NEWLAND SIERRA

FIRE SERVICES OPERATIONAL ASSESSMENT

Newland Sierra proposed development site

Prepared for the Deer Springs Fire Protection District, and Fire Marshal, San Diego County Fire Authority, by:

ROHDE & ASSOCIATES

EMERGENCY MANAGEMENT

April, 2017

NEWLAND SIERRA-FIRE SERVICES OPERATIONAL ASSESSMENT

Table of Contents ***Page***

The Project

Newland Sierra is a proposed community development in the North Twin Oaks area of north central San Diego County, California. The proposed community includes 2,130 dwelling units for 6,600 residents, and 81,000 sq. ft. of commercial space on a 1,935 acre site.

Structural fire and emergency medical services are provided to the area by the Deer Springs Fire Protection District (Deer Springs FPD). 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 Deer Springs FPD. Rohde & Associates has been retained by the Deer Springs FPD and San Diego County Fire Authority to conduct an operational review of the Newland Sierra proposal. The San Diego County Fire Authority has been retained by the Deer Springs FPD to provide fire prevention services.

The Site

The 1,935 acre project site is located in unincorporated San Diego County, east of the City of San Marcos and west of the Community of Hidden Meadows. The site is bordered roughly by I-15 on the east, Gopher Canyon on the north, Twin Oaks Valley on the west, and Deer Springs Rd. on the south. The site is within the Merriam Mountains, with elevations ranging from approximately 725–1,600 ft. The site includes rugged topography covered in most locations by heavy old-age class chaparral, and is largely included within Very High Fire Hazard Severity Zone by San Diego County.

The Newland Sierra development site in the Merriman Mountains

Analysis Approach

Rohde and Associates has assigned 4 staff members to this project with over 180 years of collective fire service experience in Southern California, including highly decorated and experienced wildfire commanders and a nationally recognized wildfire behavior analyst. This team conducted an analysis in two parts: development of a Fire Services Operational Review for the greater Newland Sierra proposed community, and development of a Wildland-Urban Interface Fire Emergency Plan for the proposed site using the County-wide standard assessment process and planning tools.

Since wildfire has been determined by agencies to be the predominant fire risk to the development site, the consultants have been tasked to conduct a wildland fire-centric study. The analysis of related data has included:

a. Draft Fire Protection Plan, prepared on behalf of the project proponent by Dudek of Encinitas, CA. May, 2015.

b. Wildfire Evacuation Plan, prepared on behalf of the project proponent by Dudek of Encinitas, CA. Nov., 2016.

c. County of San Diego High/Very High Fire Severity Zone data.

d. San Diego County fuels and topographic mapping.

e. State of California Forest Resource and Protection Program (FRAP) data.

f. Fire history map data for the Newland Sierra region.

g. Potential Fire behavior data produced by BehavePlus, FlamMap, and LANDFIRE applications.

h. Wildland-Urban Interface Fire Emergency Response Plans, San Diego County Fire Chiefs Association, 2015- 2017 (Central Twin Oaks, Hidden Meadows plans).

<u>Site inspection and Review</u>

Two site reviews were performed in March-April 2017, including a group inspection on March 29, by consultant subject-matter-experts and senior representatives from Cal Fire-San Diego Unit, Deer Springs FPD, and the San Marcos Fire Protection District. Additional consultation was sought with the San Diego County Sheriff, and San Diego Gas & Electric Fire Coordinators for purposes of developing the Wildland-Urban Interface Fire Plan and assessing specific criteria for the proposed development site. This group's collective input is cited in this report.

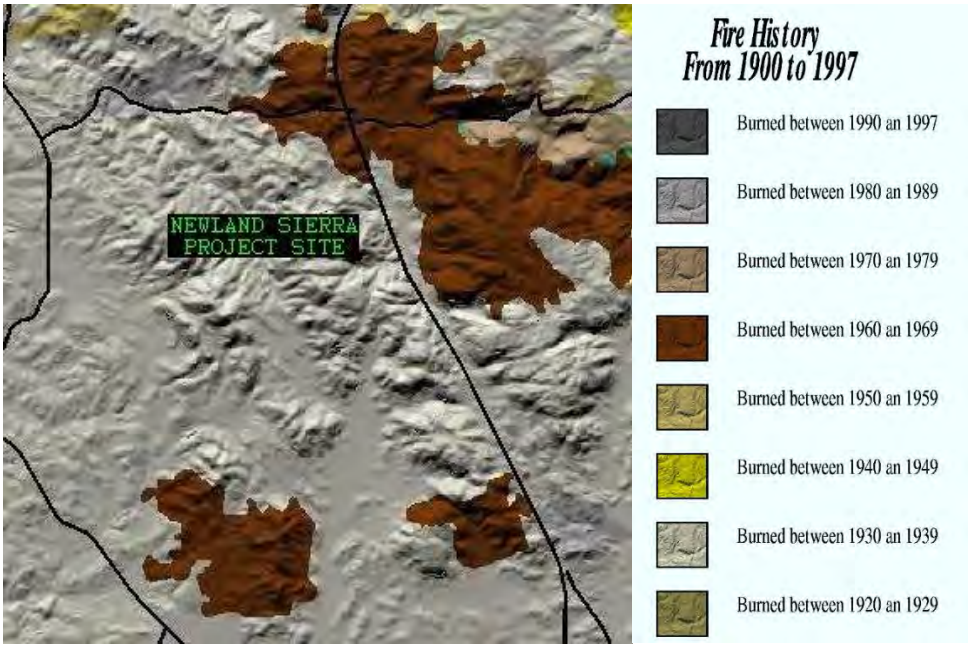
Previous Studies

This report analyzed and validated portions of two studies developed by the project proponent (a. and b., above), providing fire protection and evacuation planning for the proposed development site (Dudek 2015, 2016). Our study has validated the fire behavior and fuels assessment contained within these documents as generally accurate. Additional detail has been provided to elements of the Dudek assessments in this report, where such additions are critical to fire services operation and deployment.

Site Characterization

The Rohde & Associates assessment of the Newland Sierra project site confirmed the site characterization of the project proponent's study (Dudek, 2015) that the area is largely composed of vegetation typical of Southern California coastal and interior chaparral communities. Dudek also reported that the site has experienced limited/no contemporary fire history, and therefore has concentrations of heavy mixed chaparral exceeding 100 years of age. Small areas of riparian vegetation and coast live oak woodland also exist on the site. Topography is generally steep and rugged, with the proposed development concentrated on the southern end of the site. Much of the structural development is proposed for ridgeline configuration, with heavily fueled canyons and chimneys positioned below homes.

In the past, large fires have frequented the region, especially under Santa Ana wind/extreme fire behavior conditions. However, historic fire paths have generally followed wind corridors and canyons immediately north or south of the project site. These fires have most recently included the 6,241 acre Moosa Fire in 1969 and the 1,828 acre Lilac Fire in 1970 (CAL FIRE). The Moosa Fire, in particular, started east of Hidden Meadows/I-15 under Santa Ana winds, following a major canyon which runs north of the project site. The proposed development site, while surrounded by large fire activity, has been unaffected in contemporary history.



Offshore Winds

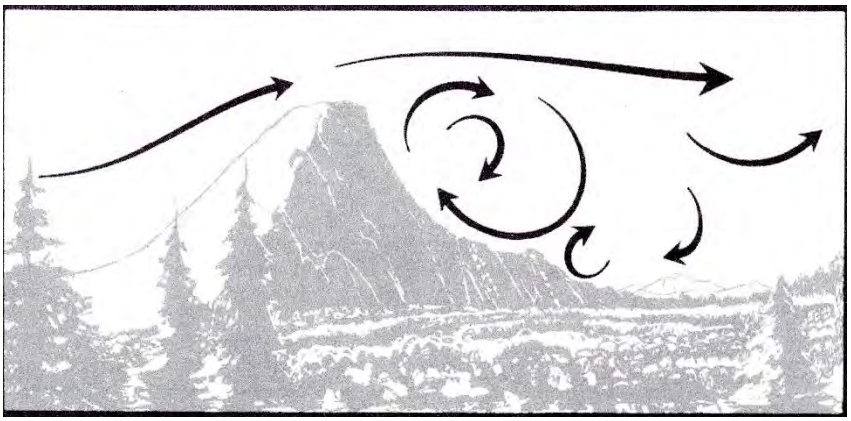
The site is subject to seasonal Santa Ana winds, a foehn wind type which characteristically critically dries native vegetation, develops high wind speeds and low relative humidity, and spawns historic wildfires in the region. Critical fire weather episodes are typically associated with Santa Ana wind events. Santa Ana winds flow in an offshore, east or northeast pattern and have occurred in every month of the year, but are characteristic of the September through February period. Santa Ana winds are influenced significantly by terrain, which locally funnels and intensifies winds. The Moosa and Gopher Canyon corridors north of the project site are typical of such locations. During Santa Ana wind events, the following average weather conditions have been recorded:

Max. Temp.- offshore winds	**Min. Relative Humidity (RH)- offshore winds**	**Average offshore wind speed**	**Average offshore gusts**	**Wind Azimuth**
100-108 degrees F.	<10%	25-35 MPH	35-50+ MPH	36-90 degrees

The mountainous terrain of the project site rises to 1,600 ft. elevation, forming a north-south oriented major ridge of the Merriam Mountains between the I-15/South Fork Moosa Canyon corridor on the east at 500-600 ft. elevation, and the North Twin Oaks Valley to the west at an elevation of 700-800 feet. East of the I-15, another major 1,600 ft. ridgeline separates the area from Valley Center. This un-named ridge is where the Hidden Meadows community is located. The ridge generally presents a geographic barrier to direct Santa Ana wind influence to portions of the project site at lower elevations.

In review of past fires in the area, small fires which have occurred along the I-15 during Santa Ana conditions have been initially wind sheltered from sustained north or east winds due to the major ridge to the east. These fires experienced erratic or shifting winds at lower elevations. All of these small fires have been held at the first ridge line above their origin. Several senior firefighters interviewed noted however that Santa Ana winds were more pronounced at higher elevations above the fires, and that wind roll-eddy effects were a common occurrence both on the “Hidden Meadows Ridge” (the unnamed ridge on the east of the I-15) and the ridge where the development is proposed in the Merriam Mountains. This phenomenon is reasonably expected after consultation with historic wind pattern mapping and study of topographic features, given their perpendicular orientation during Santa Ana winds. This finding would suggest that Santa Ana winds, while a critical feature to the creation of critical fuel and fire behavior conditions, is likely less of a driving factor in early fires which might originate along the I-15, and that slope and fuel conditions would be a more prominent factor to early fire development. However, as fires climb ridgelines and achieve elevation, they would become more directly affected by wind for trajectory. Well developed smoke thermal columns rising above any fire and associated spotting potential would continue to be influenced heavily by Santa Ana winds aloft during these periods.

Roll-eddy effects on spotting may also be significant (Schroeder & Buck, 1970). As ridge top winds may form horizontal roll vortices on the lee side of ridges, spot fires which occur in this region may be driven uphill by eddy winds, causing fires to threaten ridgeline homes with force from both the wind facing side of the slope, as well as the lee side.



Large roll eddies are typical on the lee side of ridges perpendicular to winds

Onshore Winds

The site is subject to a Mediterranean Climate with dry, warm summers, and brief, wet winters. This results in summer critical fire weather, especially in the late summer months from July through September, although critical fire weather periods have occurred in every month of the year. Summertime critical fire weather events are frequently associated with prolonged periods of warm-hot temperatures, low relative humidity, low fuel moistures associated with seasonal drought, and moderate diurnal/onshore winds. While fire behavior can be critical under these conditions, wind speeds are typically less severe than during Santa Ana wind events. The following average onshore wind conditions have been recorded for the late summer period:

Max. Temp.- Onshore winds	**Min. Relative Humidity (RH)- on-shore winds**	**Average onshore wind speed**	**Average onshore gusts**	**Wind Azimuth**
80-90 degrees F.	<10%	7 MPH	12 MPH	270 degrees

On the west side of the project, onshore winds and canyons are more aligned, providing an opportunity for fires to have a stronger correlation of wind, slope, and fuel to achieve maximum fire behavior potential for onshore wind dominated days. This situation would be most critical during the onset or return of onshore winds immediately following protracted periods of Santa Ana winds, as fuels and relative humidity may already be at critical levels from the Santa Ana event. Less critical fire behavior conditions would be expected during more typical summer days.

Effect of fuels

The heavy accumulations of old age class chaparral in the Merriam Mountains exceeds 100 years in many locations below the proposed community site. The Dudek (2015) study acknowledges the extreme burning potential of this fuel bed, identifying flame length potential of 40-110 feet. We are in agreement with this assessment. This fire behavior risk challenges the project in two significant ways. During average Santa Ana periods, fires which become established in these old fuel beds will resist control efforts and pose extreme flame lengths. This may significantly threaten Wildland-Urban Interface homes, particularly when they are positioned on the community's edge above heavy fuels, canyons, or draws. The project has proposed 250 feet of defensible space/fuel modification around the project and treatment of the upper end of steep draws, which will be critical to the safety of these residences, given the flame length potential of these fuel beds. 170 home sites and 2 of the 3 access roads for the community are proposed to have less than 250 feet of defensible space. These sites are more likely to suffer damage or be over-run during extreme fire behavior.

Merriam Mountains in the proposed project site

The second threat from the old age class fuels is the potential for development of plume dominated/fuel driven fire behavior. The phenomenon occurs when high energy outputs from burning fuels creates an intense thermal column. (Whitman, 2000). This column develops dynamics similar in many ways to thunderstorm development, with severe in-flow and out-flow winds which are column driven rather than ambient wind condition dominated. Additionally, the uplift provided by the column dynamics lifts burning materials high into the column, where they later fall-out ahead of the fire causing extreme and long range spotting. Conditions such as firewhirl development are also commonly associated with this phenomenon. While this is generally associated with large fire behavior, the process is thought to begin with fires as little as 40-50 acres in size, and requires very-

high to extreme fire risk conditions as a contributor. Steep slope also accentuates this condition, and the slopes below much of the project site are viewed as a significant potential contributor. Spotting distances achieve maximum downwind distribution potential under these burning conditions, estimated in the Dudek (2015) study as far as 2.5 miles ahead of the main fire.

Our assessment indicates the potential for development of plume dominated/fuel driven fire conditions during extreme fire weather/behavior on the majority of slopes surrounding the proposed community site. This finding will accentuate the need to harden structures and interior open spaces against burning firebrands, and a strong need to patrol the community interior for spot fires during fire assault. Given that 2 of the 3 primary access roads will have locations with less than 250 feet of clearance, it is likely these roads may become impassable during periods of fire movement, especially under heavy spotting or extreme fire behavior scenarios. This accentuates the need for early evacuation of the community, or shelter-in-place in situations where early evacuation is not possible. In either case, community road access may be lost due to decreased visibility, fire impingement, or fire branding. A strong shelter-in-place strategy for retention of populations within the community is recommended.

Plume dominated/fuel driven thermal column,
Station Fire, Los Angeles County, 2009

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

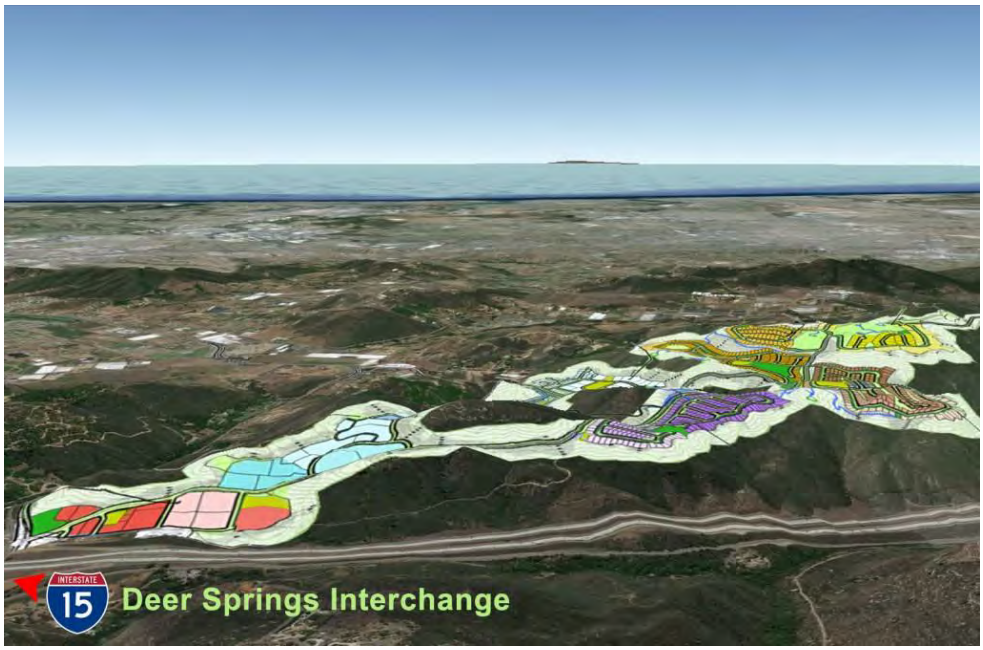
This consideration should cause agencies to consider extensive protection from fire branding for the proposed development in structural design, use and placement of ornamental vegetation, placement and design of structural features such as decks, gazebos and external structures, structural setbacks from vegetation, modification of

native fuels in internal community islands. and related actions to reduce ignition by fire branding. These conditions should include focus on attic vents, eaves, roofing materials, exterior fencing materials, and ornamental vegetation restrictions. Such actions are all required by fire and building codes for the area, and are recommended for inclusion in the Dudek study (2015).

Effect of slope

Most of the proposed development's homes will be situated above canyons either leading to the I-15 on the east, or North Twin Oaks Valley on the west. The general affect of slope is to accentuate fire behavior by a factor of 3x-5x, and to lengthen flame lengths and fire behavior to maximum potential. Slopes range from 30-60% below the project site. Once again, the proposed 250 feet of fuel modification will be critical to the protection of homes and arterial roads, particularly at the top of slopes and along ridgelines. Setbacks from ridgelines is also important, given flame dynamics. Long flame lengths come under stronger influence of both slope and wind at ridgetops, causing flames to lay-over"ridgelines in the direction of wind flow.

Slope leading east from the project site to the I-15



Position of development in relation to slope- east side of project

Rate of Spread

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 plan for this site (attached) that depicts both onshore and offshore wind scenarios under average-worst case fire behavior conditions. Fifty years of historical weather and current fuel mapping have been calculated into this modeling. Results indicate that under critical fire weather, extreme fire behavior including rapid rates of spread may be expected, averaging 1-3 miles/hour. This rate of spread may be accentuated 3x-5x on slopes. Additionally, spread will be enhanced by spotting and fire branding ahead of the main fire front, which can be significant when fires burn heavy, old-age class fuel beds.

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. This is mitigated by adherence to robust fire and building codes during development, improved fire services, effective fuel modification infrastructure maintenance, and fire safety/evacuation planning, all of which have been proposed by the project. In Southern California, human caused ignition is the primary cause of wildfire. A wildfire prevention and Ready-Set-Go public education outreach has been proposed by the proponent for the community.

Additional studies have determined that major transportation corridors, such as the I-15 freeway, are a significant source of wildland fire ignitions. This factor is of particular concern, given the position of the I-15 on the east border of the project, in a canyon below steep, heavily fueled slopes leading to ridgeline homes. Additionally, a number of human

caused smaller fires (less than 20 acres) have occurred in recent years along the freeway in the area of the project.

Some mitigations have been implemented along the I-15, including a regular mowing schedule by CAL TRANS to reduce ignitable fuels along the freeway right-of-way, and the installation of cable vehicle restriction fencing along the length of the freeway below the project. The effect of the fencing is to reduce the potential for vehicles leaving the freeway and causing ignitions. This fencing generally includes a 8-10 foot concrete apron, with the fence installed approximately 10-12 feet from the freeway edge. Mowing is scheduled for additional space from 10-50 feet from the cable fence. However, some issues have developed from the fence installation. These include that firefighting dozers are now restricted from direct access from the freeway and must be directed to either Gopher Canyon Rd. or Deer Springs Rd. to gain hillside access. Additionally, the cable is under tension, and accidental cutting of the cable releases this tension with dangerous whip potential. This has occurred during vehicle accident response.

Climate Change Impacts

Climate is currently changing for the region, and disturbance has occurred in traditional Santa Ana wind periods, rainfall amounts and timing, summer peak temperatures and related factors. Examples of this change was the occurrence of a rare critical fire weather/Santa Ana wind period in May of 2014 which resulted in a wildfire series in San Diego County (including the nearby Cocos Fire near San Marcos), and a multi-year critical drought episode. The ultimate final state of this change has not been determined, but available data suggests that drought and critical fire weather episodes will continue to occur during non-traditional periods.

Evacuations

The evacuation plan prepared by Dudek (2016) contemplates evacuation of the community via three primary routes:

1. Mesa Rock Road (4 lane primary access)
2. Sarver Lane. (2 lanes)
3. Camino Mayor (2 lane)

Of these 3 routes, Mesa Rock Road is proposed for improvement with 250 feet of defensible space/ fuels clearance, consisting of fuel modification to less hazardous vegetation for 150 feet, followed by native fuels thinning for an additional 100 feet. The other routes, Camino Mayor and Sarver Lane, are proposed for 100 feet of clearance, consisting of native fuel thinning.

Given the exposure of these routes on ridgelines and above canyons, our study would indicate they may be subject to obstruction by fire movement during extreme fire behavior conditions; by smoke, fire branding, or potential flame impingement. This is particularly true for the two smaller access routes, Sarver Lane and Camino Mayor. This would suggest that these routes will likely not be able to safely sustain community evacuation during extreme fire behavior, and that a strong shelter-in-place component will be necessary in community wildfire plans. Given that community development detail is

unavailable at this time, potential safe refuge locations are not yet available for determination. These refuges may include larger developments such as schools and commercial properties, as well as developed parks.
Nearly 6,600 residents will live within the Newland Sierra community at build-out. The proponent indicates that with effective notice and cooperation by residents, the community can be evacuated in approximately 1.5 hours (Dudek 2016).

This is consistent with estimates published for urban areas by the Federal Emergency Management Agency. Historical evacuation experience during past San Diego County wildfires has found limited cooperation by large portions of communities to evacuation warnings until late in evacuation periods, leading to traffic congestion during peak threat times. It will be important to stress the dangers associated with delay of evacuation during community wildfire threats.

Evacuation triggers

Our analysis highlights that early evacuation will be essential to the success of such a tactic. In a meeting of local fire professionals to review site risks, consensus was developed for "trigger points" as indicators for initiation of evacuation of the Newland Sierra community. These evacuation trigger points include:

Evacuation Initiation Trigger Points

a. Santa Ana wind-driven fire: Major fire approaching the area from the east side of Valley Center, crossing west of Lilac Rd.- Evacuate entire community.

b. Onshore wind-driven fire: Significant fire approaching the area east of N. Twin Oaks Valley Road- Evacuate homes on community perimeter facing the involved canyon/drainage.

These trigger points have been established in order to provide time necessary to evacuate prior to fire arrival within the community. Additional trigger points have been established for shelter-in-place actions, necessitated by potential fire conditions that may move rapidly to threaten road travel and safe evacuation, or apply to stranded populations that failed to heed evacuation orders. Potential fire behavior analysis for critical fire weather patterns and ignitions occurring along the I-15 would indicate that this could occur during the fire's first hour. In these cases, populations should seek shelter away from structures located immediately on the community's perimeter with wildlands, and retreat into large commercial areas, interior community streets, developed parks, or similar locations.

Trigger points for halting evacuation and seeking shelter-in-place include:

Evacuation Cessation Trigger Points

a. Santa Ana wind-driven fire: Fire is established and building on the west side of the I-15, below the community

b: Other scenarios: When expanding fires threaten a route of egress from the

community. Stop traffic movement on the threatened artery and divert to other routes. If all routes are threatened, seek shelter in a safe community place away from the community perimeter.

Impact to Adjacent Traffic

In the documents provided by the project for this study, no traffic improvements are envisioned on surrounding arterial routes. These include:

1. Interstate 15
2. Deer Springs Rd.
3. North Twin Oaks Valley Rd.

Traffic congestion on these routes will need to be an important consideration in conducting evacuation management and during routing of emergency vehicle access, as most of these routes are already heavily impacted during peak times without the Newland Sierra project. Past studies and evacuation experience have identified congestion will be likely on I-15 and Deer Springs Road. These routes may also be over-run by rapidly moving wildfire, posing life safety threats to motorists trapped in congestion. This issue should also be considered as a critical factor in selection of evacuation vs. shelter-in-place strategies.

Traffic congestion as the Cedar Fire crosses the I-15, 2003.
Similar conditions occurred during the 2007 Witch Fire.

Since North Twin Oaks Valley Road north of Park Valley Drive (at the rock quarry entrance) is a private and gated road, evacuations must be directed to the south, rather than towards Gopher Canyon Road. Since all 3 primary evacuation routes will channel traffic south, this should be considered when traffic congestion or fire position would threaten such travel.

The issue of emergency evacuation routing on arterials outside of the proposed development should be further detailed in future community development and emergency planning, and during environmental assessment for this proposed development. The project has proposed establishment of “Ready-Set-Go” evacuation planning by community associations as an element of community development.

Fire Services

The proponent has considered fire service emergency response times and services in its report (Dudek 2015). Response time analysis has been conducted with the proponent’s finding of a 5-minute response time (from the time the apparatus departs the Fire Station) to the entire community. Fire sprinklers have been proposed for all occupied structural development, and permanent fire station construction for the Deer Springs Fire Protection District station nearest the project has been proposed as a development mitigation.

The Deer Springs Fire Protection District maintains 3 fire stations, one of which is a temporary fire station #12, located adjacent to the development site. Station 12 provides fire and paramedic services via a single engine company. This company is currently tasked with 2 calls for service per day, with an additional 2.2 calls per day as a result of the Newland Sierra Development. (Dudek, 2015). This finding of a total 4.2 call per day is within the capacity of the existing staffing and services, according to standards used by the County of San Diego.

Current Deer Springs FPD Station 12, 1321 Deer Springs Rd., San Marcos

Detailed tract mapping indicating street design, fire flow/water systems, and housing type (retirement/multi-family, single family, etc.) has not been provided for this study, nor has a detailed analysis been conducted on these characteristics. The proponent’s plan has called for fire hydrant distribution meeting suburban development standards. These aspects should be considered as part of final fire services assessment for this proposed

development. However, these mitigations, along with fire and building code compliance, fuels management and other proposals included in the Dudek studies (2015, 2016) are typical for such community development, and are generally reasonable mitigations in comparison to similar projects elsewhere in Southern California.

Implications for Fire Operations

Structural defense and evacuation of the Newland Sierra Community from wildfire will be a dynamic and significant challenge for emergency services, but typical of challenges faced by many modern communities of 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. In many respects, developed areas of the community, especially in the community center away from development perimeters, will be safer for people than surrounding roads or wildlands during fire movement.

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 ornamental vegetation. Left unchecked, these can contribute to significant structural loss. Chief concern will be for homes at the head of the fire, and for homes perched above canyons or drainages.

Defensible space

The majority of homes in the planned community will have 250 feet of defensible space, consisting of a minimum 100 feet of fuel modification (Zone 1) which will include removal of all native vegetation and substitution with less ignitable ornamental plants under irrigation. An adjacent 150 feet of thinned native vegetation (Zone 2) will extend the defensible space to 250 feet. All substitute plantings in Zone 1 will conform with the San Diego County approved fire resistive plantings list. Large trees may be retained with pruning and thinning.

Additionally, slope setbacks of a minimum 15 ft. for single story homes and 30 ft. for two-story homes are proposed as standard for the project.

Of the three primary access roads, Mesa Rock Road will be treated to both Zone 1 and 2 defensible space standards. Sarver Lane and Camino Mayor will only receive Zone 2 treatment to 100 feet.

Exceptions

The following exceptions for defensible space have been proposed by the project proponent. All of these exceptions are due to property line constraints.

1. Three (3) lots on the northwest side of the project will have only Zone 1 clearance of 56-80 feet. An offsite easement is being pursued that may extend clearance to 100-150 feet. Fuel modification widths however will remain less than project-standard, and no additional clearance will be provided for Zone 2.

2. 25 properties in the northwest portion of the project will have only 50 feet of Zone 2 thinning, in addition to 100 feet of Zone 1 clearance, for a total of 150 feet of Zone 1 and 2 clearance.

3. 170 properties will have less than the standard slope setbacks.

Up to 198 lots will have less than project-standard defensible space or setbacks. Most of these are located on the northwestern side of the development. While definitive tract maps are not yet available, these lots appear to be located along ridgelines above Twin Oaks Valley/Camino Califia.

As mitigation for up to 173 lots with less than project-standard Zone 1 defensible space or slope setbacks, the proponent proposes to construct “heat deflecting walls” for lots with native fuels adjacency. These walls will be composed of 1-2 feet of bottom block with 4-5 feet of upper dual pane glass (max. 7 feet) to act as a barrier to fire impingement and ember cast. No additional mitigations are proposed for lots with less than project-standard Zone 2 clearance.

In our assessment, these 198 lot exceptions are located above fuels composed of old-age class mixed chaparral on steep slopes, posing the potential for development of maximum flame lengths under extreme fire behavior conditions. While the Dudek (2015) report identifies an average of 67 foot flame length potential for these sites, average flame lengths may be exceeded near these lots due to the effects of fuel concentration/age, and slope. Dudek (2015) has acknowledged that maximum flame lengths under extreme conditions may approach 110 feet. This flame length potential approaches or exceeds the amount of distance provided by the proposed non-standard clearance, and challenges its adequacy as a fire loss deterrent. As one mitigation, the heat resistant wall has been proposed with a maximum height of 7 feet. However, in our opinion, the height of this wall is potentially insufficient. This may be especially true at ridgeline locations given fire conditions which may include high flame lengths, with a ridgeline layover effect potentially exceeding the height of such a wall. An example of such lay-over is displayed in the photo of 40 foot flames, below.

40-foot flame lengths climbing a ridge from an on-shore wind driven major fire, Williams Fire, Los Angeles County, 2012

Lots with project non-standard clearance may be subject to fire, heat pulse, or ember exposure greater than other properties within the community, and therefore are at higher risk. The ultimate location of the lots should be noted by fire agencies, and plans made to prioritize structural defense resources to actively protect and defend these structures during wildfires. Firefighters should not depend on the heat resistant wall as an adequate personal defense against heat during structure protection deployment, and utilize other means of protection during firefighting activities.

Clearance along roadways may also be insufficient during extreme fire behavior to prevent obstruction during fire movement by either smoke, ember cast, or direct flame impingement. This is particularly true along the two routes (Sarver Lane and Camino Mayor) where less clearance is proposed, and at exposed locations for all 3 routes along ridgelines or within canyons.

Estimated Worst-Case Loss

Worst case conditions include severe Santa Ana winds, critical fire weather, and extreme fire behavior. The estimated total loss from a short notice, worst case wildfire condition, based upon loss experience during the 2007 Witch and Guejito Fires (Maranghides & Mell, 2009), and 2014 Poinsettia Fire (San Diego Co. OES, 2014) in similar modern San Diego County communities could range from 2-7%. Structural loss would likely be concentrated on the community perimeters due to fire intensity, proximity to heavy fuels, or fire branding, and among a limited number of homes in the community interior presenting spot fire targets due to over-developed ornamental vegetation, yard storage

conditions, and related factors. Once structures become involved, extension of fire to surrounding and exposed structures often results in a group loss in this community type.

In this worst case scenario, fire resources may not achieve desired deployment levels due to reflex time from receipt of alarm to the time fire approaches structures, or due to regional resource drawdowns due to multiple fires. Lesser fire conditions, or availability of adequate emergency mass resources will greatly alleviate worst case potential loss, especially where defensible space is robust.

Potential Structural Loss
Total number of homes = 2130
Total number of perimeter homes: Approximately 300
Loss of 10% of perimeter homes (worst case fire condition) = 30
Loss of 25% of perimeter homes (worst case fire condition) = 75
Loss of 50% of perimeter homes (worst case fire condition = 150

* Lots with less than 250 defensible space or project-standard slope setbacks will be at higher risk.

** County average for similar fire-resistive community loss during catastrophic wildfire = 2%-4% (Dudek, 2015)

Civilian entrapment potential will largely be abated within the developed community; however potential will exist for threats due to extreme fire behavior movement near or across access roads and for perimeter homes. Greater concern will exist for short-notice fire onset or conditions where residents may be asleep when fire threatens, leading to potential entrapment within affected homes.

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

Evacuation management

Road congestion must be avoided when possible by early evacuation notice and active traffic management. Early notice will be critical to evacuation success and should be directed when stated trigger points are met. Just as important however is the closure of evacuation roads and activities when shelter-in-place thresholds are met. The community will be safer than roads or perimeter areas during fire movement, and care should be undertaken not to dispatch civilians into worse conditions on the road than they may face within the community. Consideration for congestion on adjacent arteries will be a critical factor in evacuation management. Area truck trails should not be used for evacuation due to fire burnover risk.

Emergency Vehicle Access

Early deployment of response resources should be sought to ensure timely access to community areas before traffic congestion obstructs effective response travel. Perimeter streets should be cleared of vehicles obstructing roadways by law enforcement to ensure fire apparatus or water system access. Large animal rescue trailers from out-of-area response organizations should not be allowed in the emergency area except under escort, and only when such activity will not disrupt evacuation traffic flows.

Firefighters and law enforcement will have the opportunity to position themselves in relative safety on residential streets for deployment and operations. Greater risk may exist when maneuvering through open spaces adjacent to roads and green belts where fire may pose a threat.

CAL FIRE has performed considerable maintenance and improvement of back bone truck trails to improve drivability in wildlands during the spring of 2017. (See WUI Fire Plan maps). They will all be 4WD and Type 3 engine accessible. One truck trail, leading from water tanks on the north end of the area, northwest towards Gopher Canyon has also been brushed on both sides. This road will not be within the development footprint and will provide access to a ridgeline that may be used for wildland fire perimeter control. Other truck trails may be eliminated during various phases of site development.

Protection of in-situ populations

Under extreme fire behavior conditions, responders should prioritize protection of populations seeking shelter in large community spaces such as developed parks, churches, and commercial centers. As an alternate, residents may seek shelter on community interior streets away from interface properties. Evacuation of perimeter properties should be prioritized, and people directed to safe locations.

Emergency Messaging

Detailed but succinct evacuation information should be broadcast to the media and via the Alert SD reverse 911 system. Populations should be directed to evacuation facilities distant enough from the fire area 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.

Structural Fire Response

Fire sprinkler installation has been proposed by the proponent for all occupied structures within the community. This installation should assist in mitigating the intensity of structure fires and associated losses within the community.

Wildland-Urban Interface Fire Emergency Response Plan-Newland Sierra Project

Resource deployment recommendations, strategic and tactical information, command and control recommendations are included in this document.

<Attach document here>

References

1. Draft Fire Protection Plan, prepared on behalf of Newland Sierra LLC. Dudek Environmental Consultants, Encinitas, CA. May, 2015.

2. Wildfire Evacuation Plan, prepared on behalf of Newland Sierra LLC. Dudek Environmental Consultants, Encinitas, CA. Nov., 2016.

3. Wildland-Urban Interface Fire Emergency Response Plans, San Diego County Fire Chiefs Association, 2015-2017 (Central Twin Oaks, Hidden Meadows plans), by Rohde & Associates, Rancho Santa Margarita, CA.

4. "The Wildland Urban Interface Fire Problem", Jack Cohen, Forest History Today, Fall, 2008

5. Manzello, S.L., 2014. Investigation of Structure Vulnerabilities to Wind-Driven Firebrand Showers in Wildland-Urban Interface (WUI) Fires. Fire Saf. Sci. 11 IBHS, 2014

6. "Fire Management of California Scrubland Landscapes", Kelley, J.E., Environmental Management, Vol. 29, March, 2002,

7. A Case Study of a Community Affected by the Witch and Guejito Fires, National Institute of Standards and Technology, Alexander Maranghides, William E. Mell, April 2009

8. Mountain Meteorology, Fundamentals and Applications, C. David Whitman, Oxford University Press, 2000

9. Schroeder M.J and Buck, C.C., Fire Weather-Agricultural Handbook #360, U.S. Department of Agriculture, Forest Service, May, 1970.

10. Fire Resources and Assessment Program (FRAP), State of California, Department of Forestry and Fire Protection (CAL FIRE), online resource, frap.fire.ca.gov/

11. May 2014 San Diego County Wildfires-After Action Report, County of San Diego Office of Emergency Services, June 2014

Photo Credits

Pages: Cover, 3, 8, 10, 11	Newland Sierra LLC, San Diego, CA
Page: 5	San Diego County Fire Authority, CA
Page: 7	U.S.D.A. Forest Service
Page: 9	C. Elsworth
Page: 14	CNP/Corbis
Page: 15	Deer Springs Fire Protection District, CA

Page:	18	Getty Images
Page:	19	San Diego Union-Tribune

Prepared by:

ROHDE & ASSOCIATES

EMERGENCY MANAGEMENT

30 Via Gatillo, Rancho Santa Margarita, CA 92688
(949)275-4545
www.RohdeAssociates.net

Michael S. Rohde, CEO/Principal Consultant
Bill Clayton, Senior Project Manager
Jeff Lannon, Consultant/Associate
Don Boursier, Wildfire Behavior Analyst