fire Protection Plan (Dudek, 2019) identifies fire hydrant distribution, water delivery systems, pump stations, and elevated reservoir capacity meeting suburban development standards recommended by the California Fire and Building Code. Fire hydrants will be 350 feet apart (300 feet in the vicinity of the resort), each with a 2.5" and 4" outlet, and will be marked by a blue dot on the street. The system will be able to flow 2,500 GPM from fire mains. Minimum reservoir water storage capacity shall be sufficient for a flow duration of 2 hours.

It is recommended by Consultant's that all water pump / lift stations be hardened for wildfire resistance to Building Code 7A standards. Loss of a primary pump station led to the loss of nearly 150 structures uphill from the facility when the water system failed after the pump station burned in the 2008 Freeway Fire in Orange County, CA.

Construction

Fire risk mitigations proposed by the project proponent are consistent with current best practices for building construction within high fire hazard zones and includes ignition resistant construction materials and design. Structural development will be consistent with the 2017 San Diego County Consolidated Fire Code and County Building Code. This code incorporates the current 2016 California Building Code, including Chapter 7-A, the State's Wildland-Urban Interface construction standard. The project intends to update construction to meet current standard as code adoption occurs. Proposed development mitigations include:

- Automatic fire sprinkler systems in all structures (NFPA 13 compliant systems)
- Ignition and ember resistant structural roofs and attic vents
- Limited building zones on lot perimeters controlling positions of ignitable yard features and landscape
- Non-combustible roofs and exterior walls
- Multi-pane tempered glass windows
- Ornamental plants to be consistent with County approved fire resistive plant lists and planting specifications
- Overhanging decks, turbine roof ventilators, and other construction features of concern are prohibited
- Yard structures must meet fire safe code restrictions and setback requirements
- Wet standpipe systems, fire rated and smoke proof stairwells, smoke removal system, commercial sprinkler systems, elevator controls, and fire alarm systems

will be provided within the Otay Lakes Resort

Study of performance of ignition resistant construction built to similar standards in the State of California has demonstrated strong resistance from major wildfire ignition. Similarly constructed communities in San Diego County have experienced loss of under 5% of exposed homes when constructed to similar standards during the 2003 Cedar Fire and the 2007 Witch Fire, despite the loss of thousands of homes to these events.

In the proponent's Fire Protection Plan, they cite that a major wildfire in Orange County, CA in 2008, the Freeway Complex Fire burned no fire resistive structures that were compliant with modern fire and building codes, despite the loss of 194 structures. This citation is partially true, however homes that were built to compliant structural standards were lost during this fire after ignition of non-compliant yard structures (like gazebos), decks, or ornamental vegetation. (Frothingham, 2010). Yard structures and ornamental plantings are proposed for mitigating standards in the Village 13 Fire Protection Plan (Dudek, 2019).

The California Building Code has been significantly upgraded since 2008 to further enhance these standards. It should be noted however that a recent catastrophic wildfire in California challenged typical performance of fire resistive building standards but had additional contributing factors. During the Camp Fire in Paradise, California in 2018, homes built to similar construction standards only achieved a 51% survival rate (Los Angeles Times, Dec. 2018). In this case the Wildland-Urban Interface condition was designed as an "inter-mix" community with extensive native fuels intermixed between structures, and topographic influences were situated to accentuate fire behavior as it entered the community. A preponderance of non-fire resistive constructed dwellings also contributed to urban-conflagration development. Village 13 is absent these additional factors and has significantly more in common with factors affecting the Witch and Cedar Fires and is expected to achieve similar fire results.

Fuel Modification

Fuel modification for the proposed Village 13 community meets best practice currently enforced by the County of San Diego for Wildland-Urban Interface structural development. This includes:

- Annually maintained defensible space/fuel modification of 100 feet width of clearance, reduced of native vegetation by 50% (* exception noted below)
- 20 feet of fuel modification on each side all roads within the development where exposed to open space
- Annual third-party inspection for maintenance compliance

The proponent's Fire Protection Plan (Dudek, 2019) states that all community perimeter areas and those structures adjacent to the Thornmint Preserve shall be subject to

installation of 100-foot fuel modification zones. Fuel modification will extend from the developed property perimeter 100-feet into surrounding vegetated lands and include a 50% fuel reduction

An exception exists for fuel modification near the proposed Vernal Pool Preserve in the south-east corner of the development. Twenty-two (22) lots are affected by this exemption. For this site, 30-feet of fuel modification is proposed in addition to a 6-foot high heat deflecting view wall to serve as a fire barrier to the exposed lots. The wall would be constructed of 1-2 feet of block topped by 4-5 feet of dual pane glass. One of the two panes is proposed for tempered glazing. The intent of this wall would be to compensate for the reduction in fuel modification width. Such installations are contemporarily utilized by numerous Southern California fire jurisdictions to achieve such goals but are relatively untested and unstudied for actual performance under severe fire conditions.

The vernal pool site is also proposed for annual grass mowing to 4 inches in height and shrub grouping reduced through thinning. Consultants believe that this can be a successful means of mitigating fire risk, but that the mitigation will be dependent on annual fuels management meeting the Fire Protection Plan's prescription to reduce potential fire intensity. Coupled with this fuel thinning and mowing, the 30-foot fuel modification and view wall would be expected to offer successful fire mitigation. If manipulation of fuels within the area of the vernal pools fails to achieve environmental acceptance, then the SDCFA should reconsider reinstatement of the standard 100-foot fuel modification width for this area.

In addition to fuel modification, the Fire Protection Plan (Dudek, 2019) commits that Community-wide ornamental planting shall conform to the County of San Diego's recommended plant pallet for fire resistive plantings, and that plantings shall maintain coverage and density/spacing standards. No combustible yard structures will be permitted within exterior yards (Zone A) within Village 13.

Fuel modification will also be extended to roadways and designated fire access roads that are adjacent to open spaces. Fuel modification width for roadways shall be 20 feet from the edge of the road on both sides where roads traverse open space. Grasses in these areas shall be maintained by mowing at less than 4 inches in height. All fuel modification shall be maintained annually and be kept weed free. A Community Facilities District or similar entity will be developed by the project proponent for the Village 13 community to maintain fuel breaks and similar facilities.

Additional Measures

All public utilities will be undergrounded within the Village 13 community. This will significantly reduce the threat of utility sparked wildfire within the community.

The developer will complete and implement a fire prevention plan affecting the

construction phase of the development.

Recreational trails will be maintained for fuels reduction and access.

Summary of Findings

Consultants have determined through this study that all critical factors affecting wildland fire behavior and risk have been appropriately identified in the Fire Protection Plan (Dudek, 2019) and that effective mitigations have been identified sufficient to accomplish fire and life safety. Where differences in findings have been reported in this study, they are minor or have been effectively managed through proposed development mitigations.

Significant Changes: from Initial Study of 2015

- a. Consolidation of development footprint to smaller area of development.
- b. New proposal for establishment of a Vernal Pool preserve within the development area and associated exception to the fuel modification standard and use of fire resistive view walls. Otherwise, 100-foot fuel modification on the entire community perimeter.
- c. Fuel modification on roadways where they traverse open space, 20-feet on both edges.
- d. Commitment to improve Otay Lakes Road to 4 traffic lanes.
- e. Fire services delivery by the SDCFA from the initial development of the project through a temporary, onsite facility, and transition to a permanent facility in the Village 13 core once constructed.
- f. Confirmation of application of California Building Code Chapter 7A compliant construction and wildfire mitigation measures through-out the project.
- g. Proposed development by the project proponent of an Evacuation Plan, Construction Fire Prevention Plan, fuel modification maintenance oversight inspections, and community wildfire education programs.
- h. Incorporation for a temporary safe refuge recommended action for onshore wind driven fires and certain offshore wind driven fires under selected conditions, given potentially safer conditions within the community than on evacuation on nearby roads.

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