



SLEEPY HOLLOW (CA) WILDFIRE HAZARD & WILDLAND URBAN INTERFACE (WUI) AREA ASSESSMENT AND REPORT



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EXECUTIVE SUMMARY

XMR Fire Consulting (XMR Fire) prepared this report to assist Sleepy Hollow Fire Protection District (SHFPD, “the District”) of San Anselmo, CA, in assessing hazards within the wildland-urban interface (WUI) areas encompassed by the District. The purpose of the assessment is to identify specific hazards associated with wildfire and development in Sleepy Hollow (as defined by the District boundaries).

This assessment’s goal is to provide SHFPD with a strategy to minimize the risk of catastrophic wildfire within the wildland-urban interface while ensuring the protection and enhancement of economic and ecological values and resources within SHFPD’s jurisdiction. The intent is consistent with the mission of SHFPD and builds upon the District’s ongoing wildfire mitigation activities, as well as the 2016 Marin County Community Wildfire Protection Plan (CWPP), and other District plans and policies. *Ross Valley Fire Department through a Joint Powers Agreement (JPA) has fire suppression and prevention responsibility for the area of the Sleepy Hollow Fire Protection District, and no part or recommendation of this report should contradict or supersede that authority.*

This assessment looks at current conditions and predicted trends and recommends sound, long-term strategies for reducing structural ignitability, managing and reducing vegetation fuel loads on public lands and private property, and improving wildfire response and suppression capabilities within the boundaries of SHFPD.

This document addresses potential hazards, natural and human-made, and assets that may be at risk if (and when) wildfires occur. Causes of existing and potential hazards include natural vegetation “fuels,” fire spread and topography, accessibility and road conditions, and human-related risks such as hazardous yard features. Fire environment, fire defensibility, and potential mitigation techniques are discussed, and impact avoidance and minimization measures are presented.

Using geographic information (GIS), XMR Fire modeled the hazards associated with Sleepy Hollow. An evaluation of the application of GIS methods to modeling the risks within the WUI was based on a review of literature pertinent to these elements and is consistent with the techniques used in the Marin County CWPP 2016. Adjacent communities were not assessed as part of the development of this report. As detailed in this report, some neighborhoods and streets within Sleepy Hollow are at greater risk than others. Therefore, this report identifies the neighborhoods and infrastructure that are at greatest risk of being negatively influenced by wildfire and concludes with recommendations for specific measures to systematically reduce risk and mitigate hazards.

INTRODUCTION

Sleepy Hollow Fire Protection District (SHFPD, “the District”), has undertaken an assessment of potential hazards in the wildland-urban interface (WUI) within the boundaries of the unincorporated community of Sleepy Hollow, near San Anselmo, California. The various fire protection agencies responsible for the protection of wildlands and communities within and around Sleepy Hollow (primarily Ross Valley Fire Department, Marin County Fire Department, CAL FIRE) recognize the potential for catastrophic wildland fires that pose serious threats to people and infrastructure. National attention given to the 2015 “Valley Fire” and the resulting destruction of homes and environmental values in and around nearby Middletown, California, typify the concerns in Sleepy Hollow and northern California in general.

All properties in Sleepy Hollow Fire Protection District are at risk of wildfire. Sleepy Hollow is bordered by open space on approximately 75% of its perimeter, with a long history of wildfires igniting within or spreading from outside the community. Sleepy Hollow is identified as a Community at Risk in the California Fire Plan, County of Marin Community Wildfire Protection Plan 2016 (“CWPP”), and the Marin County Unit Strategic Fire Plan. All parcels fall into the “high” or “very high” WUI hazard rank as defined in the 2016 CWPP.

Many homes in Sleepy Hollow are built with combustible materials adjacent to vegetation on steep terrain without adequate defensible space and are at risk from wildfire. To complicate matters, drought conditions combined with widespread epidemics of Sudden Oak Death, pine bark beetles, and other tree disease throughout Marin County have: (1) increased fuel “laddering” potential and aerial fuel flammability; (2) increased the potential for extreme fire behavior such as crown fire, blowups (sudden increases in fire intensity), and spotting (firebrands igniting flammable fuels ahead of the main fire).

To address and potentially mitigate these hazardous conditions, SHFPD initiated an agreement with XMR Fire Consulting (XMR Fire) to conduct a field assessment and survey of all WUI areas in the District. Completed between October 2015 and May 2016, the assessment focused on the streets, neighborhoods, and public and private open space areas within the District. A variety of potential wildfire influences and hazards were measured or observed through field observation, GIS, and aerial photography review. The observed conditions were analyzed in a geographic information system (GIS), modeled using FLAMMAP and other fire modeling tools, and mapped in QGIS and Google Earth Professional. XMR Fire developed mitigation recommendations for selected neighborhoods, individual streets, and open-space areas based on the observations and analysis.

This report presents the results of the work performed and includes recommendations for potential mitigation measures based on the experience of the Consultant and currently accepted best practices.

PURPOSE

“The threat of catastrophic wildfires due to increasing vegetation fuel loads and community development in the wildland-urban interface presents significant risks to public health, safety, homes, infrastructure, property and the environment if not consistently and adequately addressed and mitigated.”

Like most Marin communities, Sleepy Hollow is built at the boundary of large tracts of undeveloped open space. In addition to being surrounded to the north, east and west by this open space, relatively large lot sizes, the narrow, steep geography, and lack of infill development contribute to the proximity of most homes in Sleepy Hollow to wild vegetation.

The wildland–urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. This WUI zone poses tremendous risks to life, property, and infrastructure in associated communities and is one of the most dangerous and complicated situations firefighters face. In WUI areas, urban “fuels” (homes and other structures) directly meet wildland “fuels” - vegetation.

Wildfires represent a potential threat to both established and newly constructed communities within the WUI. Like most communities, local emergency services may be quickly overwhelmed by a fast-growing wildfire in its early stages. Municipal fire departments, like Ross Valley Fire Department, San Rafael Fire Department, and Marin County Fire Department (the agencies with primary responsibility for wildfire suppression in and near Sleepy Hollow) maintain equipment and daily staffing to quickly suppress small wildfires. As a fire grows, especially during extreme weather scenarios, additional firefighting resources must be drawn from increasingly far away, introducing a significant lag-time between when the fire impacts a community and when firefighting resources arrive to suppress the fire or protect values at risk. It is not financially feasible for communities to maintain enough ready firefighting resources to fight a large fire, and because of this California has developed what may be the largest and best developed “mutual-aid” system in the world for fighting wildfires.

Because of this “lag-time” in firefighting response, and the often rapid growth of wildfires in California, communities cannot depend entirely on local firefighters to save their homes. To alleviate some of the hazards associated with living in the WUI, **residents must help protect their property and community by taking educated steps before and during the fire season to make their properties defensible from the threat of fire.** It is important that members of a community work together so that the community as a whole is defensible.

SLEEPY HOLLOW

Geographic Setting

The 1610 acre community of Sleepy Hollow near San Anselmo, in Marin County, California, as defined by the boundary of Sleepy Hollow Fire Protection District, is slightly smaller than the 1913 acre census-designated place (CDP) Sleepy Hollow¹. It is located 2 miles northwest of downtown San Anselmo and 7 miles south of downtown Novato, at an average elevation of 177 feet on the upper valley floor.

The main valley comprising Sleepy Hollow runs predominantly northwest to southeast and is the primary drainage and watershed for Sleepy Hollow Creek, a large tributary of San Anselmo Creek in the Corte Madera Creek watershed. Sleepy Hollow Creek flows during winter months only, though a few deep pools contain water year round and provide habitat for fingerling steelhead trout, with adults spawning during winter flows. A number of other ephemeral streams or arroyos exist in side drainages and canyons.

To the northwest of the valley lies the 509 acre Loma Alta Open Space Preserve and 1592 foot Loma Alta, one of Marin's highest peaks. Much of the eastern border of the community is defined by the 1,172 acre Terra Linda/Sleepy Hollow Open Space Preserve, separating Sleepy Hollow from Terra Linda, San Rafael, and parts of San Anselmo. Large tracts of private, undeveloped land lie at the northern border of the valley, including land surrounding San Domenico School and several private ranch parcels.

The west and east ridges forming the valley have an average elevation of 520 feet, ranging from 200-500 feet above the valley floor.

Population and Housing

Sleepy Hollow Fire Protection District encompasses an unincorporated development which includes 866 occupied structures, a population of 2,094 (2010 census), and a 2014 assessed value of \$1,138,180,834². The average household size is 2.78, and the average family size is 3.05.

Climate

Sleepy Hollow's climate is classified by the "Sunset New Western Garden Book" as the North Coast Thermal Belt, zone 16, which has more heat than Zone 17 and warmer winters than Zone 15. Summer afternoon winds are common, with strong drying spring winds observed from early April to late June, and generally slightly drier conditions than surrounding areas. Lowland valley

¹ <http://www.census.gov/>

² <http://www.marincounty.org/depts/ar/divisions/assessor>

areas such as Sleepy Hollow, and surrounding ridges and hilltops experience colder winters and may experience greater vegetation freeze kill. Average winter low temperatures are 36 – 19 degrees F on valley floors. Sleepy Hollow observes 36-38” of annual rainfall. The mediterranean climate experiences summer drought, with typical rainfall measured between May 15 and October 15 at less than 0.25 inch, and experiencing lower relative humidity (RH) and lower overnight RH recovery than nearby coastal valleys. These conditions may contribute to slight to moderate increases in expected fire behavior relative to surrounding areas.

Vegetation Communities

Sleepy Hollow is home to a diverse vegetation community. The WUI areas are characterized by residential development on larger lots, averaging .2-1 acre, and include a wide variety of non-native and urban varieties of ornamental plants and trees, while the surrounding hills and ridgelines are home to an equally diverse landscape of native oak and bay forests, grasslands, and chaparral.

Since the arrival of European ranchers in Sleepy Hollow in the mid 19th century, the native vegetation has been substantially altered by human activities. Livestock grazing, road and trail construction, residential development, introduction of non-native species (notably non-native grasses, eucalyptus, and Monterey pine), and suppressing wildfires dramatically changed plant life in the valley.

Early settlers introduced eucalyptus and pine to Sleepy Hollow as early as the 1850s. As these trees have grown and aged, many have begun to fail as they reach the end of their lifespan or are attacked by insect pests or disease (e.g., bark beetles and pine pitch canker). An increasing numbers of trees affected by these ailments already creates an elevated “fuel load” in many locations.



Sleepy Hollow, 1890, looking west towards Loma Alta.

The Marin County Open Space District, in the 2015 Draft Vegetation and Biodiversity Management Plan, identifies plant communities, natural resources, and vegetation challenges on the two Open Space Preserves immediately adjacent to SHFPD: *Loma Alta* and *Terra Linda/Sleepy Hollow Divide*. The plant communities found in these open space preserve are generally indicative of the vegetation found in Sleepy Hollow. A summary of their findings is included below:

Loma Alta

- Area = 508.5 acres
- Perimeter = 6.2 miles

Sensitive Natural Resources

Sensitive Vegetation Type(s):

- Chamise, eastwood manzanita
- Madrone, California bay, tanoak
- Rocky serpentine grasses
- Seasonally or temporarily flooded meadow
- Upland serpentine grassland
- Valley oak, coast live oak

Special-Status and Locally Rare Species

Special-Status Plants:

- *Amsinckia lunaris* (bent-flowered fiddleneck)
- *Calochortus umbellatus* (Oakland star-tulip)
- *Hesperolinon congestum* (Marin western flax)

Management Challenges

Important invasive plants include:

- *Centaurea calcitrapa* (purple starthistle)

History and Local Setting

- History of grazing. Parcels acquired in 1988, 1989, and 1990.

Vegetation Management, Maintenance

Centaurea calcitrapa eradication project is ongoing. Initiated in 2004 with Conservation Corps North Bay Project ReGen grant. Estimated cost 1K per year, 10K.

Terra Linda/Sleepy Hollow Divide

- Area = 1171.8 acres
- Perimeter = 22.2 miles

Sensitive Natural Resources

Sensitive Vegetation Type(s):

- California bay, alder, bigleaf maple, willow riparian forest
- Cliffs, rock outcrops
- Coyote brush alliance
- Madrone, California bay, tanoak
- Purple needlegrass
- Rocky serpentine grasses
- Serpentine balds
- Tall temperate perennial herbaceous
- Undifferentiated marsh
- Upland serpentine grassland
- Valley oak alliance
- Valley oak, coast live oak
- Valley oak/grass

Special-Status and Locally Rare Species

Special-Status Plants:

- *Eriogonum luteolum* var. *caninum* (Tiburon buckwheat)

Locally Rare Species:

- *Lessingia hololeuca* (wooly headed lessingia)
- *Ranunculus lobbii* (Lobb's aquatic buttercup)
- *Streptanthus glandulosus* ssp. *secundus* (one sided jewelflower)

Management Challenges

Important invasive plants include:

- *Taeniatherum caput-medusae* (medusa head)
- *Aegilops triuncialis* (barbed goatgrass)
- *Carthamus lanatus* (distaff thistle)
- *Centaurea solstitialis* (yellow starthistle)
- *Cortaderia jubata* (pampas grass)
- *Eucalyptus* sp. (eucalyptus)
- *Genista monspessulana* (French broom)
- *Mentha pulegium* (pennyroyal)

History and Local Setting

- Numerous parcel acquisitions from 1972 through 1989. Sheep grazing from 1981-1987 for fuel reduction.

Like most plant species in California, native vegetation in Sleepy Hollow is adapted to wildfire. Most plants found here thrive when subjected to periodic wildfires, and some require fire to survive. Many of the non-native species present are adapted to wildfire as well (eucalyptus, broom, etc.), and contribute to overall fuel loads. Lack of fire, primarily due to rapid fire suppression since the mid-20th century, resulted in a loss of biodiversity, an excess of dead and down vegetation material on forest floors, and infill and loss of meadows and grasslands.

Fire History

Understanding fire history is important when attempting to predict potential fire frequency, fire behavior, significant ignition sources, and vulnerable areas and communities. The historical record shows that many large, damaging wildfires (greater than 500 acres) have occurred in Marin since 1850. Many more frequent and smaller fires burned in Marin and Sleepy Hollow, and this knowledge helps us understand the likely processes, scenarios, and locations for future fires.

Sleepy Hollow's native vegetation evolved with the presence of frequent wildfires, ignited both by natural causes (primarily lightning) and by native peoples. Relatively short intervals of two to 20 years between wildfires promoted the health and regeneration of a mosaic of native grasslands, oak woodlands, and forests, favoring plant (and animal) species that were best adapted to fire. These low intensity and relatively frequent wildfires are generally considered to have been "beneficial" to the landscape, supporting and expanding native grasslands and increasing biodiversity and productivity of chaparral and coastal scrub ecosystems (Sughara et al, 2006).

The most frequently burned landscapes in California prior to 1850 were ignited, often on a nearly annual basis, by Native Americans (Lewis 1993, Keter 1995) and were generally near villages or where vegetation was cultured for food and basketry materials, such as grasslands and oak woodlands. Vegetation adjacent to areas used by Native Americans experienced more frequent fire than would be found in the same vegetation type farther away (Vale 2002). In general, the most frequent fires occurred in grasslands and oak woodlands like Sleepy Hollow. Lightning fires were common and would burn large swaths of the landscape, with research showing that the average wildfire interval in Marin county was less than 7 years prior to the arrival of Europeans (Jacobs et al, 1985).

As Sleepy Hollow's vegetation ages and land is no longer grazed or burned by prescribed fire, it becomes increasingly difficult to manage vegetation to reduce wildfire hazards in a cost-effective manner. Fire records for the Marin are incomplete, but historic newspaper articles and old fire planning studies document an active and dangerous fire history for the area going back to the early 20th century.

Sleepy Hollow Wildfire Burnover Fatality: 1936

Significantly, Sleepy Hollow includes the site of the only wildfire burnover firefighter fatality in Marin county history (1936). Captain “Bert” Meagor (great uncle of retired Ross Valley Fire Chief Roger Meagor) died from burns sustained while fighting a grass fire in the vicinity of what is now Oak Knoll Drive.



Firefighters are taught today, and evidence supports, that a key indicator of fire danger in any given area is the presence of historical wildfire-related injuries or fatalities in that area.



A 1976 wildfire that began in a eucalyptus grove near what is now Sorich Ranch Park in San Anselmo burned into the community, eventually destroying at least one home and damaging several others.

Sorich Park fire, 1976 (L). Photo by Rick Donaldson, used with permission.

Transportation and Road Networks

Sleepy Hollow is located near the Town of San Anselmo and is outside the northern town limits. The Terra Linda area of the City of San Rafael lies to the east. Though no public roads directly connect Sleepy Hollow with Terra Linda or to Lucas Valley Road to the north, a variety of unpaved fire roads, hiking trails, and one paved, gated, vehicle-accessible path, do.



Butterfield Road, Sleepy Hollow's primary access road, is accessed from the Town of San Anselmo via Sir Francis Drake Boulevard, a major east-west arterial road in Marin County. As an unincorporated area, road maintenance in Sleepy Hollow generally falls into the jurisdiction of the County of Marin Department of Public Works, with some roadways maintained privately. Butterfield Road is a relatively wide, two-lane road with wide shoulders, and serves as the primary ingress/egress and evacuation route from Sleepy Hollow.

Fire Roads

A network of unpaved Fire Access Roads (“Fire Roads”) exist in the open space and common areas of Sleepy Hollow. These fire roads are in various states of repair, with some fire roads showing signs of regular maintenance, and other locations are unpassable in a vehicle due to vegetation overgrowth, washouts, or other unsafe surface conditions. In general, access to the fire roads is limited to high-clearance off-road vehicles and fire apparatus. Four-wheel drive vehicles are recommended. All fire roads in Sleepy Hollow are closed to public motor vehicle access.



Strategic fire roads were identified and mapped to help identify potential wildfire response and emergency access issues, and to consider implications for evacuation during an emergency incident. Fire roads primarily include those roadways and trails on adjacent open space lands including unpaved roads and trails as well as some paved roads that connect and pass through open space areas.

Fire Stations and Emergency Services

Primary, initial attack fire protection for both structural and wildland fires is provided by [Ross Valley Fire Department](#), under the direction of Sleepy Hollow Fire Protection District's JPA membership. Ross Valley Fire Station 20, located at 150 Butterfield Road, is the closest fire station to Sleepy Hollow. Daily personnel staffing of two firefighters provides a single type-1 fire engine for response into Sleepy Hollow. Fire Station 20 houses two type-1 fire engines (one provided by the California Office of Emergency Services), however only one is staffed for immediate response.



A four wheel drive, Type-3 wildland fire engine, "Engine 621" is available at Fire Station 21 in Fairfax during fire-season. Availability of this fire engine for wildfire response may be limited due to the "cross-staffing" with a Type-1 (structural) fire engine - only one engine can be operated at any given time by the two on-duty firefighters. The National Interagency Fire Center, NIFC, states that three-person staffing should be the minimum for Type-3 engine companies responding to

wildfires.³ Cal Fire, Marin County Fire Department, and most municipal fire agencies in California have adopted a three-person staffing model for Type-3 engine wildfire response.

Because the entirety of Sleepy Hollow is designated as State Responsibility Area (SRA), initial attack for all wildland and vegetation fires in Sleepy Hollow includes a response from Marin County Fire Department, due to that agency's contract with the State of California. A typical wildland response (dictated by daily fire weather forecasts and observed conditions) includes 5 (five) type-3 engines, one water tender, a bulldozer, a Battalion Chief, 1 rotor-wing (helicopter) aircraft, two fixed-wing air-tankers, and a single Air Attack aircraft and crew. These resources are in addition to the initial response (wildland) from Ross Valley Fire Department of at least two type-1 engines, one type-3 engine, and a Battalion Chief.

Advanced Life Support (ALS) paramedic services are provided to Sleepy Hollow by a Paramedic Firefighter on engine 20, and ALS transport ambulance service by Ross Valley Paramedic Authority (www.rossvalleyppa.org), with ambulance response from Fire Station 18 in Ross.

³ Interagency Standards for Fire and Fire Aviation Operations. NIFC. 2017.

Community Infrastructure

Wildfires frequently damage infrastructure, including roadways, communication facilities, above-ground utility lines, and water delivery systems. Restoring basic services following a fire is a top priority, and, many agencies and organizations responsible for infrastructure incur significant restoration costs after a fire. Efforts to restore roads and highways post-fire include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair of roads, guardrails, signage, electrical supply, culverts, and landscaping. Direct impacts to water supplies may occur through contamination of ash and debris during the fire, destruction of above-ground delivery lines, and soil erosion or debris deposits after the fire.

The most significant infrastructure identified in Sleepy Hollow at risk from wildfire is overhead utility lines, including residential power lines, landline voice and data lines, and cable television/data distribution lines. Above ground utility poles are particularly vulnerable to wildfire, and frequently fall during fires when wooden pole bases burn. These fallen poles and lines present several challenges: ingress/egress routes may be blocked to evacuating residents and responding fire apparatus; communications can be cut off, including access to landline and VOIP 911 systems, Fallen power lines create a significant electrical hazard to firefighters and the public during the fire event. Undergrounding utilities is typically extremely expensive and done primarily to mitigate visual impacts.

PG&E provides natural gas distribution in Sleepy Hollow. The condition and safety of the natural gas infrastructure is addressed in a 2014 report, "Sleepy Hollow Fire Protection District Report on Safety of PG&E Natural Gas System" available at www.shfpd.org. There are no high-pressure transmission lines located in or near the Sleepy Hollow Fire Protection District. Local lines are low pressure, 2"-4", underground, and are not likely to be impacted by wildfire. Wildfire may threaten individual residential natural gas services, with above ground meters and interior residential gas line exposed if a structure ignites.

Following a fire, utility and communications repairs are necessary, with the cost or repair sometimes exceeding the cost of fighting the fire.

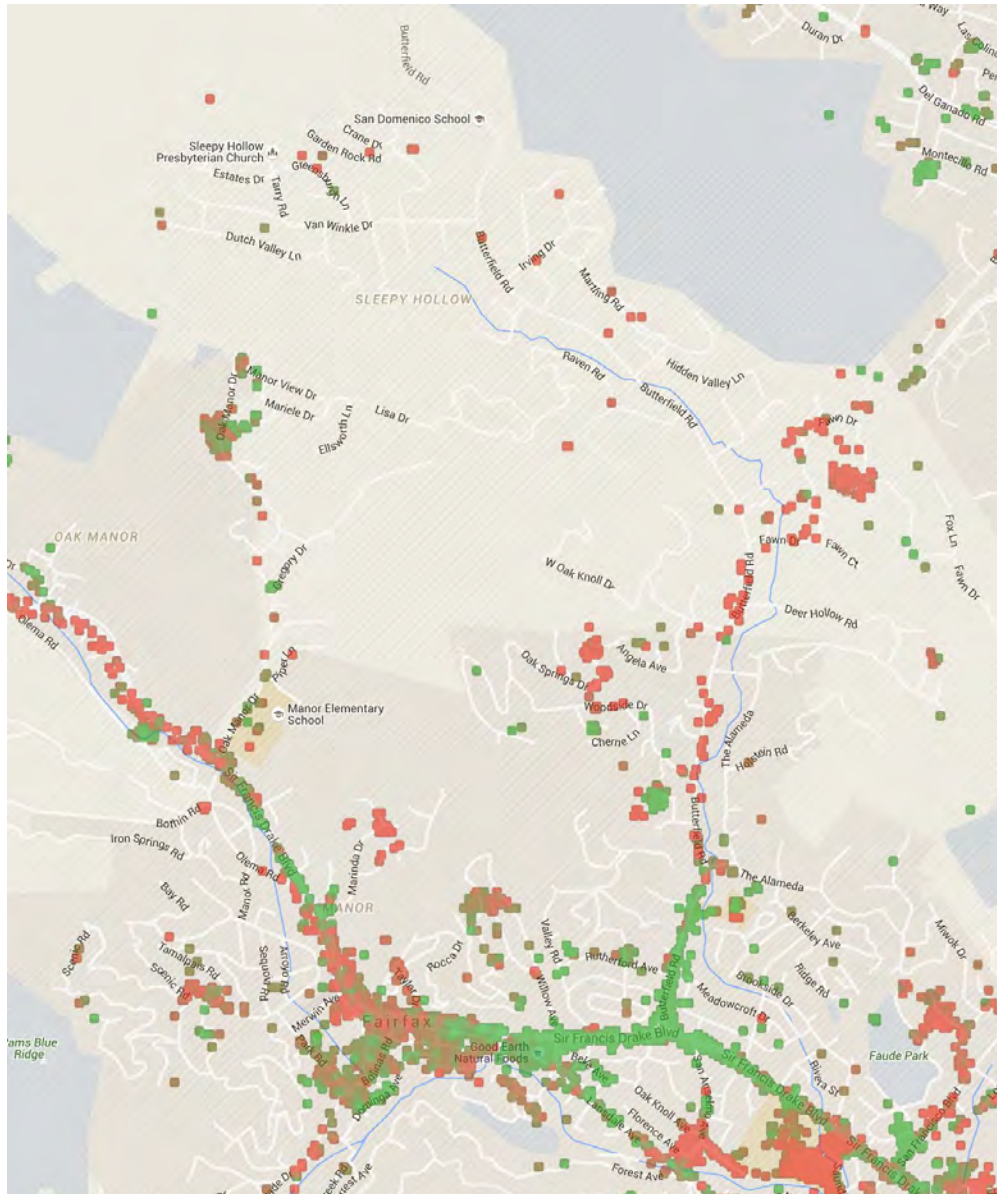
Cellular Communications

Cellular communications are an increasingly important tool for the public and fire managers alike. Adoption of systems like the *AlertMarin* disaster and evacuation notice system by the Marin County Office of Emergency Services (OES) depend on cellular voice and data transmission to communicate emergency information and evacuation to the public.

Although the dominant local cellular carriers (AT&T, Verizon Wireless, and Sprint) each indicate in their public GIS coverage data that Sleepy Hollow has 100% coverage, on-the-ground field work in the development of this plan found that many areas of Sleepy Hollow lack reliable wireless voice and data connectivity. The "crowd-sourced" signal map available from

www.opensignal.com (below) shows poor cellular connectivity for all carriers within the boundaries of SHFPD. Significant portions of Sleepy Hollow lack cellular connectivity, including much of the Butterfield Road and Van Winkle Drive corridors.

Poor reception and signal coverage observed during research for this report, and confirmed by independent analysis (www.opensignal.com), indicate that cellular infrastructure in Sleepy Hollow may be inadequate to support emergency needs.



“Crowd-sourced” cellular and data signal strength map from www.opensignal.com confirms field observations of poor or no reception in much of Sleepy Hollow for all carriers. Red points indicate weak signals, green are stronger.

HAZARDS

Fire Risk vs. Fire Hazard

The concept of risk versus hazard can be confusing, as these terms are often used interchangeably.

A “risk” is the chance, high or low, that any “hazard” will cause harm.

Examples of fire hazards may include the presence chaparral, brush, or dry grass, stands of dead or diseased trees or other fuels prone to wildfire, electrical distribution and power lines, vehicle exhaust systems, areas that attract homeless encampments, and concentrations of homes that do not meet current wildfire building codes and standards.

In the context of technical risk assessments, the term “risk” considers not only the probability of an event, but also includes values and expected losses. Within the fire community, risk also refers to the probability of ignition (both human and lightning-caused) (Hardy, 2005). The fire risk (vulnerability) of Sleepy Hollow and surrounding areas varies based on daily (weather and dead fuel moisture) conditions and longer term trends (climate and vegetation community health and distribution) within the local environment.

The purpose of this report is to assist the community in developing collaborative methods of reducing the fire ‘risk’ within Sleepy Hollow by employing strategies and tactics that will reduce or eliminate one or more distinct fire ‘hazards.’ Successful implementation of the recommendations in this report will result in the meaningful reduction of the fire risk in Sleepy Hollow through the identification and subsequent mitigation of specific hazards.

Wildfire Hazard Assessment

Wildfire is a hazard wherever people and residential developments meet wildlands. The degree of hazard and the required amount of fire safety preparation varies from area to area, even on a community scale. Identifying areas and neighborhoods of differing severity provides for the application of reasonable standards and mitigation strategies based on the actual threat and allows agencies and property owners to allocate resources more effectively.

A baseline of fire prevention and fire-safety activities should be measured to ensure a basic level of protection. Land use planning agencies and the fire service require identification and classification of areas of varying fire hazard severity in order to specify the conditions under which development and use of these areas can occur safely. In Marin, the basic identification of Wildland Urban Interface (WUI) meets this standard. Fire agencies continuously assess their

protection responsibilities for applying appropriate fire prevention programs and targeting critical areas for special programs. Insurance companies have also shown a significant interest in wildland fire hazard assessment in recent years.

To take effective action, SHFPD Directors and Sleepy Hollow residents must understand the elements, components, and factors that contribute to the problem. This hazard assessment, in conjunction with the District's desire to implement recommended mitigation strategies, presents a unique opportunity to treat risk at the landscape scale.

Information in this report is based on available data, including the Marin County CWPP GIS database, and augmented by information collected during the planning process, the wildfire hazard assessment, site reconnaissance visits conducted in 2015 and 2016, meetings with RVFD and MCFD staff, published reports, and the professional knowledge of the consultant.

Each section provides detailed information concerning the methods used to assess wildfire hazards, a description of identified wildfire hazards, and the process used to determine the recommended treatment areas discussed throughout the report and upon which hazard mitigation recommendations are focused.

GIS

GIS data and maps are crucial for pre-fire mitigation and preparation for wildfires, offering a valuable tool for better understanding fire risk through:

- Analysis of potential benefits of mitigation work.
- Review of a fire's potential intensity.
- Identification of possible evacuation routes.
- Analysis of potential spatial changes over time.

For the 2016 Marin County Community Wildfire Protection Plan, a base map of Marin County was assembled using geographic information system (GIS) data layers acquired primarily from Marin County's GIS portal, marinmap.org. The base map includes map layers of political boundaries, fire districts, land ownership, census data, infrastructure, building footprints, a parcel map, WUI boundaries, sensitive habitats, and areas of concern, merged into multiple GIS map layers. The community base map and corresponding map layers are available for viewing through an ESRI ArcOnline website and was utilized for some analysis in this report.

Additionally, GIS data provided to the public and agencies through the MarinMap portal (www.marinmap.org) was used extensively in this report's analysis, including special district boundaries, WUI boundaries, parcel data, fire hydrant locations, and census data.

QGIS Open Source Geographic Information System was used to edit, visualize, analyze and publish all geospatial information utilized in this report.

Fuel Models

Vegetation inventories and field assessments were conducted to identify existing fuels in Sleepy Hollow and to serve as the basis for identifying potential treatment areas and recommending fuel reduction and vegetation management goals. As part of the wildfire hazard assessment process, existing data was reviewed and corrected to create an improved fuel map and model for Sleepy Hollow. Using the 5 and 30-meter resolution fuel maps and associated models created for the Marin County CWPP 2016, selected vegetation fuel-model pixels were corrected based on “ground truthing” actual conditions based on site reconnaissance visits in Sleepy Hollow’s wildland-urban interface and a review of current aerial photography.

The CWPP update’s high-resolution (5x5 meter) gridded vegetation map was developed using a combination of vegetation data provided by local land management agencies and recently obtained LIDAR measurements. The 5x5 meter data was aggregated to 30x30 meter data for the purpose of fire modeling in this report using FlamMap and IFTDSS.

For consistency, fuel conditions for modeling in this report are similar to conditions used in the assessments contained in the CWPP.

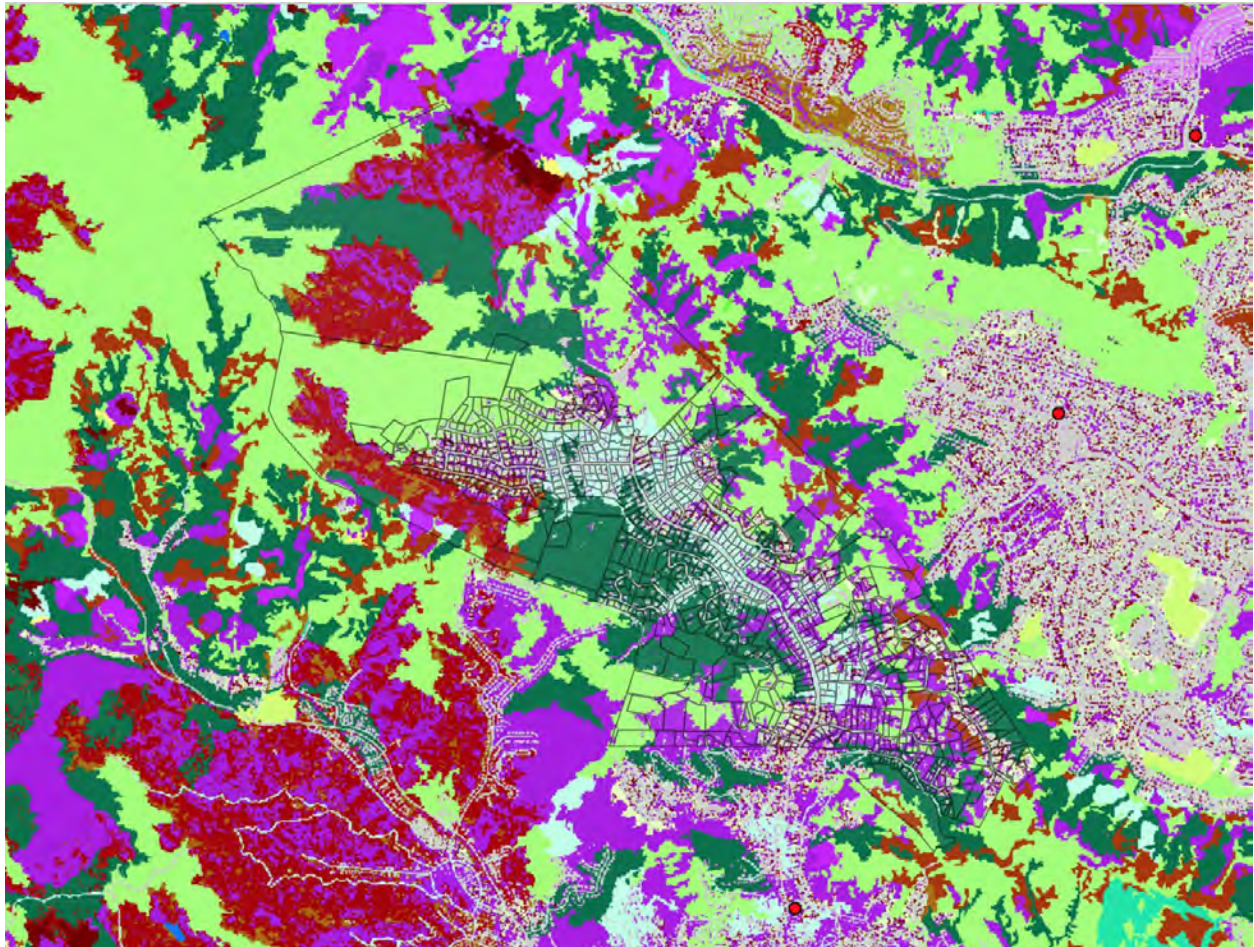
Fuel Modeling and WUI Fires

“Modeling WUI fires has all the challenges associated with wildland fire modeling with additional challenges due to the relatively more complex fuels environment. The WUI landscape contains wildland and residential vegetative fuels, a variety of fuel break types (e.g., roads, sidewalks, and lawns), as well as a range of structural fuels (e.g., siding, roofing, and decking materials) and building assemblies (eaves, decks, and various roofs). Current operational wildland fire models were developed for fire spread through solely vegetative fuels that are contiguous.” (Mell, et al. 2011. *Computer modeling of Wildland-Urban Interface Fires*. 2011)



Recognizing current limitations of modeling wildfire in the WUI, a similar fuel model was utilized to represent structures in the WUI as the analysis conducted for the 2016 Marin County CWPP.

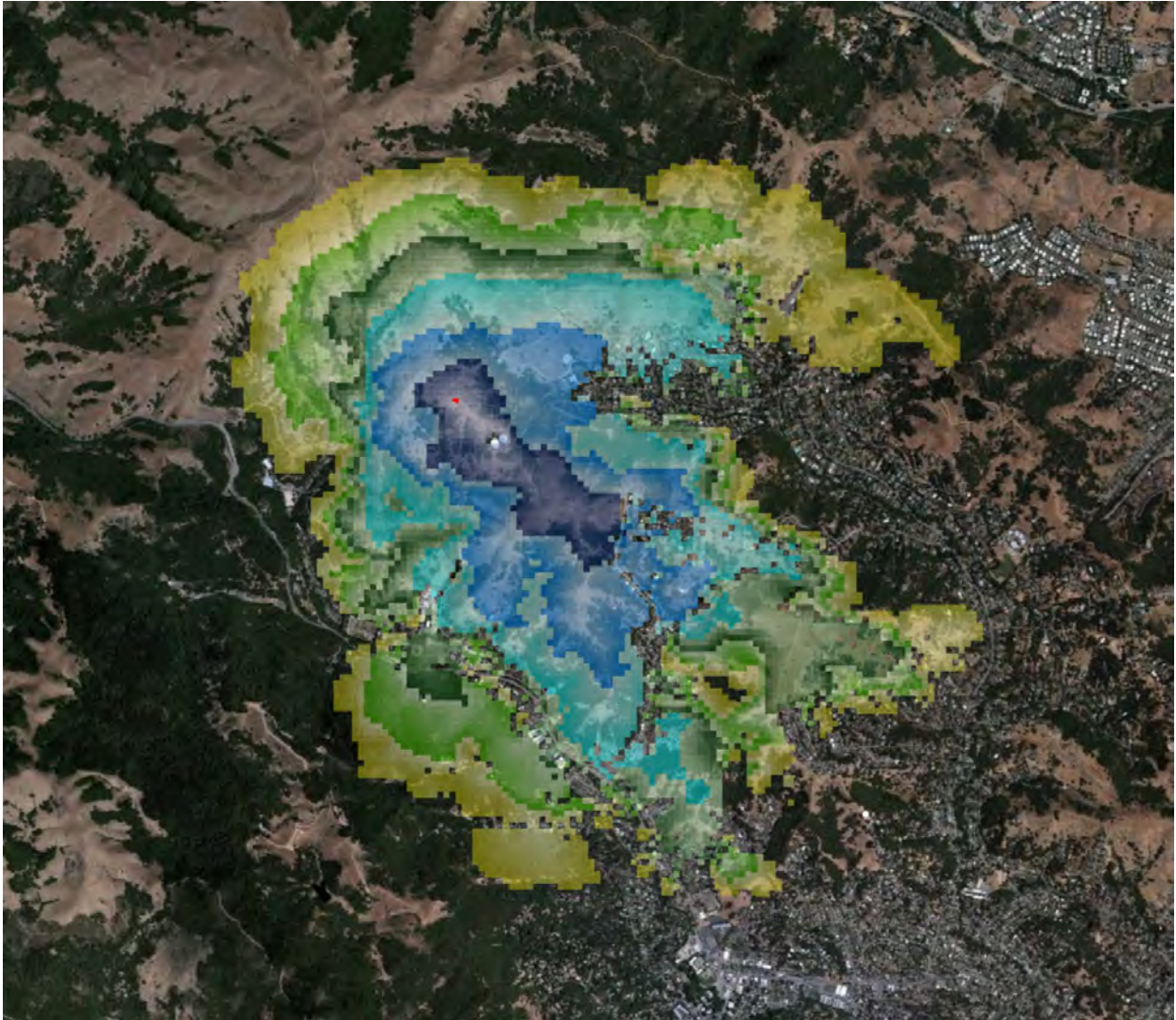
Marin County CWPP 2016 Fuel Model for Sleepy Hollow



Vegetation data published as part of the Marin County CWPP 2016 was used as the basis for modeling fuels in Sleepy Hollow. Individual point corrections were added based on field observations of actual, current fuel conditions.



Wildfire Modeling



IFT-DSS FlamMap Minimum Travel Time (MTT) shows fire growth over time (each color represents a 60-minute interval) for a simulated fire ignition on Loma Alta, near the location of an actual 2015 wildfire, under “worst case” weather and fuel conditions.

The FlamMap fire behavior prediction model and Interagency Fuel Treatment Decision Support System (IFTDSS) were used to identify hazards according to predicted flame length, spotting potential, and rate of spread. This report modeled fire conditions under a variety of weather and fuel conditions. For the purpose of this report and the final analysis, fire behavior predictions were assumed to be under late-season fuel conditions, northwest winds, and hot, dry weather to assess worst-case hazards.

Specifically, the following areas were given greater emphasis in assessing wildfire hazards due to the need to protect life and property and the elevated hazard potential resulting from these factors:

- Undeveloped public and private open space within 200 feet of homes and other structures.
- Areas of vegetation with the potential to produce greater than 8-foot flame lengths.
- Areas containing fuels prone to torching and ember production.

In general, modeling scenarios produced similar results to those obtained and published in the CWPP. The following Fuel moisture and weather values were used for the extreme fire conditions modeling scenarios.

Parameter (units)	Extreme Fire Conditions
1-hour fuel moisture	3%
10-hour fuel moisture	4%
1,000-hour fuel moisture	6%
Herbaceous fuel moisture	40%
Live wood fuel moisture	65%
Wind speed	15 mph
Wind direction	206°

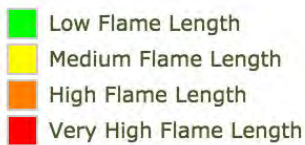
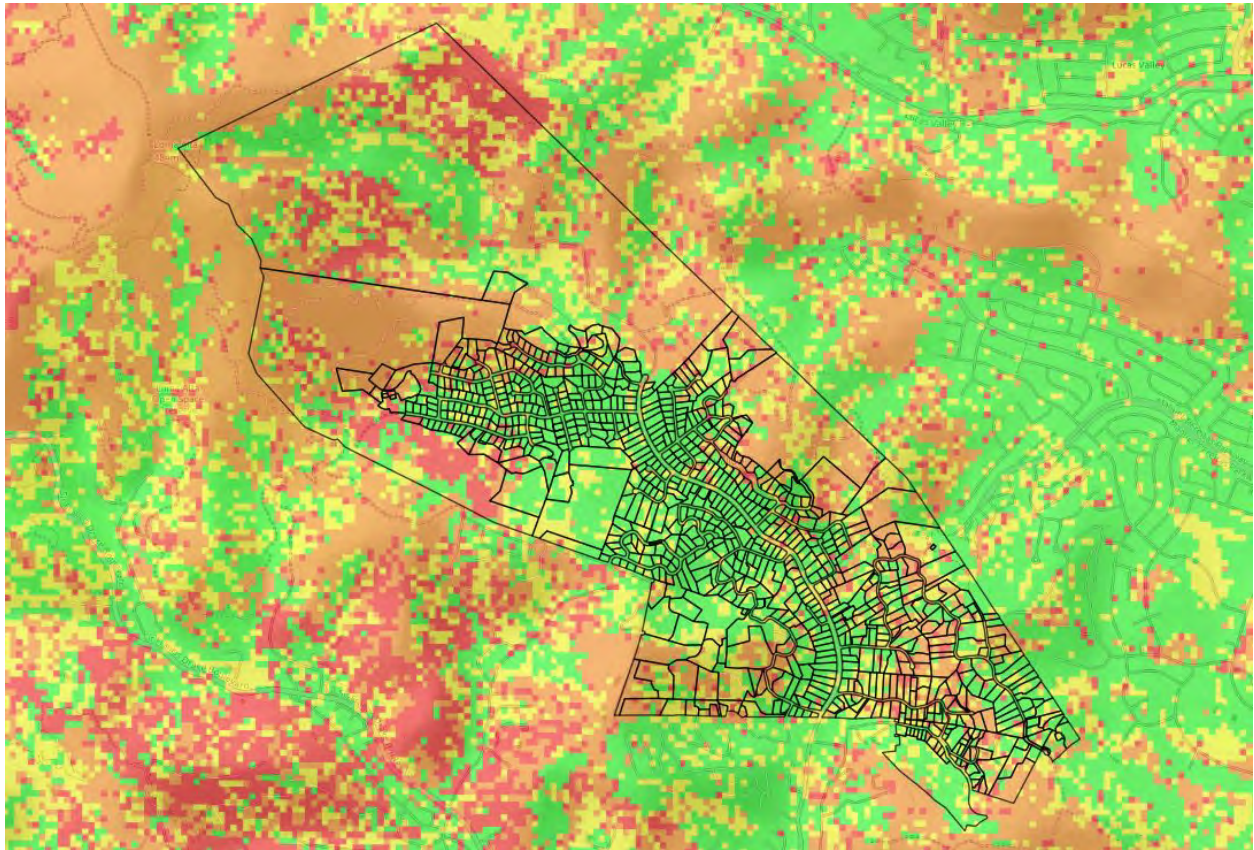
CWPP Areas of Concern and Hazard Ranking

The 2016 Marin County CWPP finds that the overall results of the hazard, value, risk assessment for both the average and extreme fire condition scenarios throughout Marin produce similar results. All areas identified in the CWPP as “areas of concern” should be considered for hazard reduction efforts, however, based on the CWPP modeling results, the following areas ranked the highest (top 10%) and could be considered high priority:

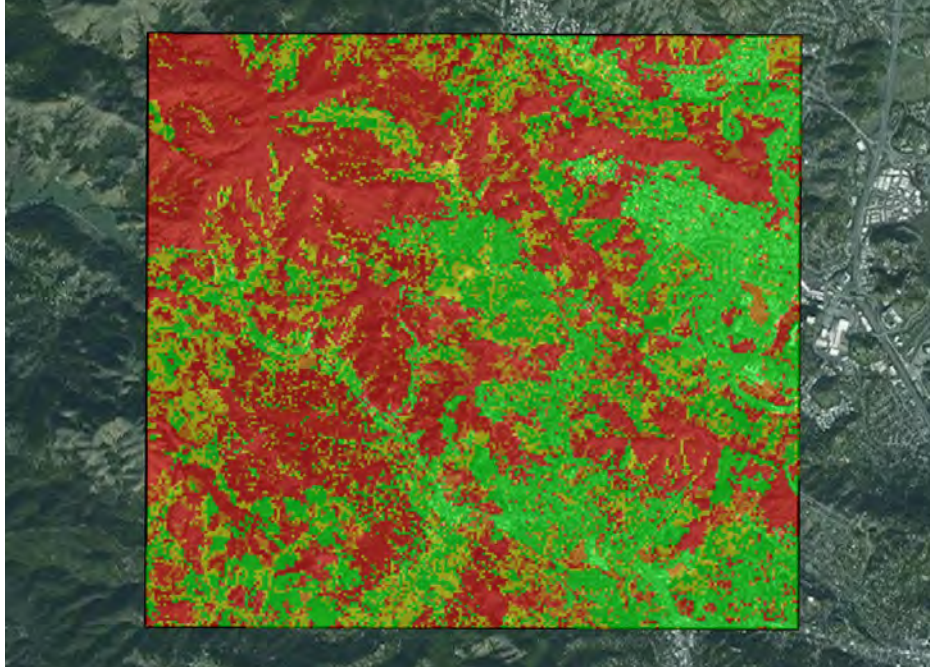
- Sleepy Hollow WUI and Loma Alta area are identified as one of 8 “high priority” locations in Marin county due to predicted fire hazard under both average and extreme conditions.

As observed in the fire history data for Marin (Marin County CWPP 2016), land ownership and fuel type strongly influence the location and frequency of burning in the landscape. The relative fire threat of an area may be influenced by a number of variables such as fuel types and age, topography, and the presence of ignition sources. When adjacent to urban development, large swaths of open space, whether public or private, presents a potential risk to adjacent communities due to continuous fuel beds, Marin’s relatively steep topography, and limited access. For example, wildfires originating on or burning through the Point Reyes National Seashore, Mt Tamalpais watershed, and Marin’s State Parks have posed a significant risk to communities in Marin.

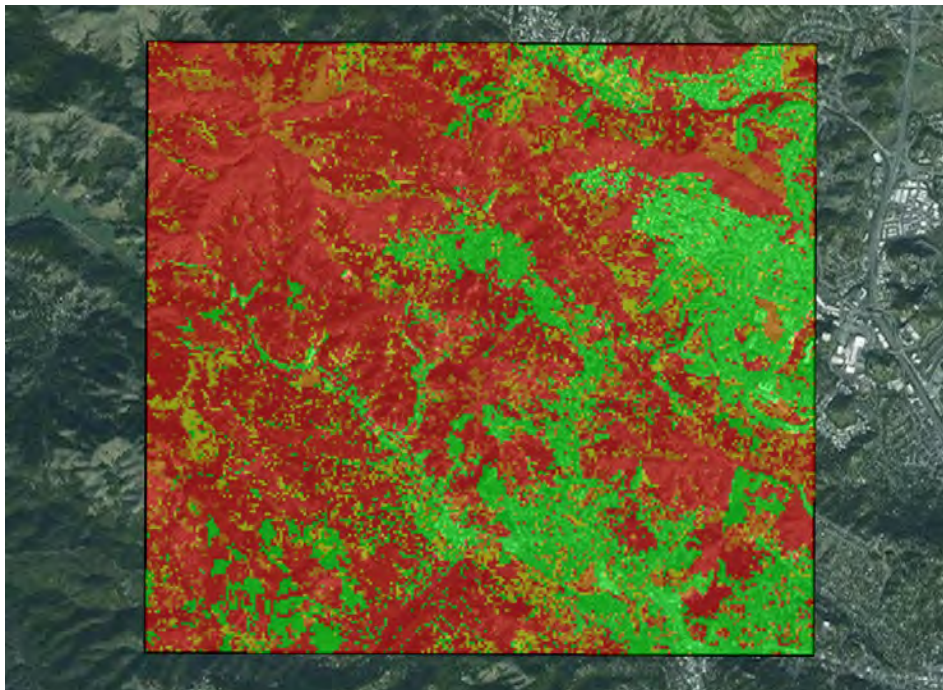
Prevailing wind patterns are a dominant factor affecting wildfire risk. In Sleepy Hollow and much of Marin, on-shore winds blowing from the northwest routinely pick up in the early afternoon, increasing the risk that fires will be driven in a southeast direction if not extinguished before the onset of the winds. Hotter, drier winds from the north or northwest are common during the summer in fall, especially at higher elevations. The well known “Diablo” winds (similar to the “Santa Ana” winds of southern California or the “Chinook” winds of the Rocky Mountains) blow from the east, or “offshore.” These winds contributed to many large, historical fires in the East Bay hills and Marin, often in the fall when fuels are extremely dry from months of summer drought.



IFTDSS FlamMap modeling conducted using locally corrected fuel models specific to this report produced this hazard map showing predicted flame lengths for the Sleepy Hollow Fire Protection District (parcels outlined in black) and surrounding areas.

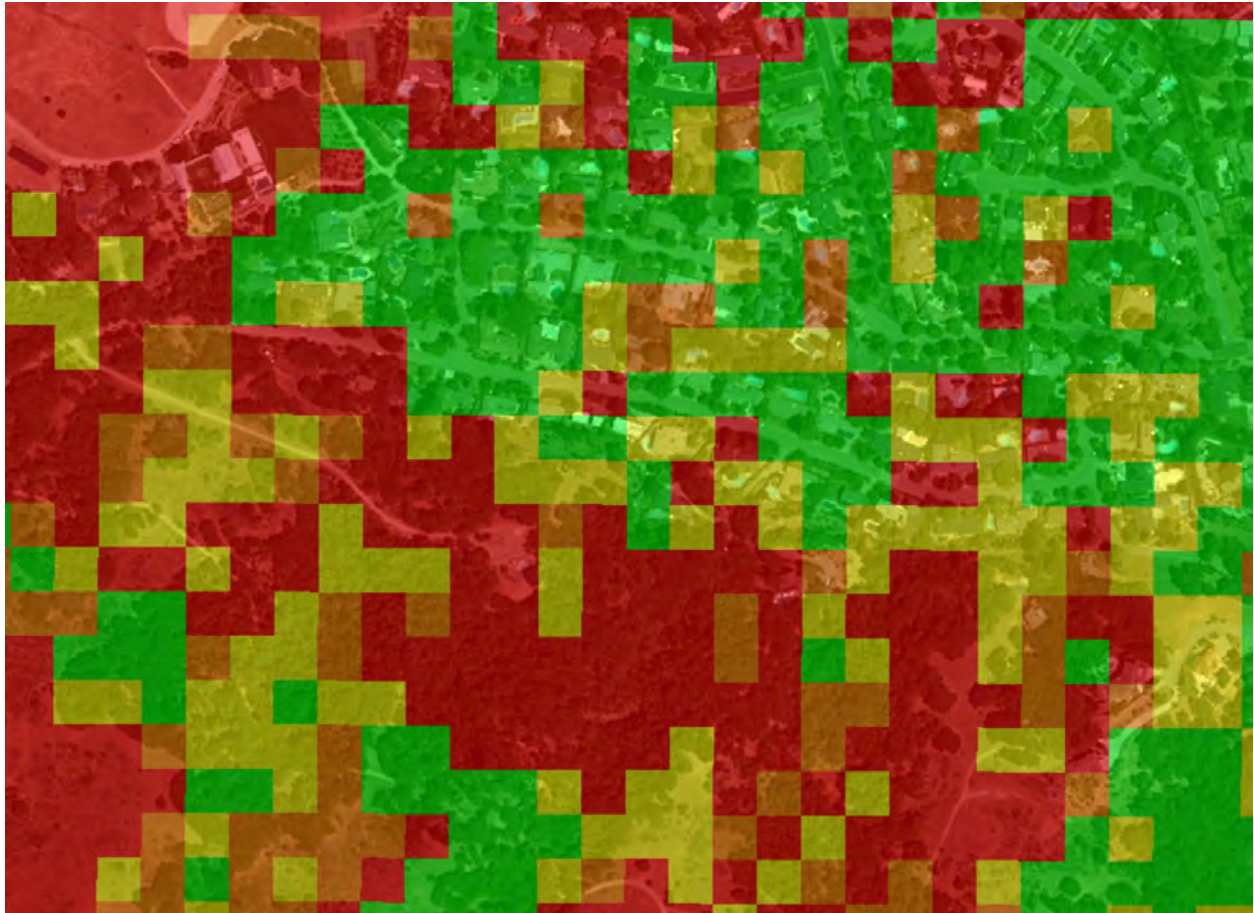


Modeling considered a variety of weather and fuel conditions. Predicted flame length is one of the best predictors of the difficulty to control a fire at a given location, an important factor when evaluating wildfire hazard. The top image shows predicted flame lengths under current fuel conditions, where ever larger areas are exposed to increased flame lengths (and resulting increased hazard) due to the loss of grasslands over time (bottom image).



Vegetation management aimed at maintaining existing grasslands by controlling the expansion of shrubs and bay forest in open spaces and undeveloped parcels may reduce the hazard near homes in the WUI.

While no large fires are included in the fire history data set for Sleepy Hollow, potential fire risk in this area is considered high. For example, a 600+ acre fire, originating in what is now the the Loma Alta Open Space Preserve, was driven southeast by prevailing winds toward the communities of Oak Manor and Sleepy Hollow in 1984. Less common, but equally concerning dry, offshore winds from the east, a key indicator of high fire danger, could blow wildfires originating in Terra Linda, San Rafael, or San Anselmo into Sleepy Hollow. Ignitions in these surrounding areas are more common and may present the most likely scenarios for large destructive wildfires in Sleepy Hollow.



- Low Flame Length
- Medium Flame Length
- High Flame Length
- Very High Flame Length

Image, Dutch Valley Ln. and Van Winkle Dr. FlamMap flame length model under extreme fire conditions. Flame lengths in excess of 11' within 100' of residential structures may result in the exposure of homes to radiant heat with enough intensity to ignite siding. The generation of large quantities of firebrands from burning timber understory is a particular concern, due to the vulnerability of structures to embers (Cohen, Quarles).

Under an offshore (east) wind condition, model scenarios showing a wildfire ignition in Terra Linda have the potential to impact the largest number of properties in Sleepy Hollow. Offshore wind conditions, although relatively rare (occurring 5-20 days per year, most often from August to November) are known to produce extreme fire behavior. These scenarios clearly demonstrate the potential benefit of fuel reduction, enhanced Defensible Space, and shaded fuel breaks near parcels on the periphery of Sleepy Hollow.

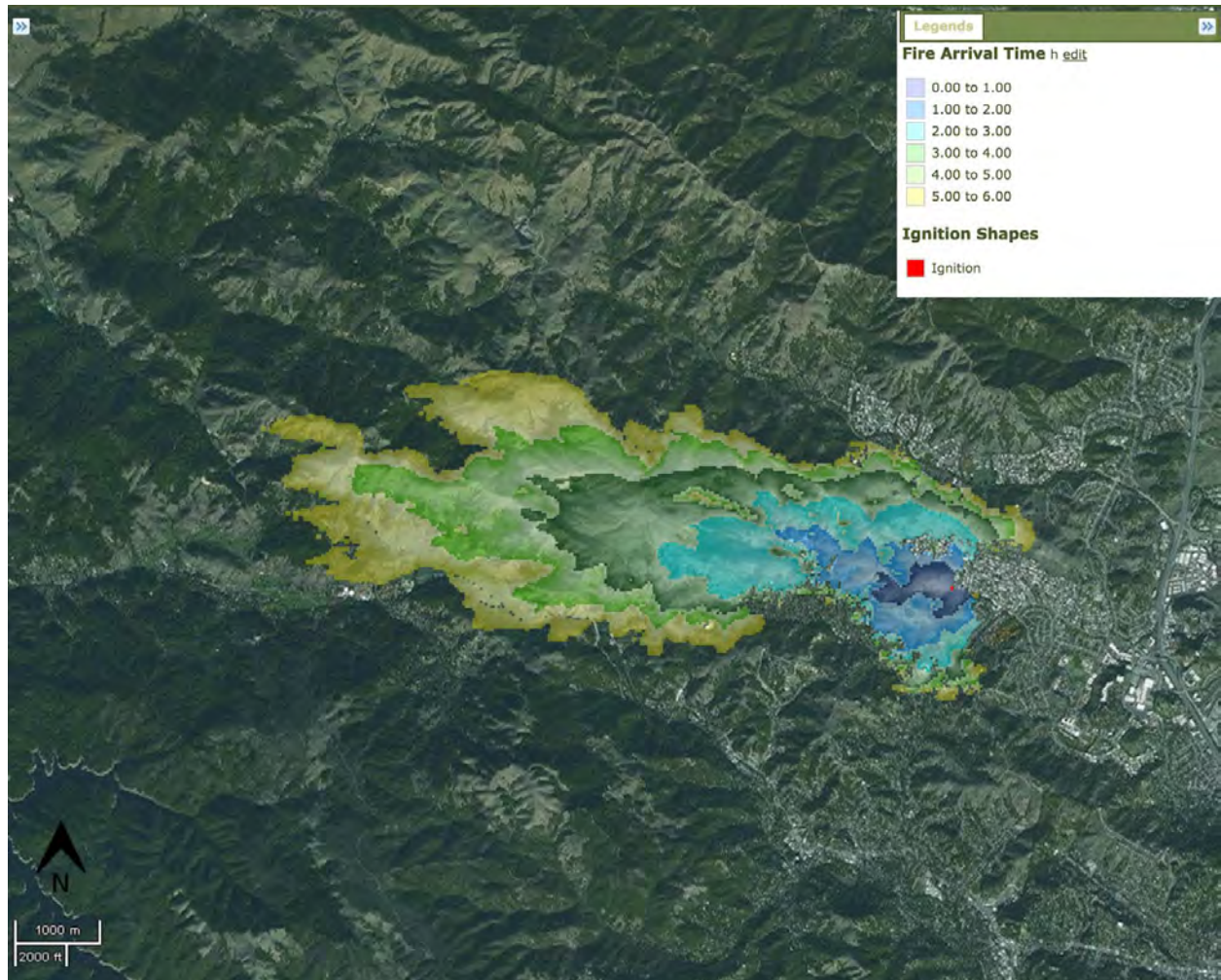


Figure 1: Wildfire modeling at 1000m scale shows the potential for a large fire, impacting nearly every parcel on the east and north/northwest perimeter of Sleepy Hollow.

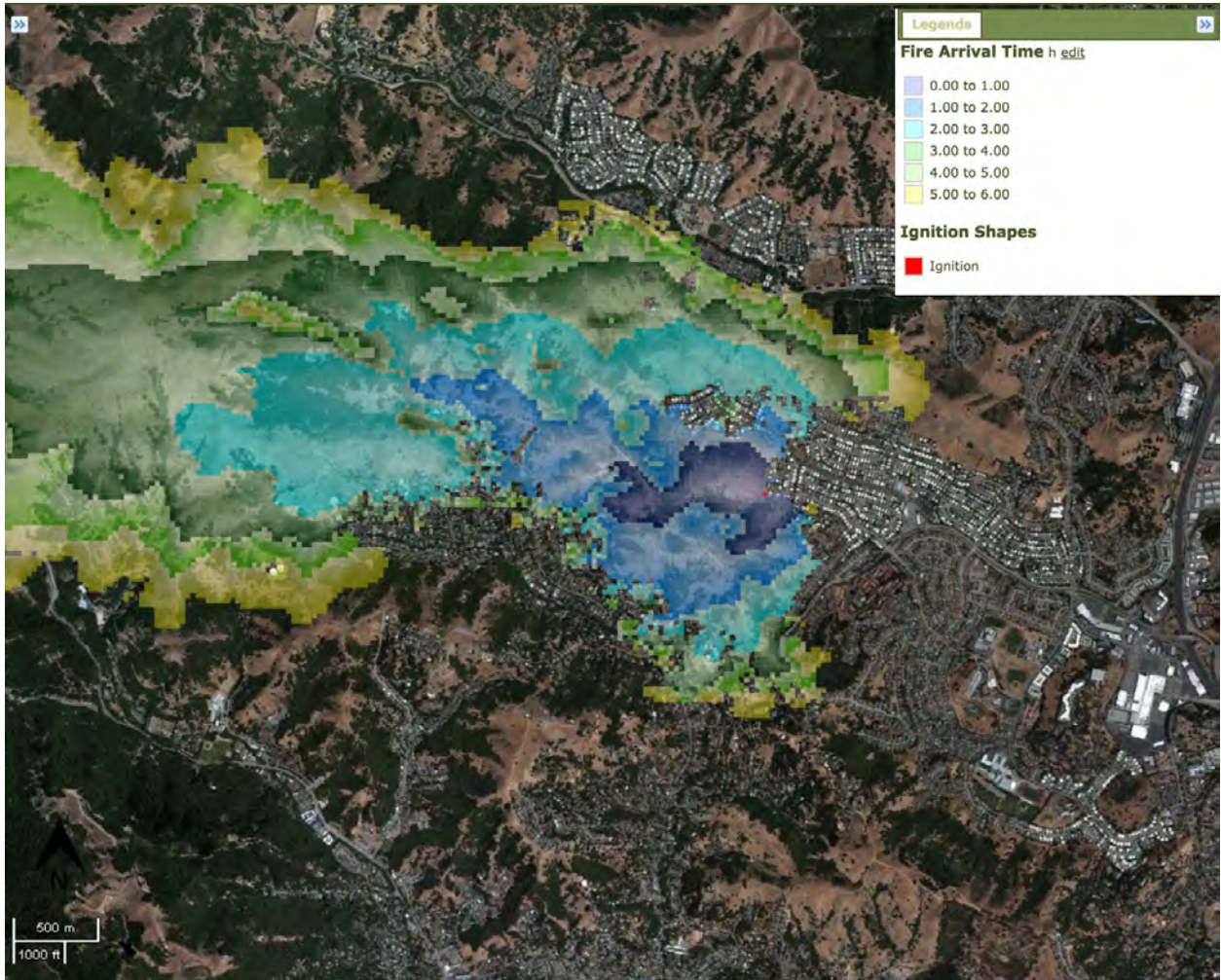


Figure 2: The same fire zoomed to 500m scale shows the potential for a large fire, impacting nearly every parcel on the east and north/northwest perimeter of Sleepy Hollow.

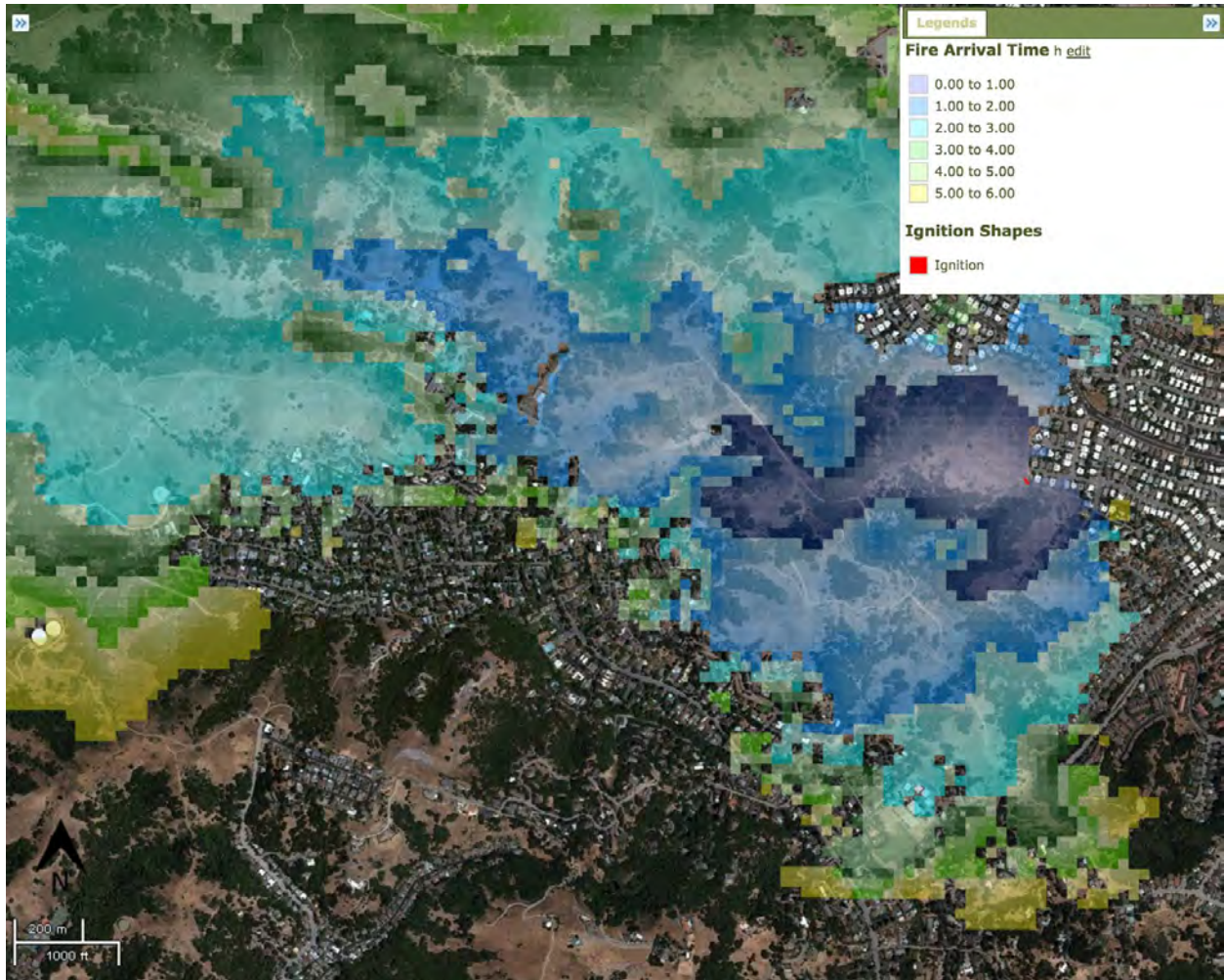


Figure 3: The same fire zoomed to 200m scale shows the potential for a large fire, impacting nearly every parcel on the east and north/northwest perimeter of Sleepy Hollow.

Ignition Hazards

Wildfires are the result of an ignition source, fuels, and conditions that allow a fire to grow. Ignition sources are broadly divided into natural causes (primarily lightning) and human causes, including both accidentally and intentionally ignited (arson) fires. Ignition, in this report, refers only to the initial ignition source of a wildfire.

Too little ignition data exists for the Sleepy Hollow study area to accurately predict future ignition sources and types specific to this location. Ignition data for the entirety of Marin was analyzed in the 2016 CWPP, and in general, may reflect expected ignitions in Sleepy Hollow.

The CWPP analyzes ignition data for Marin county's SRA areas to evaluate ignition trends and problems within the county. The data set included 414 wildfire ignition points. The table below presents the ignition history for SRA areas between 1974 and 2015, classified by ignition cause.

Ignition statistics, 1974-2015 (2016 Marin CWPP)

Ignition Cause	Number	Percentage
Arson	24	6%
Campfire	7	2%
Debris Burning	15	4%
Electrical Power	6	1%
Equipment Use	12	3%
Lightning	2	0%
Misc.	186	45%
Smoking	4	1%
Undetermined	104	25%
Vehicle	18	4%
Other	36	9%

The ignition history identifies the majority of ignition causes as miscellaneous and undetermined. Arson, electrical, and vehicles also emerge as significant ignition sources. (2016 Marin CWPP)

To address the accidental and intentional ignition sources, agencies have a few key management options—wildfire prevention education, fuels management, and law enforcement.

Structural Hazards

Large, wildland urban interface (WUI) fires damaging a large number of homes are possible in Sleepy Hollow when extreme fire weather conditions exist. Extreme conditions include periods of low humidity and high winds, and represent less than 5% of daily weather conditions during fire season (www.weatherunderground.com).



A risk analysis that considers more typical conditions with moderate humidities and winds would show that the more likely scenario for damage to structures in Sleepy Hollow involves small (1-10 acre) fires.

These smaller fires, with a moderate rate of spread in grass or medium fuels, are more likely to impact one or more structures in the time between ignition and arrival of initial attack firefighting resources. It is imperative that property owners prepare their properties with adequate defensible space and fire-resistant construction to prevent, or lengthen the time between exposure and structural ignition, in these fire scenarios. **The ignition of even a single structure increases the likelihood that other structures nearby will ignite, largely due to the production of a large number of embers (Cohen, Quarles).**

The current state-of-the-art in computer wildfire modeling is not adequate to accurately predict fire growth, spread, or structural ignitions in the WUI when housing density is high. Modeling can, however, help predict the location, travel paths, and intensity of fire in areas where structures are likely to be impacted by the flaming front of a vegetation fire.

With this in mind, **modeling indicates that larger fires (10-50+ acres) spreading from neighboring open-space into Sleepy Hollow from the west, northwest, or east (under strong wind conditions) could potentially impact a large number of structures simultaneously.** Under worst case weather conditions, due to the large numbers of homes impacted by fire simultaneously on the periphery of Sleepy Hollow, an urban conflagration similar to the Valley Fire (Lake County, 2015) or Tunnel Fire (Oakland/Berkeley Hills, 1991) is possible. Hundreds of homes might be impacted and damaged or destroyed in these conditions.



Structural Hazard Analysis considered building footprints and relation to flame lengths in continuous vegetation fuels. Building construction type and materials data does not currently exist. Collection and integration of this data is recommended in the Mitigation/Structural Ignition section.

Structural hazards can not be adequately addressed without considering other factors such as building construction, Defensible Space, and neighboring structures⁴. These issues are discussed as separate (but connected) issues in the [Structural Ignitability](#), [Parcel Inspection](#), and [Defensible Space](#) sections under the Hazard Analysis and Mitigation Strategy headings.

⁴ Syphard; Brennan; Keeley. 2014.

Assets and Facilities at Risk

Assets at risk are defined as structures and resources that can be damaged or destroyed by wildfire (Marin CWPP 2016). In addition to providing a framework for protecting citizens and providing for firefighter safety, the California Fire Plan identifies the following assets warranting consideration in pre-fire planning: watersheds and water; wildlife; habitat; special status plants and animals; scenic, cultural and historic areas; recreation; rangeland; structures; infrastructure; and air quality.

Assets in Sleepy Hollow include real estate (homes and businesses), schools, utilities and electrical distribution infrastructure, communications networks and facilities, transportation infrastructure, watersheds, protected open-space, recreation areas, and agricultural lands.

This report identified “facilities at risk” that were then evaluated as part of the wildfire hazard assessment and included, as necessary in recommended treatment areas. For the purposes of this report, facilities at risk are primarily the two schools located in Sleepy Hollow: Hidden Valley Elementary School and San Domenico School.

San Domenico School

San Domenico, a private Catholic school, sits on the largest parcel in SHFPD which at 522 acres represents nearly 30% of the total District area. Located at 1500 Butterfield Rd, the campus is located near the back of a box canyon at the bottom of the southeast slope of Loma Alta at the far northern end of the Sleepy Hollow valley.

The campus enrolls 631 K-12 students. On campus housing serves 101 boarding students, with the remaining students utilizing daily transportation by a private transportation or bus systems.

On-site facilities include 30 buildings: dormitories, library, classroom buildings, music conservatory, athletic facilities (gymnasium, pool, tennis courts), equestrian center (covered arena, barn, horse boarding stalls), administration, playing fields, parking, multiple solar power generation sites, gardens, and employee housing. Most campus structures are located within 200’ of wildland vegetation.

A detailed hazard assessment was not conducted for this facility. Some onsite hazards observed during site visits include continuous untreated wildland vegetation in contact with facilities (horse barn and riding arena), and a 2-acre stand of Monterey pine (*pinus radiata*) in poor health, with non-native ladder fuels and extensive dead and downed material adjacent to the campus parking lot.

Playing fields present near Butterfield Road may be a suitable Safety Zone or serve as Landing Zones (LZ) for rotor wing aircraft during wildfires.

Hidden Valley Elementary School

A public elementary school in the Ross Valley School District, Hidden Valley Elementary School is located on a 5.1-acre parcel between Green Valley Court and Fawn Drive at the base of a slope near the valley floor. With a total enrollment of 367 students, the school serves residents of Sleepy Hollow, San Anselmo, and parts of Fairfax.

On-site facilities include 9 buildings: a library, classroom buildings, gymnasium, administration building, playing fields, parking lots, a solar power generation site, and garden. Most campus structures were built in 1954, with remodeling and updates in 2000, and are located within 200' of wildland vegetation.

A detailed hazard assessment was not conducted for this facility. Some hazards observed during site visits include some untreated wildland vegetation (primarily annual grasses) within 100' of structures on the stabilized slope behind the upper parking lot, and uncut grass in a public parking area where contact with catalytic convertors is possible. Vegetation conditions generally were excellent, with good defensible space observed to the property lines. Several broken solar panels were observed in the solar generation site on the slope behind the campus. Some research indicates a potential electrical fire hazard from damaged solar panels⁵.

The location of a 1.5-acre irrigated playing field may create a suitable safety zone or serve as a Landing Zone (LZ) for rotor wing aircraft during wildfires or rescue operations.

Vegetation

Vegetation in Sleepy Hollow includes a variety of native and nonnative landscaping vegetation, native plant communities, and urban forest. The native plant communities, including oak woodlands, bay forest, and grasslands are naturally adapted to fire, and depend on fire for regeneration, soil health, and paradoxically, protection from fire (by consuming dead material with frequent low intensity fires, the risk of high intensity fire is reduced).



⁵ "Fire Fighter Safety and Emergency Response for Solar Power Systems." 2013. Fire Protection Research Foundation.

Landscaping Plants

The County of Marin and Ross Valley Fire Department require a Vegetation Management Plan for new construction and substantial remodels. RVFD Fire Standard 220 contains language nearly identical County of Marin requirements, and lists specific species which are not authorized in landscaping within the urban-wildland interface. A walk through Sleepy Hollow reveals the presence of many “no plant” species, often in large numbers, within the landscaping of a majority of homes.

The presence of certain species, particularly juniper which is present alongside roadways, driveways, and paths of approximately 20% of Sleepy Hollow homes, is a significant concern.



JUNIPER is a coniferous pyrophyte that grows easily and well in most environments. There are many species, some low shrubs and some growing into trees. Juniper is often used as a quick ground cover, since it grows fast, acts as a visual screen, and is easily cared for. Its berries attract birds and mammals. Juniper develops significant volumes of dead litter underneath, and even green foliage is highly flammable. No juniper should be

planted within 30' of a structure, roadway, or driveway. Removal of existing juniper is recommended for all properties in Sleepy Hollow.

Specific recommendations for juniper removal are covered in the Mitigation section.

Pyrophytic Plants

All plants can burn, but the ease of ignition, rate of consumption, and generation of heat may be vastly different between species of vegetation. Pyrophytic plants include species that ignite readily and burn intensely, and typically share certain characteristics⁶:

- They are usually blade-leaf or needle-leaf evergreens.
- They have stiff, woody, small or finer lacy leaves.
- Their leaves and wood usually contain volatile waxes, fats, terpenes or oils (easily identified, since crushed leaves have strong odors).
- Their sap is usually gummy, resinous, and has a strong odor.
- They usually contain plentiful fine, twiggy, dry, or dead materials.
- They may have pubescent (hair covered) leaves.
- They may have loose or papery bark.
- These plants flame (not smolder) when preheated and ignited with a match.
- The condition of a plant is as important as its species when considering fire. Even some "pyrophytic" species can be fire-resistant if properly maintained.
- Depending on its growth form and access to water, the same species may be fire resistant in one environment and pyrophytic in another. Water-stressed plants that are in poor condition are more pyrophytic.
- Many pyrophytic species become explosively flammable when poorly maintained. South-facing slopes, windy areas, sites with poor soils, and urban landscapes are more stressful for plants, and enhance any plant's ability to burn.

Fire safety organizations such as FIRESafe MARIN and the Firewise Communities USA program publish lists of common native and landscaping plants that are often labeled either "good" or "bad" from a fire standpoint. The lists are not all-inclusive, and may not identify invasive or uncommon plants that readily burn. The lists vary regionally and should address microclimates, irrigation needs, and soil conditions that contribute to plant health.

In some instances, a "fire safe plant list" may give property owners a false sense of security. Homeowners who believe that their properties are "fire safe" due to the species they've selected may be less worried about maintaining their landscapes.

⁶ Moritz, R.; Svihra, P. 1998.

Just as important as species selection is maintenance. Many “fire resistant” species will readily burn when poorly irrigated, diseased, or when twiggy dead wood, fallen leaves, or other organic matter is allowed to accumulate.

In Marin, the best current source of information on local pyrophytic and fire resist landscape plant species may be the 1998 publication “Pyrophytic vs. Fire Resistant Plants” from University of California Cooperative Extension and FIRESafe MARIN. This document is currently undergoing a review and update to be published spring 2017.

Roadside Vegetation



Juniper bushes along driveways are common in Sleepy Hollow and are identified as a significant concern, with heat output and flame lengths that may impede roadway evacuation routes and prevent fire suppression resources from safely accessing roads and driveways.

Juniper bushes, commonly planted along driveways and entry paths, are a significant issue noted during field assessments of roadside fuels in the community. More popular in the 1960s and 1970s (and rarely planted with new construction due to vegetation management ordinances that discourage its planting since the early 1990s), many of the existing bushes are 30-50 years old, poorly maintained, often with large amounts of accumulated dead material. These bushes present a significant hazard, with extremely high heat output often concentrated along critical driveways and access routes to homes where firefighters must work and park apparatus during wildfires.

A local (Novato) firefighter died in 2003 while fighting a wildfire when juniper bushes ignited, blocking his escape route into the home his crew was protecting.



Narrow, steep, streets and driveways create access issues for large fire apparatus, and potentially expose fleeing residents to flames and embers when evacuating. Evidence of a fallen oak (infected with SOD) which blocked the road is visible on the right.



Roadside vegetation can prevent access to whole neighborhoods during a wildfire. In this case, a large oak tree succumbed to Sudden Oak Death. Involved in fire, access to Oak Knoll Drive and West Oak Knoll Drive would be blocked, as well as access to a primary fire hydrant for the neighborhood(s).

Trees and Forests

Tree species and forest communities in Sleepy Hollow have changed dramatically since the 1850s. Planting of non-native species such as eucalyptus and Monterey pine have altered the landscape by introducing some of the most fire-prone trees on earth. Suppression of fires and loss of grazing since the 1980s has resulted in a reduction of grasslands, with native forests encroaching, often in an unhealthy state to the accumulation of woody debris and understory vegetation - also largely a result of fire suppression.



During interviews with residents and at public meetings, significant concern regarding the presence of eucalyptus (*eucalyptus globulus*) in Sleepy Hollow was voiced. Field observations found eucalyptus present primarily as single specimens planted along Butterfield Road, ranging from 31" to 74" DBH. However, these individual trees do not appear to represent a significant wildfire hazard due to their high canopies, wide spacing (75'-600'), maturity, and location along the valley floor. They may, however, represent a fall hazard from limbs and other material.

A small grove of approximately 36 eucalyptus stems is located near 1500 Butterfield Road, on a private parcel 200' east of the roadway. These specimens appear to be much smaller, estimated at an average of 10"-12" DBH, but were not examined closely due to their location on private property. This is the only stand of multiple eucalyptus trees identified within SHFPD that may present a fire issue due to stand density, ladder fuels, location near contiguous wildland fuels, and distance to nearby structures.

Tree diseases

Numerous dead or dying trees were observed along roadways, including coast live oaks (*Quercus agrifolia*) with indications of Sudden Oak Death, Monterey pines (*Pinus radiata*) in varying stages of decline (especially on the east slopes in the area of Fawn Drive, Irving Drive, Martling Drive, in the area of Van Winkle and Crane Dr, and adjacent to the parking lots at San Domenico school). These trees may contribute to increased fire behavior, and pose a fall hazard, potentially creating safety hazards and blocking evacuation routes during wildfires.

Forest Health Implications

Tree diseases and insect infestations impact fire prevention and protection through tree weakness and mortality, resulting in reduced live fuel moisture, increased dead fuel loads, and fall hazards with the potential block roadways, cause injury, or ignite new fires by falling on power lines. Standing dead fuels contribute to increased wildfire hazard and require treatment

and/or removal, especially within wildland urban interface areas like Sleepy Hollow. Care must be taken to avoid transportation of infected tools, chips, and trimmings and plant material into uninfected areas. A certified arborist should be consulted prior to removal or cutting of infected trees due to safety hazards of weakened structure and forest health implications.

Sudden Oak Death

The climate in Marin county strongly supports the Sudden Oak Death (SOD) pathogen. Signs of SOD were observed in several locations in Sleepy Hollow during while completing this report.

First discovered in Marin in the mid-1990s, Sudden Oak Death caused an immediate concern regarding its potential effects on wildland fire behavior, suppression, and impacts. Caused by the non-native pathogen *Phytophthora ramorum*, the disease infects tanoaks, coast live oak, California black oak, Shreve oak, and canyon live oak, killing over a million trees in coastal California forests since its discovery (Lee, 2009).

Field observations and anecdotal evidence suggest that sudden oak death (SOD), a disease caused by the pathogen *Phytophthora ramorum*, may alter fuel loading in affected forests. Although research has been inconclusive as to whether SOD contributes directly to increased fire behavior, additional ground fuel loading related to sick or dying oaks was observed in Sleepy Hollow and almost certainly will contribute to heat output and make controlling wildfires more difficult.

Pine Pitch Canker

Examples of individual trees showing signs of Pine Pitch Canker were identified in Sleepy Hollow during the field evaluations related to this report. Primarily affecting Monterey pines (*Pinus radiata*), the disease-causing fungus (*Fusarium subglutinans* f. sp. *Pini*) affects a number of other pine species in Marin including Bishop pine (*Pinus muricata*). Pine pitch canker occurs in response to a fungal infection and is characterized by resinous cankers on the trunk, branches or roots accompanied by needle wilt, limb dieback and eventual tree mortality. The fungus is spread through distribution of the fungal spores by contact with infected material and by insect vectors including several species of bark, twig and cone beetles.

Bark Beetles

Many of Marin's neighborhoods built in the 1950s and 1960s were planted with Monterey pine trees to create fast growing landscapes and windbreaks. As these trees become stressed from age, drought, and a warming climate, they become more susceptible to disease and pests. Two pine bark beetles, the *red turpentine beetle* and the *five spined ips*, are commonly found in Marin.

MITIGATION STRATEGIES

Mitigation strategies may be addressed in multiple plans, reports, and documents, making consistency important when pre-planning for wildfires and other disasters. Some examples of common mitigation *strategies* include fire prevention methods, reducing of impacts when fires do occur, property protection, and fire suppression. Important mitigation *tactics* include educating the public to build support for planning policies and guide responsible behavior, fuel reduction, fire-safe building standards, land use planning, and increased fire department suppression and response capabilities.

Effective mitigation strategies for achieving community-wide protection require acceptance throughout the community. Homeowners, land managers, SHFPD Directors, and fire officials must work together to achieve these goals. The community must have the desire and ability to manage wildfire risk and maintain a dialogue and desire change.

Mitigation strategies must consider issues such as aesthetics, since wood structures, dense vegetation, and narrow roads contribute to the neighborhood character but also increase the risk of wholesale destruction of the existing community. Methods should be chosen to maintain desired aesthetics while decreasing structural ignitability and reducing fuels.

A community must be willing to establish new standards to reduce fire hazards, balancing the safety of the community with private property rights.

The cost of mitigation measures can be significant, and the community must consider the impacts of financing mitigation on public and private lands. Providing financial aid (for example, to assist the elderly and those on a fixed income) to reduce hazardous vegetation on private property can be an effective measure, but requires public buy-in and support.

A widespread community understanding and acceptance of the overall wildfire risk is critical to gain support for any mitigation measures adopted.

SHFPD tasked the consultant with drafting a proposed 5-year work outline to mitigate hazards identified in the Wildfire Hazard Assessment. Mitigation measures fall into the following categories:

- Wildfire Preparedness and Planning
- Evacuation Planning and Preparation
- Vegetation Management
- Structural Ignitability

Wildfire Preparedness and Planning

Mitigation recommendations related to wildfire preparedness and planning.

Firewise Community Recognition

Options

<p>Goal: Achieve Firewise Community Recognition from NFPA/Firewise Communities USA program.</p> <p>Status: Complete</p> <p>Completed: 100%</p>	<p>Timeline: 01/01/2016-07/31/2016; continuous 2016-2021</p> <p>Cost Estimate: \$5,000 annually, minimum.</p> <p>Implementation: Complete</p> <ol style="list-style-type: none"> 1. Host 2016 Firewise Chipper Day June 5, and Home Ignition Zone class June 11. 2. Submit completed application to state forestry liaison for recognition.
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SHFD committed in 2015 to achieving Firewise® Community recognition from the National Fire Protection Association. The publication of this documents coincides with the initial application for recognition.

Firewise Community recognition provides direct and indirect benefits to the community. Educational programs may improve awareness and individual accountability, and annual fuel mitigation efforts measurably reduce hazards. Financial benefits may include property insurance discounts, while the Federal Emergency Management Administration (FEMA) gives Firewise Communities priority in consideration for pre-disaster mitigation planning and project grants.

The initial application form and Firewise Assessment were submitted when SHFPD reached the annual \$2 per capita Firewise spending requirement June 11, 2016. The Firewise® Communities/USA approved the application in December 2016.

Scientific research has shown the effectiveness and benefits of implementing wildfire mitigation concepts across individual property boundaries and throughout communities.

Since 2002, The Firewise® Communities/USA Recognition Program, developed and managed by the National Fire Protection Association (NFPA), has empowered neighbors to work together to reduce their wildfire risk.

The Firewise® Communities/USA program is designed to provide an effective management approach for protecting homes and communities from the threat of wildfire while preserving community aesthetics related to living in and near wildlands. The program can be tailored for adoption by any community and/or neighborhood association that is committed to ensuring its citizens maximum protection from wildland fire.

Using a five-step process, communities develop an action plan that guides their residential risk reduction activities, while engaging and encouraging their neighbors to become active participants in building a safer place to live. Hundreds of neighborhoods and communities throughout the United States have embraced the benefits of becoming a recognized Firewise® Community.

Sleepy Hollow: Firewise® Community Recognition

There are five steps required of a community seeking Firewise® recognition:

- Obtain a wildfire risk assessment as a written document.
- Create an action plan based on the assessment.
- Conduct an annual “Firewise Day” event.
- Invest a minimum of \$2 per capita in local Firewise® actions for the year.
- Submit an application to your state Firewise liaison.

SHFPD, in collaboration with, and with the assistance of, Ross Valley Fire Department, Marin County Fire Department, and FIRESafe MARIN, contracted with XMR Fire Consulting to develop a summarized wildfire hazard assessment to meet the Firewise® Communities USA standards and achieve recognition as a Firewise® Community. The Firewise® assessment, in concert with this document’s larger and more thorough wildfire hazard assessment, is intended as a resource to be used by individual residents of Sleepy Hollow to help create a wildfire safety action plan.

Property Insurance Implications

In May 2014, the California Department of Insurance approved a filing by USAA to give homeowner insurance discounts to USAA members living in communities recognized by the Firewise® Communities/USA program. This discount applied to policies issuing or renewing on or after October 1, 2014. New USAA policies for homes in recognized communities may also qualify for the discount, if USAA agrees to provide property insurance per its underwriting guidelines. USAA members living in a recognized community, who had a USAA California homeowner’s policy automatically received the discount when their policy renewed on or after October 1, 2014.

USAA has partnered with Firewise® to automatically determine if a home is in a recognized community. USAA believes community-level action is important and provides the discount to

members in participating Firewise® Communities to reward actions taken at the community level, rather than singling out individual properties.

This partnership between USAA and Firewise® evolved from the fact that the Firewise® Communities/USA recognition program has national scope and consistent criteria for recognition. NFPA has collected and maintained data on all participating communities since 2002, including data that specifies the exact location boundaries for each community. From this data, USAA's research found a favorable difference in loss experience for members who live in Firewise® communities in California. USAA chose Firewise® based on their expertise and experience in the community wildfire prevention and feels its program best aligns with its wildfire strategy.

Ongoing Maintenance

Maintenance of Firewise® recognition requires an ongoing commitment of time and resources. The annual minimum commitment to maintain recognition includes:

- A per capita expenditure of \$2.
- Hosting of a Firewise® Day to involve community in hazard reduction efforts.
- Documentation and recordkeeping of Firewise® activities.
- Annual renewal application submittal.



Many fine examples of “Firewise” homes and landscaping already exist in Sleepy Hollow. Good selection of landscaping plants with proper spacing, fire resistant building materials, and use of hardscaping are shown here. Even for well prepared properties, annual maintenance and further refinement of landscaping and structures will only serve to enhance survivability of the entire community. In this case, the fine grasses should be moved at least 30’ from the structure and spaced at least 3’ from other plants.

Codes and Standards

Various laws and regulations have been passed regarding hazard mitigation and wildfire preparedness that pertain to planning. Public Resources Code (PRC) 4291 addresses wildfire vegetation issues in State Responsibility Areas (SRA), which includes all parcels in Sleepy Hollow. PRC 4291 applies to buildings/structures in, upon, and adjacent to mountainous areas, forest-covered lands, brush-covered lands, grass-covered lands, or any land covered with flammable material.

Options

<p>Goal: Adopt appropriate codes and standards to ensure conformity and continuity with existing regulations and reduce community wildfire hazard.</p> <p>Status: In-Progress & Proposed</p> <p>Completed: NA</p>	<p>Timeline: 07/01/2016-06/30/2018</p> <p>Cost Estimate: \$0</p> <p>Implementation:</p> <ol style="list-style-type: none"> 1. Adopt amended WUI code. 2. Consider juniper (and other) removal ordinance. 3. Consider Resale Inspection ordinance.
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A variety of Codes and Standards may be applicable to wildfire mitigation efforts in Sleepy Hollow.

Local Ordinances

SHFPD may adopt local ordinances to address specific concerns not covered by existing codes or amendments. Examples include the City of San Rafael's juniper ordinance and San Bernardino County/City of Big Bear ordinances related to wood roof replacement.

State Regulations

Chapter 7A Building Code

- CA Building Code Chapter 7A (January 2009 Supplement)
- CA Fire Code Chapters 47
- CA Building Code Testing Standards
- 2010 Title 24 California regulations

Fire Safe Regulations

- 2006 International Wildland-Urban Interface Code
- Public Resources Code 4290
- Public Resources Code 4291
- California Code of Regulations Title 14
- 2010 California Fire Code

- California Code of Regulations, Title 24, Part 9 Chapter 49: Requirements for Urban-Wildland Interface Areas

Public Resources Code 4291

Public Resources Code (PRC) 4291 applies to properties in State Responsibility Areas, including all of Sleepy Hollow. PRC 4291 distinguishes between a zone within 30 feet of a structure where fuel reduction and maintenance is most intense, and a slightly less restrictive “reduced fuel zone” from 30 to 100 feet.

Homeowners are required to maintain a fire break (essentially a gap in the vegetation to prevent a fire from spreading) in the most intense zone, clearing away all flammable vegetation and other combustible growth, with certain exceptions. For example, single well-pruned trees are allowed, but none of their branches shall reach within 10 ft of a chimney or stovepipe. Dead parts of vegetation that overhang a building and material on a roof need to be removed. In the reduced fuel zone, dead and dying vegetation is to be removed and ladder fuel must be reduced.

The allowable spacing between shrubs depends on their height. If the home is located near a steep slope, then the allowed distance of a home to vegetation and the spacing between vegetation is larger. The law also includes directives about the dimensions of access roads (i.e. a fire truck has to be able to reach the home).

Federal Regulations

At the Federal level, the Federal Disaster Mitigation Act of 2000 (DMA 2000) provides the “legal basis for FEMA mitigation planning requirements for state and local governments as a condition of mitigation grant assistance.” The DMA 2000 requires localities to adopt a Local Hazard Mitigation Plan (LHMP) in order to obtain FEMA and federal grant eligibility. The LHMP is administered at the county level and does not need to be adopted specifically in Sleepy Hollow.

In addition to the LHMP, California requires a Safety Element as part of any General Plan. The goal of the Safety Element is to “reduce the potential risk of death, injuries, property damage, and the economic and social dislocation resulting from hazards.” The Safety Element is used to develop action-oriented policies and implementation measures that should correspond with the data collected, and other examples such as access and evacuation routes, road and structural identification, roadway widths, and water supply. An example of a policy that might appear in the Safety Element is that “no development shall be approved unless the local government can make a finding that development is reasonably accessible and served in the case of a wildfire.”

Design, Construction, and Building Material Strategies for Mitigation

The building design and construction process provides one of the most cost-effective means of addressing wildfire risk (Schwab, 2005). The new construction and remodel process is governed by building codes, architecture, and design criteria, and soils and landscaping considerations. Most often code criteria that support risk reduction apply only to new construction, substantial renovation or renovation to change the type or use of the building.

The construction process offers other opportunities to use fire resistant building materials such as stone, tile, and stucco, and incorporate new technologies and design features to help homes resist and survive wildfires.

Landscaping is particularly critical in areas of potential wildfires because vegetation close to structures can become fuel for a fire. Clearing, grading, and siting all have potential impacts to soil stability and erosion and can be included as part of a design or building permit review process. The use of “hardscape” features such as retaining walls and stone pathways can also be used to engineer an attractive landscape that helps structures survive wildfires, and should be encouraged.

Codes and Standards Recommendations

SHFPD should continue to assist the County of Marin and Ross Valley Fire Department with the adoption of recommended code updates and amendments to encourage the use of building materials and design standards that help structures resist wildfire.

Finalize Adoption of Amended WUI Code

Continue working to finalize adoption of the 2006 International Wildland Urban Interface Code as recommended by Ross Valley Fire Department. Timely adoption of the amended 2016 Code update should coincide with adoption by other members of the Ross Valley Fire Department JPA in 2017. SHFPD’s counsel should attend meetings where discussion or adoption of code amendments and ordinances occurs to ensure that process is followed.

Juniper Removal

During visual roadside surveys of Sleepy Hollow vegetation, sampling was used to determine that approximately 20-25 percent of Sleepy Hollow homes, or about 175-200 addresses, have juniper bushes growing as part of their landscaping. Commonly planted as a hedge shrub alongside driveways and walkways, juniper particularly presents a dramatic threat to the safety of residents and firefighters.

Several references describe juniper as a “gasoline” shrub in reference to the extreme heat output, high flame lengths, and ease of ignition during wildfires. A firefighter from Marin died in

2003 while protecting a home during a wildfire in southern California. The National Institute for Occupational Safety and Health (NIOSH) cited the firefighter's proximity to juniper bushes as one factor in the fatality report (<http://www.cdc.gov/niosh/fire/reports/face200336.html>). SHFPD should consider adoption of a local ordinance or fire code amendment modeled after San Rafael's, specifying at a minimum: a moratorium on planting, and up to a 5 year deadline for deadline removal, of juniper, pampas grass, and bamboo within 30' of any structure, driveway or roadway in Sleepy Hollow.

San Rafael Case Study: "Juniper" Ordinance (ORDINANCE NO. 1856)

4.12.030 Vegetation Management Standards. Paragraph 3, "EXCEPTION:" Remove all Junipers (genus Juniperus) and Bamboo (genus Bambusa) within 15 feet of any structure. Remove all Junipers (genus Juniperus) and Bamboo (genus Bambusa) from 15 to 100 feet of a structure before January 1, 2011. After January 1, 2011, single specimens of Junipers or Bamboo are permitted beyond 15 feet of a structure if separated by 2 times the height of the taller of the nearest bush as measured from the outermost edge of the bush.

See [Structural Ignitability](#) and [Vegetation Management](#) sections for recommendations related to Wood Roof and Juniper Removal Ordinances.

SHFPD should consider formal inclusion of all pyrophytic and hazard species listed by FIRESafe MARIN when discussing any potential ordinance to require removal of specific hazard vegetation.

Resale Inspections

Ross Valley Fire Department (RVFD) utilizes a novel approach to vegetation management enforcement through its "Resale Inspection" program. Adopted by the other members of the RVFD JPA, Resale Inspections are vegetation hazard inspections that occur whenever a property is (re)sold in San Anselmo, Fairfax, or Ross. RVFD Fire Inspectors visit each property prior to sale to conduct a vegetation hazard inspection. Current vegetation management standards and codes are included with property sale disclosures, and the sale can not be finalized until the property is determined to be compliant with the Defensible Space standards set forth in the jurisdiction's adopted code.

This successful program provides valuable access to fire department inspectors and ensures that property owners and buyers understand the wildfire risk and conform to standards to reduce hazards on their property. The cost associated with compliance is borne by the seller and buyer, and may be more easily absorbed during the sale process of a property.

Sleepy Hollow is currently the only member of the RVFD JPA that does not require a Resale Inspection for real estate sales. It is recommended that SHFPD adopt a local ordinance

modeled after the ordinances of San Anselmo, Fairfax, and Ross to require Resale Inspections for all real estate sales in Sleepy Hollow.

Community Wildfire Outreach and Education

The following recommendations constitute one potential outline for a 5-year strategic community wildfire outreach and education plan.

Options

<p>Goal: Improve communications with residents related to wildfire and general hazards, and create a timeline for communications through 2021.</p> <p>Status: Proposed</p> <p>Completed: NA</p>	<p>Timeline: 07/01/2016-06/30/2021</p> <p>Cost Estimate: \$7,500-\$10,000 annually</p> <p>Implementation:</p> <ol style="list-style-type: none"> 1. Print and mail updated “Living With Fire” Booklet in Even Years 2. Print and Mail Evacuation Pamphlets in Odd Years 3. Expand the www.shfpd.org Website to Include more comprehensive local Firewise Recommendations 4. Specific Mailings to Address Adopted Recommendations and Projects
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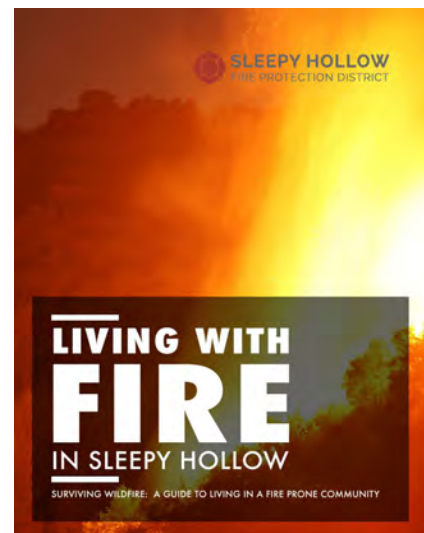
Print and mail updated “Living With Fire” Booklet in Even Years

In 2014, SHFPD developed a custom 24-page booklet outlining wildfire hazards and homeowner mitigation methods to reduce structural ignitability and create defensible space. 1000 copies of the booklet were printed in a full color, glossy magazine style format, and mailed to each property owner and site address in the District.

The Living With Fire document was updated in 2016, to incorporate two new pages related to the Firewise Community program and update fact and figures with current data.

SHFPD should print the 2016 update, and mail to all residents and property owners in Sleepy Hollow. Additional copies should be secured to ensure handouts are available at community events during the following year.

Consider printing and mailing an updated document every even year through 2021. Mailings should occur no later than May 1 so arrival coincides with the beginning of fire season.



Print and Mail Evacuation Pamphlets in Odd Years

The Evacuation Planning and Preparation section suggests development of a 4 fold, heavyweight brochure with an evacuation map on one side, and Ready, Set, Go! preparation and evacuation information on the opposite side.

Consider printing and mailing this document to all residents and property owners in Sleepy Hollow in odd years through 2021, with any necessary updates applied prior to each printing.

Expand the www.shfpd.org Website to Include Local Firewise Recommendations

Specific findings and recommendations from this report, and the Firewise Community USA Assessment, should be adapted for web publication and posted at www.shfpd.org/firewise. This web page, and the Firewise content currently contained there, was developed to complement this report and the planning process. Continuous updates are necessary to engage the community and ensure timely and frequent engagement with the community.

Specific Mailing to Address Adopted Recommendations and Projects

Develop specific and engaging mailings to communicate all adopted recommendations and projects undertaken as a result of this assessment or related to wildfire preparedness. Incorporate Firewise educational content into district communications about specific projects and mail to all residents and property owners at least once annually.

Many of the recommendations in other sections contain specific communication or outreach recommendations. For example, the Evacuation Planning and Preparation Recommendations “Promote AlertMarin” and “*Provide Educational Materials and Checklists to Animal Owners*” do not carry specific plans on how to conduct outreach. Promotion of this service would likely include mention in an updated Living With Fire document, dedicated space on the Evacuation Route brochure, a dedicated web page, and mention in email and mailed communications from the district.

All District communications related to this program should emphasize Ross Valley Fire Department’s role as the primary emergency response and fire prevention agency.

Evacuation Planning and Preparation

Rapid and timely evacuation is critical to protect lives and property. Residents should be encouraged to evacuate as soon as possible after becoming aware there is a fire, since the presence of citizens in the fire zone only serves to slow firefighting efforts and puts lives at risk. Early evacuation increases the safety of evacuating residents, reduces the involvement of fire suppression personnel in evacuation (allowing firefighting resources to commit to fire suppression), and reduces the likelihood that evacuees might become and trapped on roadways and subjected to reduced visibility, smoke, heat or direct flame impingement.

While a majority of evacuating residents will evacuate by vehicle, it is recognized that some residents may be forced to shelter in place or evacuate by foot for a variety of reasons.

The County of Marin, through the Sheriff’s Office of Emergency Services and local fire agencies, has adopted a “Mutual Threat Zone Plan” with detailed evacuation maps intended for emergency managers and responders. Sleepy Hollow is covered by the “Freitas Ridge Mutual Threat Zone” ([Appendix B](#)) evacuation plan map, which identifies Butterfield Rd as a secondary evacuation route (on a regional scale Sir Francis Drake Blvd is the “primary” route). Analysis of road conditions and potential evacuation routes for this report agree with all findings of that plan.

Options

<p>Goal: Address community evacuation needs for wildfires and all-hazards to improve community understanding of evacuation issues and identify and improve safety of potential evacuation routes.</p> <p>Status: Proposed</p> <p>Completed: NA</p>	<p>Timeline: 07/01/2016-06/30/2021</p> <p>Cost Estimate: Varies. \$2,500-\$50,000 annually.</p> <p>Implementation:</p> <ol style="list-style-type: none"> 1. Address Roadway Clearance and Vegetation 2. Promote “Alert Marin” 3. Promote improved Cellular Communications 4. Adopt Ready Set Go! program 5. Create and Distribute Educational Pamphlet and Evacuation Maps 6. Install Evacuation Route signage 7. Conduct Evacuation Drills 8. Consider Evacuation/Disaster Siren/Horn 9. Designate “Safety Zones” 10. Consider Pets and Large Animals
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Evacuation Recommendations

Address roadway clearance and vegetation

Roadway clearance and roadside vegetation, specifically addressed in the Vegetation Management section, is critically important to secure safe evacuation routes and provide for ingress of firefighting resources.

Promote “Alert Marin”

In 2015, Marin County adopted the *AlertMarin* system (www.alertmarin.org) that allows residents of all Marin jurisdictions to register their landline, cell phone or VoIP (voice over internet protocol) phone to receive emergency alerts sent by voice, text, email, or smartphone application from the County of Marin.

Emergency officials use the *AlertMarin* Emergency Notification System to deliver incident-specific information or potentially life-saving instruction to the precise geographic area(s) affected. Emergency situations may include:

- flooding, wildfires, and subsequent evacuations;
- public safety incidents including crimes that affect your neighborhood;
- and post-disaster information about shelters, transportation, or supplies.

Individuals may list up to five addresses per profile where they wish to receive notifications such as home, at work, at a child’s school, or a relative’s home. Each profile may contain up to 2 SMS (text) devices, two email addresses, a TTY device, four phone numbers (including a mobile phone) and a work phone. An *AlertMarin* “*ContactBridge*” application is also available for Apple iOS or Android devices.

SHFPD should recommended that all Sleepy Hollow residents sign up for this service and become familiar with receiving information from *AlertMarin*.

During wildfires, there is often a loss of loss of electrical power due to damage to power poles and electrical distribution infrastructure. Cordless phones and phone recorders do not work if there is no electricity. Firefighters do their best to prevent the disruption of service; however, it is recommended that all homes keep at least one hard-wired telephone that will work without electricity or if no other device is registered to receive *AlertMarin* notices.

Promote Improved Cellular Communications

Recognizing that issues around the construction and placement of cellular communications equipment in Marin has contributed to an ongoing political debate, consider adopting a formal stance requesting carriers work to improve cellular communication connectivity in the Sleepy Hollow valley. Cellular sites and wireless data transmissions may provide critical evacuation alerts, emergency communication, 911 system access, and critical updates to residents and

visitors to Sleepy Hollow. Without reliable wireless communications for residents, systems such as *AlertMarin* are ineffective.

Improvements to cellular communications may result from upgraded equipment, improved siting, or installation of new communication sites. Existing or potential new sites should be evaluated for wildfire hazard, constructed of maximally fire resistant materials and design, and inspected annually for adequate defensible space, as well as addressing community concerns in balance with the need for emergency communications.

Adopt Ready, Set, Go! Program

Adopt the Ready, Set, Go! (RSG) program developed by the [International Association of Fire Chiefs \(IAFC\)](#). This program seeks to develop and improve the dialogue between fire departments and the residents they serve. Launched nationally in 2011, the program helps fire departments to teach individuals who live in high-risk wildfire areas – and the wildland-urban interface – how to best prepare themselves and their properties against fire threats, with specific emphasis on preparation for, and following through with, early evacuation.



The RSG! program tenets help residents be *Ready* with preparedness understanding, be *Set* with situational awareness when fire threatens, and to *Go*, acting early when a fire starts.

Adoption of language and concepts from the RSG program should be conducted in cooperation with Ross Valley Fire Department and the Marin County Fire Chiefs Association.

Create and Distribute Educational Pamphlet and Evacuation Map

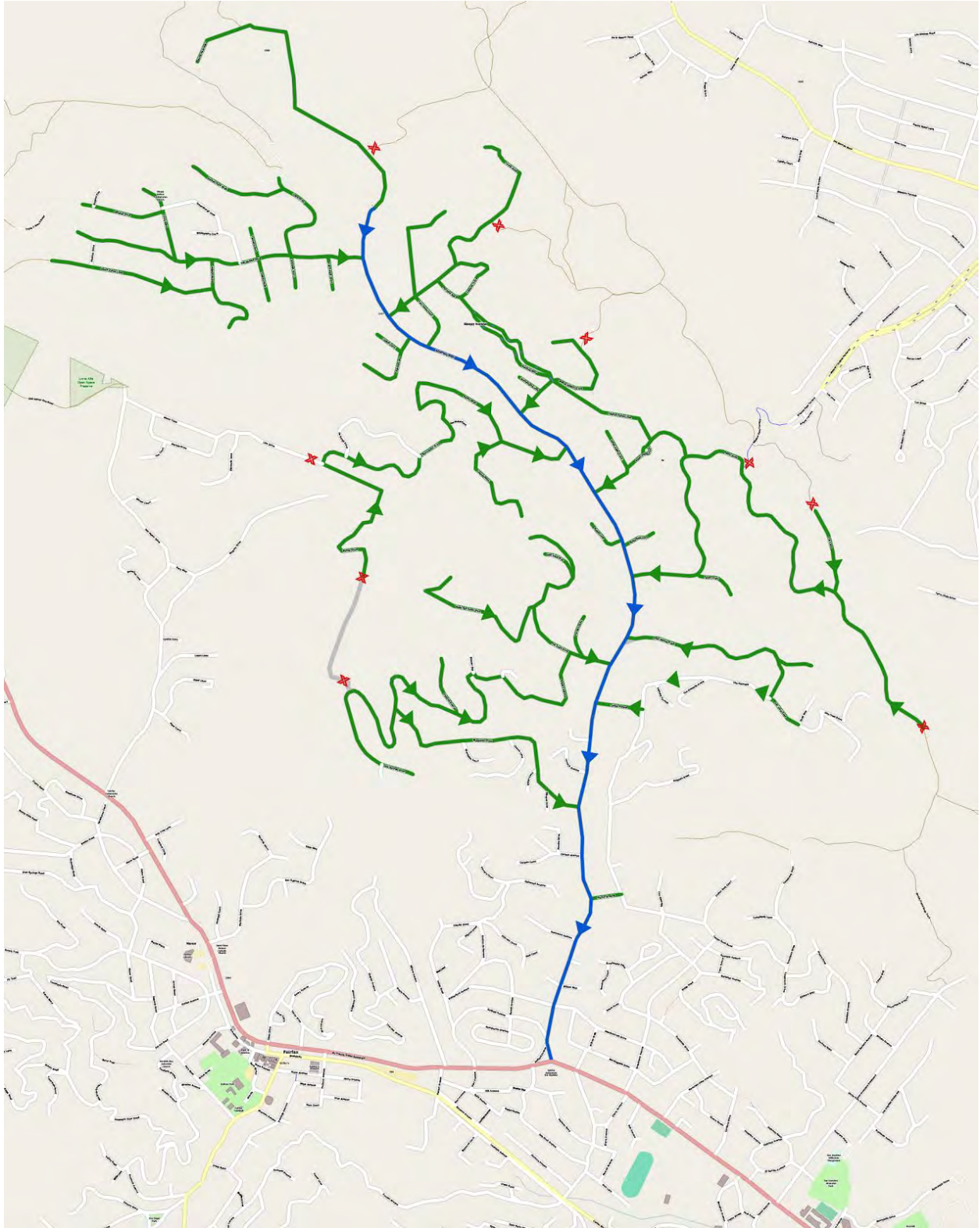
Consider development, printing, and distribution of a custom educational pamphlet outlining evacuation best practices, mapping evacuation routes for the entirety of the Sleepy Hollow valley, and highlighting evacuation steps recommended by the Ready, Set, Go! program.

A potential example of this pamphlet might be an 11x17 full-color brochure, fourfold, printed on both sides are on heavy paper with a UV laminate for durability. On one side would be printed a full-color evacuation map of the valley, highlighting streets, direction of travel, potential safety zones, and rallying points. On the other side would be the text information including evacuation checklists, emergency contact numbers, and URLs or QR codes leading to additional, or more in-depth, information.

Any educational material must provide specific information on:

- Routes of travel
- Shelter in place vs Evacuation
- Safety Zones
- Rallying points

Proposed Local Evacuation Route Map for Sleepy Hollow



The routes and information shown on this or any adopted local evacuation map should not contradict the County of Marin "Freitas Ridge Mutual Threat Zone" evacuation plan map ([Appendix B](#)).

Evacuation/Escape Route Signage

Consider installation of recognizable signage to indicate the presence and direction of evacuation routes. Installation of signage at the junction of fire roads and gates (indicating that the evacuation route is NOT on fire roads) will likely be helpful in informing residents and visit visitors of the potential extreme safety hazards involved with evacuation via fire roads.

The example shown (R) is the standardized format of evacuation route signage adopted in Mill Valley. For countywide consistency, a similar or identical format should be adopted in Sleepy Hollow.



Support Designation of On-Street Parking

Work with County of Marin Department of Public Works to consider designating on-street parking spaces that are compliant with clearance requirements (similar to those designated on Christmas Tree Hill near Corte Madera and some locations in Mill Valley) to encourage legal on-street parking. In some instances, these efforts could result in an increase in the net on-street parking spaces due to clearance of vegetation to make room for a dedicated parking space.

Evacuation Drills

Consider adoption of annual or biannual evacuation drills to be conducted in cooperation with Ross Valley Fire Department, Marin County Sheriff's Office, and Marin County Fire Department. SHFPD should work with Ross Valley Fire Department to facilitate. Modeled around the multi-agency examples set in Mill Valley and Kentfield, these drills are proven to be an excellent education opportunity for both residents and the fire service and law-enforcement. Marin Humane Society, American Red Cross, and Central Marin Police Authority, should be invited to attend as well.

Evacuation/Alert Siren/Horn

Consider installation of a wildfire and disaster evacuation/alert siren or horn that is audible to a majority of residents and visitors present in Sleepy Hollow at any given time.

For example, Sleepy Hollow might be equipped with an emergency siren at a central location, possibly the Community Center at 1317 Butterfield Road. The siren would alert residents and visitors to the community that important emergency (wildfire, flood, etc) information and communications will shortly be disseminated by the appropriate agency. The decision to sound emergency sirens typically originates from the Incident Commander directing an emergency incident. The siren will produce a loud blast repeatedly for one to three minutes. Alarm blasts from the siren should be audible throughout Sleepy Hollow. The alarm sounds repeatedly (for example, every thirty (30) minutes) until the emergency is no longer a threat to the community.

This will coincide with the Marin’s “Alert Marin” system notifying the community of any safety precautions or recommended actions. Information will be specific to and pertain to an emergency in Sleepy Hollow. Once the emergency has passed, a distinct siren pattern will sound signifying all-clear. Routine, scheduled public tests and educational campaigns alert the community to the presence and systems in place.

Designate Safety Zones

Consider adoption of designated safety zones in Sleepy Hollow. Safety Zones are areas where evacuating residents may seek shelter during a wildfire if evacuation is not possible. In the unlikely event that the primary evacuation route of Butterfield Road is compromised during a wildfire, formal alternate safety zones should be established. Potential candidates for safety zones are the irrigated playing fields at San Domenico School and Hidden Valley Elementary school, and the Sleepy Hollow Homes Association (SHHA) Community Center at 1317 Butterfield Road. Both playing fields are greater than one acre, irrigated, and located in the relative safety of the riparian zone along the valley floor.

SHFPD should work with school administrators and SHHA to review site issues and develop joint plans for use of the fields and Community Center during a wildfire where evacuation out of the Sleepy Hollow valley is not possible.

Animal Evacuation

Consider Pets, Large Animal, and Livestock Evacuation

Recent catastrophic events, such as the Valley Fire in 2015 identified the need to provide animal evacuation and sheltering. During disasters, emergency managers have learned that many people refuse to leave their pets behind, and sometimes do not evacuate early (when conditions are safer) due to the failure to locate animals or lack of preparation for animal evacuation. Refusals or delays to evacuate may begin a chain reaction that can seriously jeopardize or cause a total breakdown of an overall evacuation.

Additionally, large numbers of pets and livestock animals are often left behind or otherwise become stray during wildfires. Minimizing the likelihood of animals becoming stray improves animal, public, and firefighter safety, and may facilitate a more rapid recovery following disasters.

Disaster and wildfire preparedness for equine & large animal owners may differ somewhat from disaster preparedness for domestic pet owners, however, general guidelines and recommendations are similar.

During a wildland fire, local animal rescue organizations (primarily the Marin Humane Society) will work with law enforcement and fire departments to rescue as many animals as they can. While fighting a wildfire, firefighters will attempt to protect animals, but they are not responsible for evacuating animals. Firefighters may cut fences or open gates to free trapped animals.

Work with Marin Humane Society to Complete Animal Inventory and Database

Consider working with Marin Humane Society and Ross Valley Fire Department to promote voluntary registration and ensure that the Humane Society's existing database of large animals and livestock is complete and current for Sleepy Hollow. At a minimum, the database should contain:

- Type of animal
- Animal name
- Animal location
- Owner contact information
- A photograph of the animal
- Special concerns or access notes.

Conduct Animal Evacuation Exercises

Marin Humane Society is tasked with animal evacuation and care responsibilities in Marin and should be invited to attend planned evacuation drills in Sleepy Hollow. All large animal and pet owners should be encouraged to participate in annual evacuation drills. Additional training should be conducted in conjunction with exercises of emergency response plans and procedures to ensure large animal issues are addressed. Emergency plans shall be activated at least once a year in the form of a simulated emergency to provide practical controlled operational experience to residents, fire department staff, and volunteers.

Provide Educational Materials and Checklists to Animal Owners

Consider adopting and distributing a custom pamphlet or brochure for distribution to large animal and pet owners outlining specific recommendations, with checklists for preparation.

Educational materials for emergency preparedness for animals should include the following tips and information:

Animal Evacuation Tips

Animal owners must provide an appropriate standard of care for their animals at all times, including during emergencies, disasters, and evacuations. It may not always be possible to evacuate horses or livestock, but having a plan in place for a potential evacuation is important.

Prepare for future evacuations

- Develop an emergency evacuation plan for all animals.
- Know where to take animals in the event of an emergency, and be familiar with at least two possible evacuation routes.
- Most owners affected by disasters and needing to evacuate should take their animals to stay with friends or family. Self-reliant behavior should be encouraged at all times.

Prepare for imminent evacuation

- When a fire is burning in the area, or it becomes known that evacuation is possible, make arrangements quickly and in advance to move livestock from the danger zone.
- Large animals should be moved to a confined area where they can be easily controlled in the event evacuation becomes necessary.
- Gather small animals in crates and carriers and keep near vehicles.
- Keep halters and leads ready.
- Have a trailering and transportation plan in place.

Be ready to shelter in place

- Prepare a portable first aid kit, as well as several days' supply of water, hay, feed and medications.
- Consider alternative methods of watering your animals, as water supplies can become contaminated.

Make sure your animals have identification

- Wildfire and severe weather can damage fencing and containment structures like barns, potentially allowing animals to leave your property.
- Proper identification for large animals includes a combination of metal tags and microchips, helping to quickly identify animals and ensure their safe return.
- Visible identification should include the owner's name and contact information.

Provide safe containment

- Owners may not be home, and may not be able to return to your home to evacuate animals once a fire starts.
- Barns and stalls should be accessible to the fire service and neighbors, to allow access during wildfires and other emergencies.
- High perches, ledges and access to high ground can be a lifesaver for poultry, livestock and other animals in an emergency.

After evacuation

- While at an emergency shelter, provide hay, feed, and medications if needed, for a minimum of several days.
- Owners should be prepared to provide all proper care for their animals while at a shelter.

During development of this report, a dedicated “Emergency Preparedness for Animals” page was added to the SHFPD website at <http://shfpd.org/preparedness/animals>.

Fire Roads and Evacuation

The District specifically asked for the examination of the feasibility of use of fire roads by Sleepy Hollow residents as a potential evacuation route during wildfires or other disasters.

Based on the analysis of fire road locations and modeling to estimate potential flame lengths, there are no likely wildfire scenarios where self-evacuation by residents via unpaved fire roads would be safer than evacuation via paved surface roads to Butterfield Rd and Sir Francis Drake Blvd.

It is conceivable that fire personnel, law-enforcement officials, or fire Incident Commanders could determine in *specific instances* that alternate evacuation routes, including by fire road, might be necessary or recommended. In those instances, the authority of the emergency personnel should be observed and followed, even if it means deviating from pre-designated evacuation routes or the recommendations set forth in this report.

Fire Road Evacuation Assessment

A network of fire roads exists along the ridges to the east and west of Sleepy Hollow and on the Sleepy Hollow side of the Loma Alta open space preserve. These fire roads are primarily converted ranch roads or roads that were installed specifically for the purpose of accessing and suppressing wildfires. The roads first appear on area maps in the 1940s and were often engineered by a single individual in a bulldozer making the initial road cuts.

Marin County Fire Department, in the Unit Strategic Fire Plan, emphasizes the importance of the existing network of fire roads for firefighter access and potential control lines during wildfires.

Fire road maintenance has historically fallen on cooperation between landowners and Marin County Fire Department, and more recently, the Marin County open space district.

These fire roads are characterized by unpaved surfaces, often deeply rutted, with seasonal washouts, steep slopes, washboard surfaces, and rocks and other obstructions that make passage by four-wheel-drive vehicle necessary. Few turnouts exist for passing, road widths average 8 to 12 feet total (too narrow to allow two vehicles to pass safely), and steep drop offs, ruts, and washouts that are often concealed by overgrown vegetation.

- Evacuation of residents via fire roads during wildfires is not feasible or recommended.
- Paved surface streets in Sleepy Hollow are generally adequate to support the safe evacuation of residents downhill and down valley to evacuate during a wildfire.

- Typical roadway widths in Sleepy Hollow are above average for Marin County, and even many hillside streets will support vehicle turnouts and passage of evacuating residents while fire apparatus respond uphill.
- Area fire roads are not adequately maintained to support passenger vehicles.
- High clearance four-wheel-drive vehicles are required to safely navigate nearly all fire roads leading in and out of Sleepy Hollow.
- Passing vehicles on fire roads is not adequately supported by turnouts or road width.
- Fire modeling shows that nearly all fire roads in the vicinity of Sleepy Hollow could potentially be impacted by high or very high flame lengths. Fire roads, by virtue of their location in wildlands, and confirmed by hazard analysis, are more likely to be impacted by fire than paved roads and present a greater threat to the safety of evacuating residents than would be present on paved roadways.
- Signage does not exist on fire roads to lead evacuating residents out of Sleepy Hollow. Although this could be overcome with the installation of signs, unfamiliarity with the fire roads is likely to lead to confusion and potential traffic jams.
- Locked gates, including those leading to private property, are likely to cause entrapments and potentially expose evacuating residents to impingement by wildfire.
- Some communities have designated evacuation routes by “steps, lanes, and paths,”⁷ but this is not applicable or advised in Sleepy Hollow.



Fire roads - many deeply rutted and lacking signage - require high-clearance four-wheel drive vehicles to navigate safely. Residents attempting to evacuate by fire road would likely be impacted by fire conditions more severe than on paved surface roads. The risk of entrapment behind locked gates is another factor discouraging use for evacuation.

⁷ <http://www.cityofmillvalley.org/Index.aspx?page=875>

Vegetation Management

This section provides location-specific information and recommendations for preliminary vegetation treatment goals and guidelines to be used when selecting and implementing fuel reduction actions for reducing wildfire hazards in Sleepy Hollow.

It is important to note that the District is not a landowner, and as such does not have the ability to conduct direct fuel modification treatments without landowner permission. All proposed fuel treatments should be achieved through a cooperative process with landowners or enforcement of existing (or proposed) regulations such as the adopted amendments to the WUI Code, California Fire Code, PRC 4291, or Title 14 CCR.

Preliminary vegetation management goals, proposed treatment methods, and local considerations are identified in this section for specific recommended treatment areas: residential; roadways; open spaces and undeveloped land.

Residential Vegetation

Individual homeowners are ultimately responsible for the protection of their homes from wildfire. In a severe wildfire event, the fire service cannot protect all homes at risk. Individual responsibility and preparation taken long before a wildfire starts is of paramount importance.

Options

<p>Goal: Improve Defensible Space for all homes in Sleepy Hollow through programs designed to identify hazards and assist homeowners in vegetation removal and disposal.</p> <p>Status: Proposed</p> <p>Completed: NA</p>	<p>Timeline: 07/01/2016-06/30/2021</p> <p>Cost Estimate: \$15,000-\$75,000 annually</p> <p>Implementation:</p> <ol style="list-style-type: none"> 1. Improve Defensible Space 2. Conduct annual Chipper Days 3. Expand Hazard Inspections and Notices 4. Enhance Defensible Space on Priority Risk Parcels 5. Adopt Hazard Tree Removal Program
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Recommendations

Improve Defensible Space Around All Structures

Defensible Space is required by law (*WUI Code, California Fire Code, PRC 4291, Title 14 CCR*). Residents and landowners in Sleepy Hollow must be encouraged to develop, enhance,

and maintain Defensible Space annually. Property owners are ultimately responsible for maintaining Defensible Space, however, in some instances, rental contracts or lease agreements may subrogate responsibility for landscaping or building maintenance.

If all structures in Sleepy Hollow complied with Defensible Space requirements and current building standards, there would be little threat from fire. Unfortunately, observations in Sleepy Hollow reveal that *virtually no property* is in strict compliance with regulations. Only structures built or substantially remodeled since 2008 are likely to meet current WUI building standards.

Many of the recommendations in other sections of this report overlap with Defensible Space. Any fuel modification within 100'-200' of a structure could be considered an improvement of Defensible Space. In this section, specific recommendations for the 0'-100' Defensible Space zone are addressed.

In order to improve achieve high compliance with Defensible Space requirements across the community, the following steps are recommended for adoption by SHFPD:

1. Continue to provide community chipper days at least twice annually (spring and fall)
2. Conduct annual inspections and provide hazard notifications for all parcels
3. Recommend enhanced defensible space 200' to properties at boundaries
4. Support removal of specific hazard species (juniper, pampas grass, bamboo)
5. Support removal of hazard trees in a timely manner

Community Chipper Days

SHFPD should continue to provide community chipper days at least twice annually, in the spring and fall. Since 2014, community Chipper Days have been shown to promote community involvement and dispose of large quantities of hazardous vegetation. Annual Chipper Days will also help the District meet annual Firewise Community recognition requirements.

Proposed annual timeline:

- Mid-May: Mail Living With Fire or Evacuation Brochure to all residents, with a letter announcing dates for Spring Chipper Day(s). Configure online registration and email newsletter announcement. Set out signage on Butterfield Rd.
- First weekend in June: Conduct 2 day "door-to-door" chipper collection service.
- September 1: Mail postcard announcement of fall chipper day.
- Last weekend in September: Conduct single collection point/drop-off Chipper Day at end of Butterfield Road to coincide with annual creek cleanup.

Continue to work with Ross Valley Fire Department to support maintenance and operation of the fire department chipper. Continue to work with local tree services and non-profits like Sleepy Hollow based Youth2Work and Conservation Corps North Bay to assist with operation of Chipper Days.

Hazard Inspections and Notices

Ross Valley Fire Department (RVFD) is responsible for enforcement of Defensible Space regulations in Sleepy Hollow. SHFPD should support RVFD to conduct annual inspections and provide hazard notifications for all parcels in Sleepy Hollow. Currently, on-duty fire department personnel are responsible for drive-by hazard inspections for parcels in preset zones throughout Ross, San Anselmo, Fairfax, and Sleepy Hollow. These inspections result in hazard notices for only highly visible issues, primarily targeting annual weed and grass abatement due to limited personnel, time, and resources.

SHFPD should consider adoption of a one-year enhanced inspection program, with the support of RVFD. Hazard notices should be provided to *all non-compliant properties*. A more in-depth, PRC 4291 specific inspection form modeled after the MCFD/CAL FIRE “LE100” is recommended. Data collected on this form could be used to update the Parcel hazard database recommended in the Structural Ignitability section.

To inspect all parcels in Sleepy Hollow, SHFPD should consider contracting with MCFD (in consultation with RVFD, and with RVFD approval) to utilize seasonal inspectors from the Wildfire Hazard Inspection Program. A team of four inspectors should be able to inspect all 866 developed parcels in 4 days, or 40 hours. Hazard notices could be provided to all properties that are not 100% in compliance with requirements.

This inspection program would require re-inspection of properties that do not meet standards on the first attempt. Multiple re-inspections, as outlined in PRC 4291, are required prior to enforcement actions. SHFPD should support multiple follow-up inspections, as required, to determine the number of properties that remain non-compliant. Any resulting enforcement actions should be reviewed with RVFD and appropriately supported by SHFPD.

Recommend Enhanced Defensible Space to 200’ for Boundary Properties

The hazard and risk assessment of this report finds that *parcels adjacent to large parcels of open space (public or private) and large tracts of contiguous vegetation are at particular risk from wildfire*. Properties at the boundary of large parcels of open space (private or public) should be encouraged to maintain up to 200’ of Defensible Space. Where property lines are closer than 200’, refer to the recommendations under “Open Space and Common Space Areas” to work with landowners on large parcels to support vegetation management.

Specific recommendations should include cutting grass, thinning tree canopies, enhanced spacing of landscaping plants, and thinning native vegetation up to 200’ from all structures on the side(s) facing contiguous vegetation.

This recommended enhancement is specific primarily to parcels located in the high hazard areas in [Appendix D](#). A specific mailing with notification of risk and recommended actions should be considered for these parcels, repeated annually in the spring.

Priority Risk Parcels

Although all parcels in Sleepy Hollow meet the accepted definition of Wildland Urban Interface (WUI), some parcels may be at particular risk from wildfire. By analyzing hazard data derived from wildfire modeling in conjunction with other data (see below) and field observations, all Sleepy Hollow fall into two categories: Moderate (Risk); and High (Risk). A graphical diagram is attached as [Appendix D](#).



Highlighted areas are of particular importance due to one or more factors:

- Located at the edge of open space and/or large parcels of wildland vegetation.
- Ingress or egress impediment due to vegetation encroachment, steep or narrow roads, or travel time for responding fire resources.
- Construction type, surrounding vegetation, slope, or other observed factors that may contribute to increased fire behavior or ember susceptibility.

Additional description of criteria and hazard analysis is available in [Appendix D](#).

Data collected during the recommended Enhanced Inspection Program will be used to refine parcels into multiple hazard zones (low, moderate, high, extreme).

Support Removal of Specific Hazard Species (juniper, pampas grass, bamboo)

See recommendation under [Codes and Standards](#).



Juniper bushes near the entrance and exits of a home can impede a resident's escape. As a highly pyrophytic species, juniper should not be present within the 100' Defensible Space zone.

Hazard Tree Removal

SHFPD should consider adoption of a Hazard Tree Removal Assistance Program. As discussed in the [Hazards, Trees and Forests](#) section, a variety of factors, including insects and diseases, result in significant tree mortality each year in Sleepy Hollow. Standing dead trees, regardless of species, contribute to significant fire, injury, and infrastructure hazards (contributing additional fuel; ignition hazard by falling on power lines; falling on people or assets). The cost of individual tree removal and disposal is significant and often results in lengthy delays in removal due to the burden on individual property owners.

A Hazard Tree Removal Assistance Program would consist of one or more concepts:

- A matching grant program up to a specified maximum District contribution towards tree removal and disposal.
- Contracts with local tree services to conduct an annual "hazard tree removal day."
- A tree hazard notification form, and or grant application, online.
- Support of hazard abatement enforcement by RVFD.



Roadside Vegetation

Vegetation management in the vicinity of roadways and driveways is critical to safe access and egress during a wildfire event. Narrow roads with unmaintained vegetation create considerable challenges for responding fire apparatus. Under current vegetation conditions, some roads and areas in Sleepy Hollow are not safely accessible to fire crews and may entrap residents attempting to evacuate.

Options

<p>Goal: Support removal of vegetation at roadsides and improve access and egress routes to enhance safety during fire response and evacuations, minimize likelihood of roadside ignitions, and reduce fire intensity near roadways.</p> <p>Status: Proposed</p> <p>Completed: NA</p>	<p>Timeline: 07/01/2016-06/30/2021</p> <p>Cost Estimate: \$0-\$5,000 annually</p> <p>Implementation:</p> <ol style="list-style-type: none">1. Adopt and communicate specific roadside clearance recommendations.2. Encourage maintenance of turnouts and fire road gates.
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Roadway Vegetation Clearance Responsibility

Roadway clearance is ultimately the responsibility of individual landowners when property lines extend to the edge of roadways. Right of way maintenance, such as annual mowing, drainage maintenance, hazard tree removal, may fall on the County of Marin Department of Public Works.

Roadway Clearance Recommendations

SHFPD should consider funding enhanced vegetation maintenance in the public right-of-way to reduce vegetation that may threaten evacuation or impede fire apparatus access. Roadway clearance mitigation should prioritize roads and parcels identified in [Appendix D](#).

Because roadway vegetation maintenance is largely the responsibility of individual landowners, SHFPD should consider encouraging voluntary improvements through incentive programs such as hazard tree removal matching grants, hazard vegetation removal matching grants, and/or sponsorship of vegetation management/fuel crews to conduct vegetation removal in the highest hazard areas and adjacent to evacuation routes, with property owner permission.

Specific Roadside Treatment Recommendations

- Remove all dead trees and limbs that might obstruct roadways or impact utility lines.
- Remove all conifer stems 6" and smaller within 10' horizontally from road edges.
- Tree canopies extending over the roadway should be raised to a minimum of 15 feet above the road surface to provide safe clearance for fire apparatus.
- Tree canopies on opposite sides of road should not meet. Limbing or removal of specific trees may be necessary to achieve discontinuity of canopies.
- Roadside trees should be limbed up so the lowest point of lower limbs is at least 10 feet above grade.
- Fine "ignition fuels" such as grass and weeds along road edges should be removed annually, before June 1, or prior to the declared start of the fire season.
- Transition zones (from grass and weeds to shrubs and low branches and to tree canopies) should be disrupted by mowing grass and herbs, removing brush, brambles (blackberries) and limbing up trees.
- Roadway turnouts should be mowed as necessary to prevent catalytic converter ignitions. Mowing may occur once or more per fire season, as needed.
- Tree stands adjacent to roadways should be thinned to create crown separations. Always favor fire-resistant plants over fire-prone plants when thinning fuels (favor oaks, madrones and redwoods versus bays, Monterey pine, or Douglas fir).
- Remove dead branches and clean up down and dead debris within 30' of all roadways.

Other Roadway Access/Egress Issues

Turnouts

Road width is a crucial element for allowing access/ egress during an emergency. Roads and spurs within Sleepy Hollow are relatively wide for Marin's WUI areas, however, some streets are narrow and potentially interfere with fire engine access. Where roadways are narrower than 15', paved turnouts are important to allow incoming fire apparatus and evacuating passenger vehicles to pass safely. Where turnouts are not available, vegetation clearance along roadways and driveways should be enhanced to reduce the threat of direct flame impingement upon the roadway and improve visibility.

Fire Road Gate Access

Vegetation clearance near fire road gates is imperative for fire department and resident access. Fuel treatments should be similar to those recommended for roadways, but should extend a minimum of 30 feet from road edges near gates. Grasses should be cut annually near gates, ground fuels (fallen wood, brush) should be removed, and gates should be functionally inspected and maintained.



The fire road gate shown (R) is located on Fawn Drive. This access is of particular importance due to the relatively large number of visitors and access to the Sleepy Hollow/Terra Linda Divide Open Space Preserve, where existing fire roads present firefighters with an excellent option for fire containment.

Open Space and Common Space Vegetation

Work With Marin County Parks and Open Space to Maintain Fuels

As the third largest landowner in SHFPD, and largest landowner of property bordering the District, MCOSD is responsible for much of the vegetation adjacent to the district capable of supporting wildfires.

SHFPD should work with MCOSD to encourage improvements and maintenance of fuels and fire roads on the Freitas Ridge in the Terra Linda/Sleepy Hollow Open Space Preserve.

- The network of existing fire roads and surrounding natural vegetation-fuel types (grass and light fuels are nearly continuous from Sorich Ranch Park to the intersection with the Loma Alta Open Space Preserve), present an excellent naturally-defensible fuel break where firefighters may be able to contain fires on either the Sleepy Hollow or Terra Linda sides of the ridge.
- Reduced maintenance, lack of grazing, and fire suppression, and invasive plants are contributing to a slow conversion of fuel types to heavier fuels that may present fire suppression difficulties in the future. Maintenance of grasslands should be encouraged.
- MCOSD in their Draft / Vegetation and Biodiversity Management Plan (2015) outlines priorities for this and other Preserves that include developing and maintaining fuel breaks (4-61), protecting ingress and egress zones (4-71), and treating Fuel Modification Zones (4-71).
- Fire road maintenance is of particular importance, as unrepaired washouts and rutting have been observed in the area and may impede access of fire equipment.
- Fire modeling conducted as part of this assessment verified the value of fire containment along the Freitas Ridge.

MCOSD Vegetation and Biodiversity Management Plan

This draft plan addresses all types of vegetation management on MCOSD lands; the management of vegetation in fuel modification zones is one aspect of their overall program.

“Place a High Priority on Fuel Reduction in Defensible Space Zones: the establishment of defensible space zones along the wildland-urban interface can assist in fire control, reduce fuel loads, and protect structures and adjacent communities, when used in concert with fuelbreaks. Given the most current information about the effectiveness of various fuel risk reduction practices, and the impacts associated with fuelbreaks (including invasive species infestations) in high-value resource areas, MCOSD is shifting its fuel reduction strategy to include a combination of tools as opposed to using one or the other. MCOSD will work with Marin County Fire and local fire agencies to collectively determine the most appropriate combination of strategies to enhance community wildfire protection, including collaborating with adjacent property owners to establish and maintain effective defensible space zones.”



Terra Linda fire ignition model, under NE wind conditions blowing towards Freitas Ridge/Sleepy Hollow. (L) without ridgetop containment. (R) with ridgetop containment.

The ability of firefighters to operate safely and conduct fire suppression along ridgetop and mid-slope roads is critical to the rapid containment of wildfires. Maintaining or reducing fuels along fire roads in the Terra Linda/Sleepy Hollow Open Space Preserve to levels that allow safe access for firefighters might make the difference between catastrophic wildfire or containment. Modeling confirms the value of this location for fuel maintenance and minor modifications.

Using an east wind modeling scenario, with weather and fuel conditions typical of late autumn, comparisons were made of potential fires from an ignition source in Terra Linda blowing towards Sleepy Hollow. In the images shown, the containment line does not indicate a fuel break or propose any specific fuel modification. Rather, the dramatic difference in impacts from the same fire ignitions result only when firefighters are able to successfully contain a fire at the ridgeline (between Terra Linda and Sleepy Hollow). In this scenario, without containment in the first hour, 74 Sleepy Hollow homes would be directly impacted by fire.

Maintain Existing Fire Roads and Conditions on Freitas Ridge

Maintenance of *existing fire roads and vegetation conditions* - specifically a 100' corridor of continuous grass on Freitas Ridge from Fawn Drive to the Luiz Ranch Fire Road on County owned Open Space - ought to allow safe working conditions for firefighters. With the support of firefighting aircraft which are highly effective along ridgetop grasslands, containment of the fire in the first hour may be possible. Lateral spread of the fire shown in the model is less likely to actually occur since the models do not take into account initial attack fire suppression that would take place on the lateral flanks of a fire.

SHFPD should work with MCOSD to ensure conditions support safe working conditions for fire suppression and potential fire containment lines.

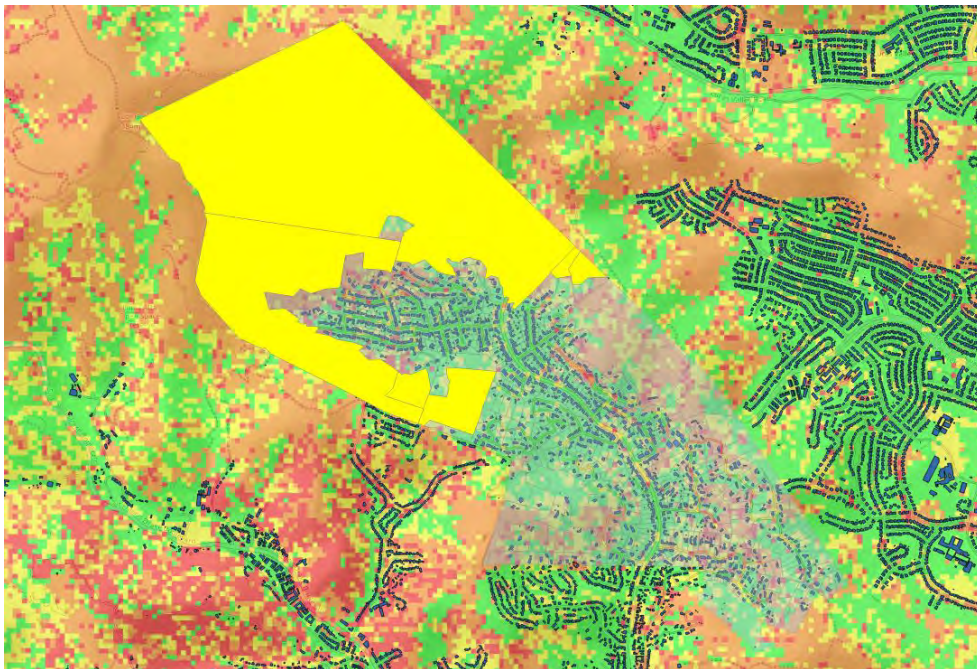
Work With Private Landowners to Maintain Fuels on Large Parcels

The presence of several large private parcels in strategic locations presents an opportunity for fuel reduction partnerships to achieve mutually beneficial goals and reducing community wildfire risk. Specific large parcels identified include (but are not limited to):

- Parcel 176-300-30; 522.38 acres; 1500 Butterfield Road (San Domenico School)
- Parcel 176-251-57 (+ multiple parcels); 184.19 acres; 1, Sulphur Spa Rd (Triple C Ranch)
- Parcel 176-270-15; 27.31 acres; 55 Tappan Rd
- Parcel 176-280-18; 5.71 acres; 84 Irving Dr

Engagement with individual landowners in strategic locations to coordinate fuel reduction projects that will benefit the community as a whole is recommended. Utilizing appropriate fuel treatment techniques ([Appendix G](#)), reduce ground and ladder fuels, create shaded fuel breaks, thin canopies, maintain existing grasslands, cut annual grasses, and maintain private fire roads. District cost sharing, matching grants, or direct funding should be considered due to potential community-wide benefits.

SHFPD should consider development and adoption of a formal plan for annual grass cutting and maintenance of shaded fuel breaks within 200' of residential parcels along the Sleepy Hollow (inside) perimeter of these parcels. CEQA compliance and environmental review may be required prior to implementation.



By working with five landowners on as few as six private parcels, nearly three miles of continuous fuel modification could potentially provide risk reduction to 296 homes in Sleepy Hollow.

Reducing Structural Ignitability

Reducing structural ignition is the highest priority when considering mitigation strategies to reduce the likelihood of urban conflagration.

Options

<p>Goal: Improve community resistance to conflagration by reducing structural ignitability.</p> <p>Status: Proposed</p> <p>Completed: N/A</p>	<p>Timeline: 01/01/2017-06/30/2021</p> <p>Cost Estimate: \$100,000-\$150,000 over life of programs.</p> <p>Implementation:</p> <ol style="list-style-type: none"> 1. Adopt code and ordinance recommendations. 2. Create a Parcel Inspection Database. 3. Encourage fire resistant building construction. 4. Consider wood shake roof replacement grant program.
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During WUI fires homes ignite in two principal ways: 1) direct flame heating, 2) firebrand ignition. When homeowners take action to lessen the ignitability of the home ignition zone they dramatically increase the survivability of their home (Cohen, Quarles).

High-intensity wildfires typically do not spread directly through residential developments. Access roads, driveways, utility corridors, and home sites produce gaps in the forest and shrub canopy sufficient to discontinue high-intensity canopy fires. Home destruction largely results from direct firebrand ignitions and fires spreading on the surface within the community. (Cohen, Quarles)

Fire-resistant building materials and designs are extremely effective at reducing structural ignitions. These include a huge variety of materials and engineering and design choices for nearly every aspect of home construction. Ranging from relatively expensive materials such as tempered glass and upgraded roofing, to simple, inexpensive but effective features such as fine wire mesh covering attic and basement vents, these features can be retrofitted or applied to new construction.

While new construction and substantial remodels in Sleepy Hollow are required to use fire resistant materials meeting the standards of Chapter 7A of the CBC, owners of existing homes should be encouraged to make simple but effective upgrades.

By reducing structural ignitability, in conjunction with improved Defensible Space and vegetation maintenance on open spaces, overall community risk can be dramatically reduced.

Building Codes Reduce Structural Ignitability

The California Building Code (CBC) Chapter 7A specifically addresses the wildland fire threat to structures by requiring the use of fire-resistant materials and construction techniques in WUI areas. These requirements only apply to new construction, and do not address existing structures or remodels and additions to existing structures.

There are several strategies to identify and implement regulatory and nonregulatory approaches to reduce structural ignitability.

- Encouraging Individual Responsibility
- Zoning Regulations
- Development Standards
- Building Codes
- Fire Prevention Codes
- Fire Department Response

Big Bear Case Study: Wood Shake Roof Replacement

City of Big Bear Lake Ordinance #2008-383 mandated the replacement of all Wood Shake/Shingle Roofs by over a five-year period ending September 1, 2012. The purpose of this program was to remove existing wood shake/shingle roofs and install primarily asphalt composition fire resistant "Class A" roof shingles or other fire resistant roof types on homes within the mountain communities of San Bernardino County. The local fire agency identified structures with wood shake roofs as the highest risk of igniting during a wildfire. A program was developed to help homeowners upgrade roofs to meet current codes, and in the process substantially reduced the risk of wildfire damage spreading in this community.



A cost sharing/reimbursement grant process assisted homeowners with the cost of roof replacement. Using FEMA and California EMA grant funds, the agency reimbursed eligible homeowners a percentage of the cost of replacing wood shake/shingle roofing with "Class A" fire resistant roofing, including the removal and disposal of existing wood shake/shingles. Three factors were utilized to limit the reimbursement:

- The reimbursement shall not exceed 70% of the cost of the lowest bid for roof replacement
- The reimbursement shall not exceed \$266.00 per square (100 sq/ft.)
- The grant cannot exceed a maximum reimbursement amount of \$4,500.00

This successful program replaced nearly 200 roofs. In 2015, only 5 homes remained in the jurisdiction with wood shake roofs.

See [Appendix F](#) for additional details on the grant program.

Fire Resistant Roofing

Disaster examinations reveal that most destroyed homes are not ignited directly by intense wildfire. This indicates flame contact from surface fires and direct firebrand ignitions are the cause. Firebrands (lofted burning embers) that result in roof ignitions commonly originate from a fire over ½ mile away depending on the fire intensity and the type of fuel burning.

For a home, the roof is the most common structural fuel bed for ignition by firebrands or fire sparks. For this reason, materials used to construct a roof are of great importance to the home. Homeowners should be aware of the dangers associated with having wood shingle (shake) rather than fire resistant types. All newly constructed homes are required to utilize roof materials of Class-A or better.

Many roofing materials meet the Class-A standard, allowing flexibility in achieving architectural aesthetics while providing fire resistance. Typical Class-A roofing products include (but are not limited to):

- Asphalt Shingles
- Metal
- Concrete (standard and lightweight)
- Clay Tile
- Synthetic
- Slate
- Hybrid Composites

Even a Class-A roof is vulnerable to fire if leaf litter or needles are allowed to accumulate!

Field observations and sampling indicate that approximately 3-5% of all roofs in Sleepy Hollow are made of wood shakes, and as such make these properties among the most vulnerable to ignition by firebrands. Current building standards require all roof assemblies to meet “Class-A” fire resistance standards, effectively limiting the use of wood shake in new construction or when re-roofing. Because wood shake roofing is relatively long lasting, with a lifespan of 20-50 years, these highly combustible structures are likely to remain in Sleepy Hollow for many years.



Recommendations

Adopt Relevant Fire and Building Codes

See section “Wildfire Preparedness and Planning: Codes and Standards.”

Create a Parcel Inspection Database

Consider development and maintenance of a local database to collect, organize, and analyze data regarding building construction, Defensible Space, and vegetation for all parcels in Sleepy Hollow. The collected data would be used to identify specific parcels for enforcement of Defensible Space requirements by Ross Valley Fire Department, further analyze risk, locate specific hazards for potential mitigation (eg, wood shake roofs for replacement), and better model wildfire in the WUI to prioritize future mitigation.

Beginning in July 2016, Marin County Fire Department seasonal inspectors are available to assist with an initial inspection assessment and inventory of homes in Sleepy Hollow. Using a modified CAL FIRE “LE100 Wildfire Hazard Inspection Form,” valuable data on building construction, roof type, and vegetation conditions would be gathered. Four inspectors could potentially inspect all parcels in Sleepy Hollow over a four day period.

Although Marin County Fire Department has indicated a willingness to assist, any inspection program must be coordinated and approved by Ross Valley Fire Department. Ross Valley Fire Department does not currently have the resources or staffing to conduct nearly 900 inspections and collect data. SHFPD should work with Ross Valley Fire Department and Marin County Fire Department to facilitate this program and archive the data it will generate.

Encourage Fire Resistant Building Materials and Design Standards

Consider adoption of a fire resistant home upgrade program. A program might include:

- Distribution and mailing of Firewise Building Practices brochures;
- Simple upgrade kits including wire mesh, staple gun, and instructions for installation, made available to all Sleepy Hollow residents to protect vent openings;
- Small grants to provide individual property inspections and recommendations;
- Grants for contractor installation of mesh screens on basement and attic vents, metal rain gutter debris screens.

Encourage Improved Roofing

Based on field observations and sampling, the total number of wood roofs in Sleepy Hollow is estimated at 15-30. Each exposed wood shake roof potentially threatens adjacent structures within a ½ mile radius due to the large number of firebrands (embers) likely to be produced should that structure ignite. Replacing wood shake roofs will benefit the entire community.

Because of the potentially dramatic benefits to the community, and in order to facilitate a more rapid transition to 100% Class A roofing, SHFPD should consider adoption of a roof

replacement grant program to be modeled after the successful Big Bear program. SHFPD should inventory all existing wood shake roofs through the recommended enhanced hazard inspection program. When the locations of individual roofs is known, spatial analysis and modeling can be used to demonstrate specific potential benefits. When the total number of potential roof replacements is better understood, SHFPD should consider setting a budget or pursuing state or federal grants to assist homeowners with replacement.

[The City of Big Bear Fire and San Bernardino County program offered a cost-share grant of up to \$4500 per roof, with specific criteria for replacement and management of funds to ensure that the results benefit the entire community ([Appendix F](#)).]

SUMMARY OF RECOMMENDATIONS

Wildfire Preparedness and Planning

1. [Firewise Community Recognition](#)
2. [Codes and Standards](#)
3. [Finalize Adoption of Amended WUI Code](#)
4. [Juniper Removal](#)
5. [Resale Inspections](#)

Community Wildfire Outreach and Education

1. [Print and mail updated “Living With Fire” Booklet in Even Years](#)
2. [Print and Mail Evacuation Pamphlets in Odd Years](#)
3. [Expand the \[www.shfpd.org\]\(http://www.shfpd.org\) Website to Include Local Firewise Recommendations](#)
4. [Specific Mailing to Address Adopted Recommendations and Projects](#)

Evacuation Planning and Preparation

1. [Address roadway clearance and vegetation](#)
2. [Promote “Alert Marin”](#)
3. [Promote Improved Cellular Communications](#)
4. [Adopt Ready, Set, Go! Program](#)
5. [Create and Distribute Educational Pamphlet and Evacuation Map](#)
6. [Evacuation/Escape Route Signage](#)
7. [Support Designation of On-Street Parking](#)
8. [Evacuation Drills](#)
9. [Evacuation/Alert Siren/Horn](#)
10. [Designate Safety Zones](#)
11. [Animal Evacuation](#)
12. [Fire Roads and Evacuation](#)

Residential Vegetation

1. [Improve Defensible Space Around All Structures](#)
2. [Community Chipper Days](#)
3. [Hazard Inspections and Notices](#)
4. [Recommend Enhanced Defensible Space 200’ to Boundary Properties](#)
5. [Support Removal of Specific Hazard Species \(juniper, pampas grass, bamboo\)](#)
6. [Hazard Tree Removal](#)

Roadside Vegetation

1. [Roadway Clearance Recommendations](#)
2. [Other Roadway Access/Egress Issues](#)

Open Space and Common Space Vegetation

1. [Work With Marin County Parks and Open Space to Maintain Fuels](#)
2. [Maintain Existing Fire Roads and Conditions on Freitas Ridge](#)
3. [Work With Private Landowners to Maintain Fuels on Large Parcels](#)

Reducing Structural Ignitability

1. [Fire Resistant Roofing](#)
2. [Recommendations](#)
3. [Adopt Relevant Fire and Building Codes](#)
4. [Create a Parcel Inspection Database](#)
5. [Encourage Fire Resistant Building Materials and Design Standards](#)
6. [Encourage Improved Roofing](#)

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APPENDIX A

Glossary

Where applicable, definitions are excerpted from 14 CCR § 1271.00 § 1271.00.

Accessory building: Any building used as an accessory to residential, commercial, recreational, industrial, or educational purposes as defined in the *California Building Code, 1989 Amendments, chapter 11, group M, division 1*.

Agriculture: Land used for agricultural purposes as defined in a local jurisdiction's zoning ordinances.

Bark Beetle: An insect that bores through the bark of forest trees to eat the inner bark and lay its eggs.

Building: Any structure used or intended for supporting or sheltering any use or occupancy that is defined in the California Building Code, 1989 Amendments, chapter 11, except group M, division 1, Occupancy. For the purposes of this subchapter, building includes mobile homes and manufactured homes, churches, and daycare facilities.

CAL FIRE, CDF: California Department of Forestry and Fire Protection. The State of California agency ultimately responsible for fire protection and suppression in the SRA. In Marin County, CAL FIRE is represented by Marin County Fire Department by contract.

Canopy/Crown: The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees.

Conifer: A tree that produces cones, such as a pine, spruce or fir tree.

Crown: The part of a tree, or other woody plant, bearing live branches and foliage.

Crown Fire (crowning): A fire that advances through the crown fuel layer (typically tree canopies) normally in direct conjunction with a surface fire. Three categories of “crowning” are recognized (passive, active, and independent); they are determined by three crown fuel properties (live crown base height, foliar moisture content and bulk density) and two characteristics of fire behavior (spread rate and surface intensity).

CWPP (Community Wildfire Protection Plan): A CWPP is a plan developed by a community in an area at-risk from wildland fire. The CWPP is a collaborative product involving interested parties, local government, local firefighting agencies, the state agency which oversees forest management and, if present in the vicinity, federal land management agencies. Sleepy Hollow is included in the Marin County CWPP 2016. With additional community input, this report would meet the definition of a CWPP.

Dead-end road: A road that has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

Defensible space: The area within the perimeter of a parcel, development, neighborhood or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires. The perimeter as used in this regulation is the area encompassing the parcel or parcels proposed for construction and/or development, excluding the physical structure itself. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Defensible Space Zone: A type of fuel modification zone established between a developed area and the surrounding undeveloped area for the purpose of reducing the potential for wildfires to spread between the two areas. Typically 0-100' from structures.

Density (Stand): The number of trees growing in a given area usually expressed in terms of trees per acre.

Development: As defined in section 66418.1 of the California Government Code.

Diameter Breast Height (DBH): Tree diameter, measured 4.5 feet above ground.

Direct Attack: Line is constructed adjacent to the fire perimeter: usually the preferred method, because of immediate access to escape routes and safety zones. Used when fire behavior, weather and fuel permit. Directly related to individual experience, escape routes and safety zones. Usually involves burnout of interior fuels as the line construction progresses or the fire is allowed to burn into the fire line.

Director: Director of Sleepy Hollow Fire Protection District (elected or appointed).

Domestic Animals: animals that have been domesticated by humans by having their behavior, life cycle or physiology systemically altered as a result of generations of human control.

Driveway: A vehicular access that serves no more than two buildings, with no more than 3 dwelling units on a single parcel, and any number of accessory buildings.

Dwelling unit: Any building or portion thereof which contains living facilities, including provisions for sleeping, eating, cooking and/or sanitation for not more than one family.

Ecosystem: A functional unit consisting of all the living organisms in a given area, and all of the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size, but it always functions as a whole unit.

Ember Wash, Ember Shower: A mass of firebrands blown ahead of the main fire, capable of igniting multiple spot fires.

Escape Route: A route to access a safety zone.

Exception: An alternative to the specified standard requested by the applicant that may be necessary due to health, safety, environmental conditions, physical site limitations or other limiting conditions such as recorded historical sites, that provides mitigation of the problem.

FEMA (Federal Emergency Management Agency): A federal agency with the mission “to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.”

Fuel modification area: An area where the volume of flammable vegetation has been reduced, providing reduced fire intensity and duration.

Extreme Fire Behavior: "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Fine Fuels: Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire Behavior: How fire reacts to the influences of fuel, weather and topography.

Fire Hazard: The ease of ignition and resistance to control of a fuel source.

Fire Intensity: A general term relating to the heat energy released by a fire.

Fire Line: A linear fire barrier that is scraped or dug to mineral soil.

Fire Risk: The probability or chance of fire starting in a given location, determined by the presence and activities of causative agents.

Fire Severity: A relative measure of the post-fire appearance of vegetation as it relates to the intensity of the fire and the consumptive effects on vegetation.

Fire Suppression (Fire Control): All of the work and activities connected with fire extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Firefighter Safety: A work environment where foreseeable risks have been minimized through the mitigation of known hazards associated with wildfire suppression.

Fire valve: see hydrant.

FlamMap: A computer fuel and fire behavior prediction model developed by the USDA Forest Service at the Intermountain Forest Fire Research Laboratory. Additional information regarding FlamMap can be found at the following website: <http://www.firemodels.org/content/view/14/28/>

Forb: A herbaceous flowering plant that is not a graminoid (grasses, sedges and rushes). The term is used in biology and in vegetation ecology, especially in relation to grasslands and understory.

Forest Health: The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity while providing for human needs and values.

Fuel: Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs and trees. (See Surface Fuels.) Includes both living plants; dead, woody vegetative materials; and other vegetative materials which are capable of burning.

Fuel Break (or fuelbreak): A zone in which fuel quantity has been reduced or altered to provide a position for suppression forces to make a stand against wildfire. Fuel breaks are designated or constructed before the outbreak of a fire. Fuel breaks may consist of one or a combination of the following: Natural barriers, constructed fuel breaks, man-made barriers.

Fuel Loadings: The oven dry weight of fuels in a given area, usually expressed in tons per acre. Fuel loadings may be referenced to fuel size or time lag categories; and may include surface fuels or total fuels. The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Modification Zone: A specific area where vegetation has been removed, planted, or modified in ways that increase the likelihood a structure will survive a wildfire, improve the defensible space around that structure needed for firefighting activities, and prevents direct flame contact with structures. Vegetation includes native and ornamental plants, non-native naturalized annual grasses, and other invasive or naturalized species. Fuel modification activities can include removal, partial or total replacement of existing plants with adequately spaced drought-tolerant and fire-resistant species, and thinning of existing native or ornamental species.

Fuel Management: Manipulation or reduction of flammable matter for the purpose of reducing the intensity or rate of spread of a fire, while preserving and enhancing environmental quality.

Fuel Reduction: Manipulation, including combustion or removal of fuels, to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

Geographic Information System (GIS): Computer software that provides database and spatial analytic capabilities. Often used to analyze the spatial characteristics of vegetation, fuels, development patterns, and terrain.

Greenbelts: A facility or land-use, designed for a use other than fire protection, which will slow or resist the spread of a wildfire. Includes parking lots, irrigated or landscaped areas, golf courses, parks, playgrounds, maintained vineyards, orchards or annual crops that do not cure in the field.

Ground Fuels: All combustible materials below the surface litter layer. These fuels may be partially decomposed, such as forest soil organic layers (duff), dead moss and lichen layers, punky wood, and deep organic layers (peat), or may be living plant material, such as tree and shrub roots (Miller 1994).

Hammerhead/T: A roadway or driveway feature that provides a “T” shaped, three-point turnaround space for emergency equipment, being no narrower than the road that serves it.

Hazard: Any real or potential condition that can cause injury, illness, or death of personnel, or damage to or loss of equipment or property.

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Heavy Fuels: Fuels of large diameter such as snags, logs, large limb wood, that ignite and are consumed more slowly than light fuels.

Hydrant: A valved connection on a water supply/storage system, having at least one 2 1/2 inch outlet, with male American National Fire Hose Screw Threads (NH) used to supply fire apparatus and hoses with water.

IFTDSS: Interagency Fuel Treatment Decision Support System. A web-based, service-oriented framework architecture for fuels treatment planning. Developed by Sonoma Technology, Inc of Petaluma for the US Joint Fire Science Program, and used extensively in the development of the Marin County CWPP 2016 and this report for wildfire modeling and hazard and risk analysis.

Ignition Prevention Zone: A type of fuel modification zone designed and managed to minimize and, if feasible, reduce the chance of a fire igniting.

Ingress/Egress zone: A type of fuel modification zone designed and managed to ensure that patrol, maintenance, fire, and other emergency vehicles have unobstructed access along fire road.

Initial Attack: An aggressive suppression action by the Fire Department, typically immediately after the first report of a fire, characterized by an assessment of conditions, evacuation and rescue of threatened people and animals, attempts to halt the spread of fire, and requests for additional firefighting resources if needed. Actions are consistent with firefighter and public safety and the values and assets to be protected.

Invasive Species: A species whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health. Invasive species reduce biodiversity by displacing native organisms, bring about changes in species composition, community structure, or ecosystem function. Not all nonnative plants are invasive. Only a small minority of the thousands of species introduced to California has escaped cultivation, and a minority of those has established problematic populations in natural areas.

Ladder Fuels: Fuels which provide vertical continuity between strata. Fire is able to carry from the surface fuels by convection into the crowns with relative ease.

Light Fuels: Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a fuel moisture time-lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Live Fuels: Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

Live Fuel Moisture: The moisture content of living vegetation fuels, expressed as a percentage of the total mass of a standard foliage sample. Fluctuates seasonally according to plant life cycles, rainfall, ground and atmospheric moisture, and plant health. Lower live fuel moistures contribute to increased fire behavior.

Livestock: cattle, horses, sheep, goats, pigs, poultry and other animals typically associated with agriculture, farming, food production, and recreation.

Local Jurisdiction: Any county, city/county agency or department, or any locally authorized district that issues or approves building permits, use permits, tentative maps or tentative parcel maps, or has authority to regulate development and construction activity.

Native Species: Species that are indigenous to a region: not introduced or exotic.

Occupancy: The purpose for which a building, or part thereof, is used or intended to be used.

One-way road: A minimum of one traffic lane width designed for traffic flow in one direction only.

Overstory: The portion of the trees that form the uppermost canopy layer in a forest of more than one story.

Pets: Domestic animals commonly kept as household companions.

PRC 4291: The California Public Resources Code section that defines Defensible Space and actions that must be taken by property owners to protect structures from wildfire.

Prescribed Fire: The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, etc.). Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and CEQA requirements must be met, prior to ignition.

Project: An organized effort to achieve an objective, identified by location, activities, outputs, effects, and time-period and responsibilities for execution.

Pyrophytic plants (pyrophyte): Plants that have adapted to tolerate fire and/or to require fire for regeneration. Typically burn with greater intensity, and a higher likelihood of burning, than plants without specific adaptations for fire.

Riparian: A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it. This includes floodplains, woodlands, and all areas within a specified distance from the normal line of high water of a stream channel, or from the shoreline of a standing body of water.

Roads, streets, private lanes: Vehicular access to more than one parcel; access to any industrial or commercial occupancy; or vehicular access to a single parcel with more than two buildings or four or more dwelling units.

Roadway: Any surface designed, improved, or ordinarily used for vehicle travel.

Roadway structures: Bridges, culverts, and other appurtenant structures which supplement the roadway bed or shoulders.

Open Space: Undeveloped land, either under public or Private ownership, but most often referring to parklands maintained by the Marin County Open Space District.

Safety Zone (SZ): Areas that are fuel free zones that are incapable of burning. They afford a very high degree of firefighter or public safety from an advancing wildfire. They can be natural or human made fire resistant areas such as irrigated fields, dirt, gravel or asphalt parking lots, roads and areas already burned.

Shoulder: Roadbed or surface adjacent to the traffic lane.

Spot Fire: A fire ignited by firebrands landing in flammable fuels, usually ahead of the main fire.

State Responsibility Area (SRA): The area in the state where the State of California has the primary financial responsibility for the prevention and suppression of wildland fires. *As defined in Public Resources Code sections 4126-4127; and the California Code of Regulations, title 14, division 1.5, chapter 7, article 1, sections 1220-1220.5.*

Structure: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Subdivision: As defined in section 66424 of the Government Code.

Suppression: The act of extinguishing or confining a fire.

Traffic lane: The portion of a roadway that provides a single line of vehicle travel.

Turnaround: A roadway, unobstructed by parking, which allows for a safe opposite change of direction for emergency equipment. Design of such area may be a hammerhead/T or terminus bulb.

Turnouts: A widening in a roadway to allow vehicles to pass.

Understory: The portion of vegetation that is underneath the dominant tree canopy.

Urban Conflagration: The potentially catastrophic ignition of multiple structures in a wildland urban interface fire, with ignitions occurring structure to structure, either through radiant heat, direct flame impingement, or firebrand ignitions.

Watershed: The drainage basin contributing water, organic matter, dissolved nutrients and sediments to a stream, lake or river.

Vertical clearance: The minimum specified height of a bridge or overhead projection above the roadway.

Wildfire (Wildland Fire, Wildfire, Vegetation Fire): A fire, other than prescribed fire, that occurs from natural or human causes in the wildlands or on undeveloped land, primarily burning vegetation. *As defined in Public Resources Code sections 4103 and 4104.*

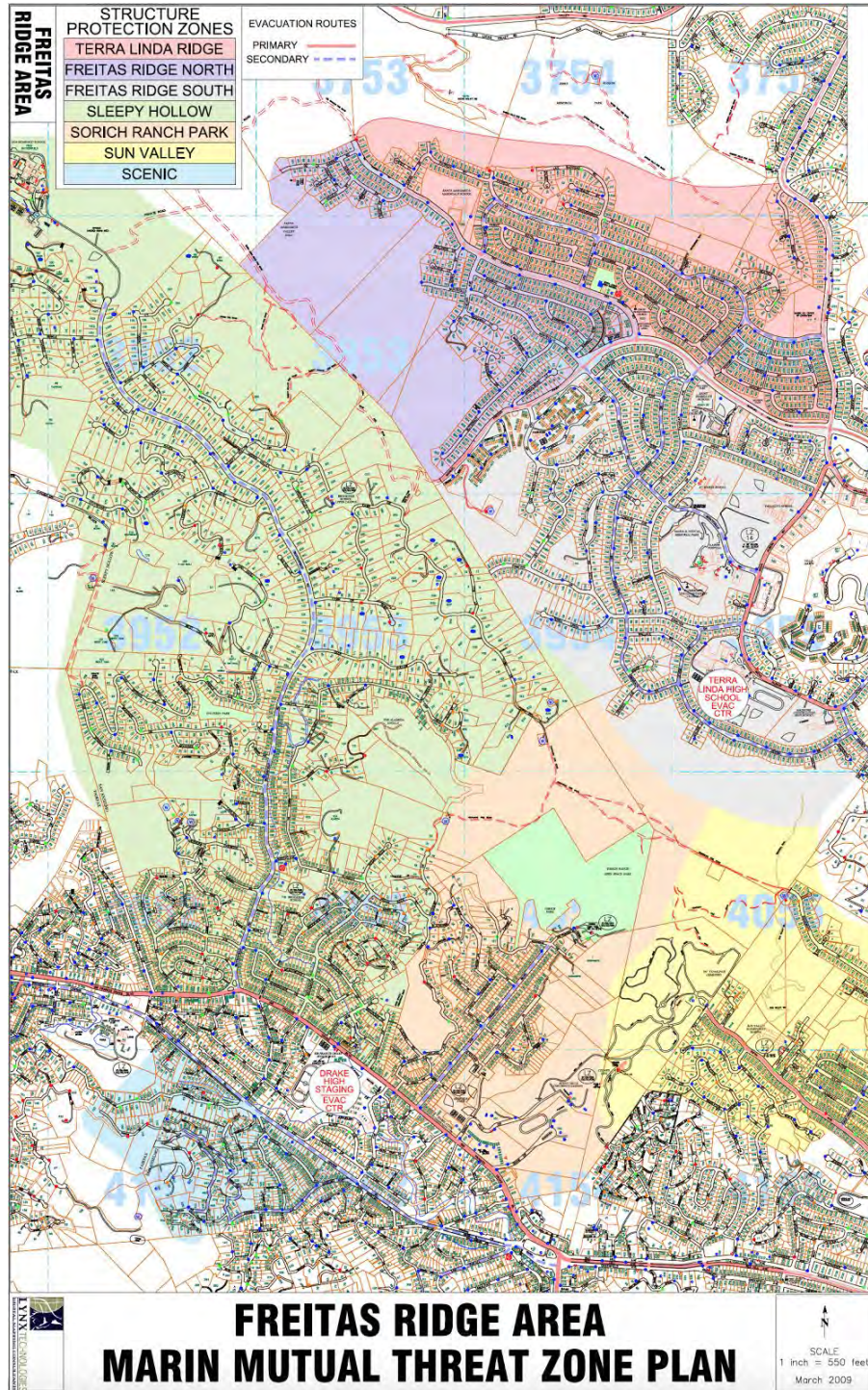
Wildlands: Lands that are in a natural uncultivated state, especially when they form habitat for wildlife.

Wildland Urban Interface (WUI): Includes those areas of resident human population at imminent risk from wildfire, and human developments having special significance, typically where wild vegetation and open space meet said development. These areas may include critical communications sites, municipal

watershed, high voltage transmission lines, observatories, camps, schools, and other structures that if destroyed by fire, would result in hardships to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

APPENDIX B

Freitas Ridge Area Mutual Threat Zone Evacuation Map



APPENDIX C

Title 14 CCR

California Code of Regulations
Title 14. Natural Resources
Division 1-5. Department of Forestry and Fire Protection
Subchapter 2: SRA Fire Safe Regulations
Subchapter 3: Fire Hazard

Title 14 regulations serve the purpose of establishing minimum wildfire protection standards in conjunction with building, construction and development in SRA.

Article 2. Emergency Access Standards Road and street networks, whether public or private, shall provide for safe access for emergency wildland fire equipment and civilian evacuation concurrently, and shall provide unobstructed traffic circulation during a wildfire emergency.

Article 3. Signing and Addressing Standards To facilitate locating a fire and to avoid delays in response, all newly constructed or approved roads, street, and buildings shall be designated by names or numbers, posted on signs clearly visible and legible from the roadway. This section shall not restrict the size of letters or numbers appearing on street signs for other purposes.

Article 4. Emergency Water Supply Standards Emergency water for wildfire protection shall be available and accessible in quantities and locations specified in the statute and these regulations, in order to attack a wildfire or defend property from a wildfire. Such emergency water may be provided in a fire agency mobile water tender, or naturally occurring or man made containment structure, as long as the specified quantity is immediately available.

Article 5. Fuel Modification and Defensible Space Standards To reduce the intensity of a wildfire by reducing the volume and density of flammable vegetation, the strategic siting of fuel modification and greenbelts shall provide

1. increased safety for emergency fire equipment and evacuating civilians; and
2. a point of attack or defense from a wildfire.

These regulations apply to new construction and development in State Responsibility Area (SRA) in California. These regulations are not retroactive to existing structures and facilities, unless a new use or occupancy is applied for. CAL FIRE offices and fire stations, as well as, County Planning and Building Departments can assist in modifying specific SRA boundaries. The following is a summary only for the purpose of information. Reference to the specific adopted language should be made before construction or development plans are prepared.

14 CCR § 1299.03

§ 1299.03. Requirements.

Defensible space is required to be maintained at all times, whenever flammable vegetative conditions exist. One hundred feet (100 ft.) of defensible space clearance shall be maintained in two distinct "Zones" as follows: "Zone 1" extends thirty feet (30 ft.) out from each "Building or Structure," or to the property line,

whichever comes first; "Zone 2" extends from thirty feet (30 ft.) to one hundred feet (100 ft.) from each "Building or Structure," but not beyond the property line.

The vegetation treatment requirements for Zone 1 are more restrictive than for Zone 2, as provided in (a) and (b) below. The Department of Forestry and Fire Protection's "Property Inspection Guide, 2000 version, April 2000," provides additional guidance on vegetation treatment within Zone 1 and Zone 2, but is not mandatory and is not intended as a substitute for these regulations. This publication may be found on the Department of Forestry and Fire Protection (CAL FIRE) website.

(a) Zone 1 Requirements:

- (1) Remove all dead or dying grass, plants, shrubs, trees, branches, leaves, weeds, and pine needles from the Zone whether such vegetation occurs in yard areas around the "Building or Structure," on the roof or rain gutters of the "Building or Structure," or any other location within the Zone.
- (2) Remove dead tree or shrub branches that overhang roofs, below or adjacent to windows, or which are adjacent to wall surfaces, and keep all branches a minimum of ten feet (10 ft.) away from chimney and stovepipe outlets.
- (3) Relocate exposed firewood piles outside of Zone 1 unless they are completely covered in a fire resistant material.
- (4) Remove flammable vegetation and items that could catch fire which are adjacent to or under combustible decks, balconies and stairs.

(b) Zone 2 Requirements:

- (1) In this zone create horizontal and vertical spacing among shrubs and trees using the "Fuel Separation" method, the "Continuous Tree Canopy" method or a combination of both to achieve defensible space clearance requirements. Further guidance regarding these methods is contained in the State Board of Forestry and Fire Protection's, "General Guidelines for Creating Defensible Space, February 8, 2006," incorporated herein by reference, and the "Property Inspection Guide" referenced elsewhere in this regulation. The "General Guidelines for Creating Defensible Space" may be found on the Board's website.
- (2) In both the Fuel Separation and Continuous Tree Canopy methods the following standards apply:
 - (A) Dead and dying woody surface fuels and aerial fuels shall be removed. Loose surface litter, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches, shall be permitted to a maximum depth of three inches (3 in.).
 - (B) Cut annual grasses and forbs down to a maximum height of four inches (4 in.).
 - (C) All exposed wood piles must have a minimum of ten feet (10 ft.) of clearance, down to bare mineral soil, in all directions.

(c) For both Zones 1 and 2:

- (1) "Outbuildings" and Liquid Propane Gas (LPG) storage tanks shall have the following minimum clearance: ten feet (10 ft.) of clearance to bare mineral soil and no flammable vegetation for an additional ten feet (10 ft.) around their exterior.
- (2) Protect water quality. Do not clear vegetation to bare mineral soil and avoid the use of heavy equipment in and around streams and seasonal drainages. Vegetation removal can cause soil erosion, especially on steep slopes. Keep soil disturbance to a minimum on steep slopes.

Public Resource Code 4290 and 4291

Public Resources Code 4290

4290. (a) The board shall adopt regulations implementing minimum fire safety standards related to defensible space which are applicable to state responsibility area lands under the authority of the department. These regulations apply to the perimeters and access to all residential, commercial, and industrial building construction within state responsibility areas approved after January 1, 1991. The board may not adopt building standards, as defined in Section 18909 of the Health and Safety Code, under the authority of this section.

As an integral part of fire safety standards, the State Fire Marshal has the authority to adopt regulations for roof coverings and openings into the attic areas of buildings specified in Section 13108.5 of the Health and Safety Code.

The regulations apply to the placement of mobile homes as defined by National Fire Protection Association standards. These regulations do not apply where an application for a building permit was filed prior to January 1, 1991, or to parcel or tentative maps or other developments approved prior to January 1, 1991, if the final map for the tentative map is approved within the time prescribed by the local ordinance. The regulations shall include all of the following:

- (1) Road standards for fire equipment access.
 - (2) Standards for signs identifying streets, roads, and buildings.
 - (3) Minimum private water supply reserves for emergency fire use.
 - (4) Fuel breaks and greenbelts.
- (b) These regulations do not supersede local regulations which equal or exceed minimum regulations adopted by the state.

Public Resources Code 4291

4291.1. (a) Notwithstanding Section 4021, a violation of Section 4291 is an infraction punishable by a fine of not less than one hundred dollars (\$100), nor more than five hundred dollars (\$500). If a person is convicted of a second violation of Section 4291 within five years, that person shall be punished by a fine of not less than two hundred fifty dollars (\$250), nor more than five hundred dollars (\$500). If a person is convicted of a third violation of Section 4291 within five years, that person is guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars (\$500).

If a person is convicted of a third violation of Section 4291 within five years, the department may perform or contract for the performance of work necessary to comply with Section 4291 and may bill the person convicted for the costs incurred, in which case the person convicted, upon payment of those costs, shall not be required to pay the fine. If a person convicted of a violation of Section 4291 is granted probation, the court shall impose as a term or condition of probation, in addition to any other term or condition of probation, that the person pay at least the minimum fine prescribed in this section.

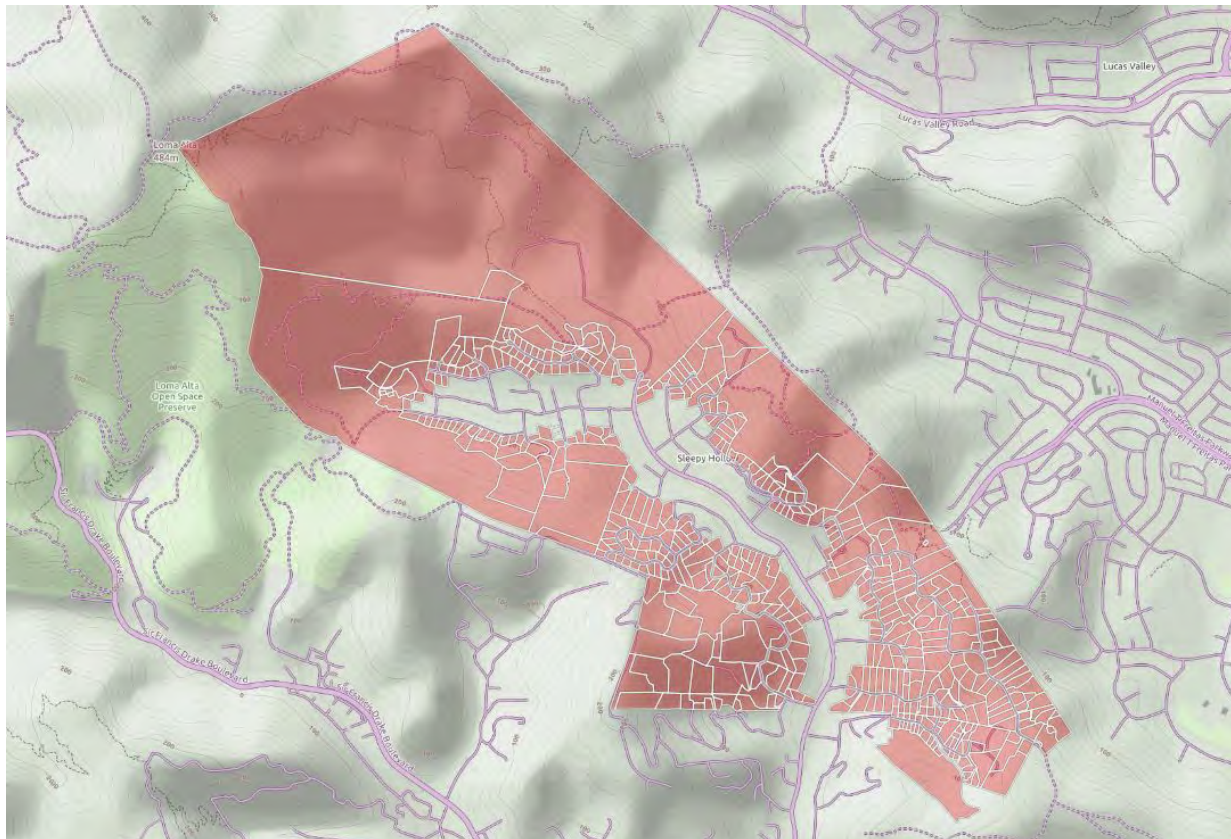
(b) If a person convicted of a violation of Section 4291 produces in court verification prior to imposition of a fine by the court, that the condition resulting in the citation no longer exists, the court may reduce the fine imposed for the violation of Section 4291 to fifty dollars (\$50).

4291.3. Subject to any other applicable provision of law, a state or local fire official, at his or her discretion, may authorize an owner of property, or his or her agent, to construct a firebreak, or implement appropriate vegetation management techniques, to ensure that defensible space is adequate for the protection of a hospital, adult residential care facility, school, aboveground storage tank, hazardous materials facility, or similar facility on the property.

The firebreak may be for a radius of up to 300 feet from the facility, or to the property line, whichever distance is shorter.

APPENDIX D

Priority Risk Parcels



GIS analysis and wildfire modeling reveal elevated risk for some parcels and zones in Sleepy Hollow. Highlighted parcels are those most at risk and should receive first priority for hazard inspection, defensible space enforcement, and future fuel treatments suggested in this report. Remaining parcels outside of the highlighted areas should also continue to receive all inspection, fire department defensible space enforcement, and future fuel treatment, with slightly diminished priority.

When involved in fire, residential structures are capable of casting embers more than ½ mile, potentially exposing hundreds of additional structures to ignition. Preventing structural ignition at the periphery of the WUI, where homes are most likely to be exposed to a wildfire's flame front, is critical to reducing the likelihood of conflagration in a community. Based on this concept, SHFPD should focus additional fuel reduction effort, defensible space enforcement, and incentive for adoption of fire resistant building practices in the locations with the greatest risk of exposure to wildfire.

This list is general, and does not represent a parcel-specific list of vulnerable structures - rather it generalizes the risk of developed parcels to exposure to a flame front or embers from a wildfire. The relative risk of individual parcels will not be analyzed until an individual inspection is completed at each address.

APPENDIX E

San Rafael Juniper Ordinance/Code Amendment

4.12.030 Vegetation Management Standards.

A. Any person owning, leasing, controlling, operating or maintaining a property containing a structure in or upon the City Wildland-Urban Interface, and any person owning, leasing controlling, operating or maintaining a property that is adjacent to another property containing such a structure, shall at all times maintain a defensible space within 100 feet of such a structure as follows:

- 1) Raise the crown of all trees, by removing growth less than 3-inches in diameter, from the ground up to a maximum height of 10 feet, provided that no crown shall be raised to a point so as to remove branches from more than the lower one-third of the tree's total height.
- 2) Cut and remove all dry grasses (by means other than discing, tilling or other soil manipulation) so that their height does not exceed 3 inches.
- 3) Remove all combustible vegetation, provided that single specimens of combustible vegetation are permitted if separated by a distance equal to two (2) times the height of the next adjacent combustible or non-combustible bush on slopes 0 to 20%, four (4) times the height of the next adjacent combustible or non-combustible bush on slopes 21 to 40%, and 6 (six) times the height of the next adjacent combustible or non-combustible bush on slopes exceeding 40% as measured from the most outer edge of both bushes.

Exception: Remove all Junipers (genus *Juniperus*) and Bamboo (genus *Bambusa*) within 15 feet of any structure. Remove all Junipers (genus *Juniperus*) and Bamboo (genus *Bambusa*) from 15 to 100 feet of a structure before January 1, 2011. After January 1, 2011, single specimens of Junipers or Bamboo are permitted beyond 15 feet of a structure if separated by 2 times the height of the taller of the nearest bush as measured from the most outer edge of the bush.

- 4) Remove or chip the wood of all dead trees and other dead vegetation from the ground that is less than 3 inches in diameter, provided that the stump of a dead tree does not need to be removed. Chipping materials left upon the surface of the ground shall not exceed a depth of 3 inches.

B. Any person owning, leasing, controlling, operating or maintaining a property containing a structure in or upon the City Wildland-Urban Interface shall at all times:

- 1) Remove combustible vegetation on the ground of the property within 10 feet of any highways, city streets, or private streets used for vehicle traffic.
- 2) Remove all vegetation within 10 feet of a chimney outlet.
- 3) Remove any portion of trees or brush on the property that overhang any roadway and reach within 13 feet 6 inches (13'6") vertically above the roadway surface.
- 4) Remove any combustible vegetation under the eaves, decks or other components of the structure on the property.
- 5) Maintain the roof of any structure on the property free of leaves, needles, or dead vegetative growth.
- 6) Maintain woodpiles a minimum of 2 times the height of the woodpile away from any component of the structure on the property.

C. To the extent there is any conflict, the vegetation management standards in this Section shall supersede the property development standards for protecting the natural state of property as contained in Sections 14.12.030(C) and 14.12.040 of the City of San Rafael Municipal Code.

APPENDIX F

San Bernardino/Big Bear Wood Roof Replacement Program

- City of Big Bear Lake Ordinance #2008-383 mandates the replacement of all Wood Shake/Shingle Roofs by September 1, 2012. | [Download the ordinance](#)
- County of San Bernardino Ordinance #4225 mandates the replacement of all Wood Shake/Shingle Roofs in the County by July 1, 2016. | [Download the ordinance](#)

ELIGIBLE APPLICANTS

Due to the nature of the funding source, the applicant must own an "Eligible Unit" with a wood shake/shingle roof. Any and all work to replace wood shake/shingle roofs must be conducted after the property owner receives a "Notice to Proceed" from the MAST organization.

ELIGIBLE IMPROVEMENTS

Eligible improvements include the replacement of wood shake/shingle roofs with a minimum "Class A" rated asphalt composition shingle roof or other approved non-organic material having a minimum 30 year warranty and underlaid with a minimum 30 lb. felt material or equivalent, replacement of skip sheathing with solid sheathing, ice dams, drip edge, vent flashing, and non-ember intrusion vents.

INELIGIBLE IMPROVEMENTS

Ineligible improvements include the replacement of dormers, skylights, rain gutters, insulation, roof additions or other accessories, and existing plywood sheathing. Other ineligible costs are costs associated with the installation and/or repair of any structural improvements that may be needed or required.

GRANT LIMITS AND SOURCE OF FUNDING REIMBURSEMENT PROCESS

Property owner understands that his/her participation in this Roof Replacement Program is a cost sharing/reimbursement process. The MAST organization through its Roof Replacement Program agrees to use its available FEMA and Office of Emergency Services grant funds to reimburse selected homeowners a percentage of the cost of replacing wood shake/shingle roofing with "Class A" composition roofing having a minimum 30 year warranty underlaid with 30 lb. felt with ice dam, including the removal and disposal of existing wood shake/shingles. There are three factors which will be utilized to limit the reimbursement:

- The reimbursement shall not exceed 70% of the cost of the lowest bid for roof replacement
- The reimbursement shall not exceed \$266.00 per square (100 sq. ft.)
- The grant cannot exceed a maximum reimbursement amount of \$4,500.00

(Note: an adjustment will be made at the beginning of each calendar year to reflect price adjustments based upon the San Bernardino County Consumer Price Index.)



SHAKE/SHINGLE ROOF REPLACEMENT PROGRAM

GRANT GUIDELINES FOR DR 1884 AND LPDM 08

GRANT PURPOSE

The purpose of this program is to remove existing wood shake/shingle roofs and install primarily asphalt composition fire resistant “Class A” roof shingles on homes within the mountain communities of San Bernardino County. These identified structures are at the highest risk of igniting during a wildfire occurrence. This program seeks to help homeowners upgrade these structures to current codes, and substantially reduce the risk of wildfire damage spreading in this community.

GRANT SCOPE

San Bernardino County Fire Department and the City of Big Bear Lake has applied for and has received funding through FEMA’s Hazard Mitigation Grant Program to undertake upgrades of pre-identified existing vulnerable wood shake/shingle roofs. The Roof Replacement Grant is intended only for those properties that have been previously identified by the Mountain Area Safety Taskforce (MAST) operations group and that are located near the San Bernardino National Forest.

ELIGIBLE UNITS

Single family residences, multifamily residences, garages, and commercial structures are eligible for this grant.

ELIGIBLE APPLICANTS

Due to the nature of the funding source, the applicant must own an “Eligible Unit” with a wood shake/shingle roof previously identified by MAST. Any and all work to replace wood shake/shingle roofs must be conducted after the property owner receives a “Notice to Proceed” from the MAST organization.

ELIGIBLE IMPROVEMENTS

Eligible improvements include the replacement of wood shake/shingle roofs with a minimum “Class A” rated asphalt composition shingle roof or other approved non-organic material having a minimum 30 year warranty and underlaid with a minimum 30 lb. felt material, replacement of skip sheathing with solid sheathing, ice dams, drip edge, vent flashing, and non-ember intrusion vents.

INELIGIBLE IMPROVEMENTS

Ineligible improvements include the replacement of tile, stone or other roofing material, dormers, sky lights, rain gutters, insulation, roof additions or other accessories, and existing plywood sheathing. Other ineligible costs are costs associated with the installation and/or repair of any structural improvements that may be needed or required.

GRANT LIMITS AND SOURCE OF FUNDING REIMBURSEMENT PROCESS

Property owner understands that his/her participation in this Roof Replacement Program is a cost sharing/reimbursement process. The MAST organization through its Roof Replacement Program agrees to use its available FEMA and Office of Emergency Services grant funds to reimburse selected homeowners a percentage of the cost of replacing wood shake/shingle roofing with “Class A”

composition roofing having a minimum 30 year warranty underlaid with 30 lb. felt with ice dam, including the removal and disposal of existing wood shake/shingles. There are three factors which will be utilized to limit the reimbursement:

- The reimbursement shall not exceed 70% of the cost of the lowest bid for roof replacement
- The reimbursement shall not exceed \$254.00 per square (100 sq. ft.)
- The grant cannot exceed a maximum reimbursement amount of \$4,500.00

(Note: an adjustment will be made at the beginning of each calendar year to reflect price adjustments based upon the San Bernardino County Consumer Price Index.)

APPLICATION PROCESS

Applications for the Roof Replacement Program are limited to the properties identified on a prescreened list. Applications are available by contacting the MAST wood shake shingle roof replacement program. Applications will be accepted on a year-round basis from qualified property owners. Funding is reserved on a first come, first served basis for property owners who have successfully submitted a complete application to the MAST wood shake/shingle roof replacement program. Roof replacement improvements will be authorized throughout the year based on funding, staffing resources, and weather. Once funding is exhausted, property owners will be placed on hold for future funding and/or the application will be denied due to lack of funding.

MAST will maintain an “approved” list of licensed, qualified roofing contractors from which program participants can obtain bids for the work to be completed. Please note that no self-labor will be permitted under this program. To be eligible for reimbursement, the property owner must submit three bids from approved licensed roofing contractors.

The MAST staff will work with property owners to ensure that all requirements are met prior to issuing a “Notice to Proceed.” After all conditions of the application process have been fulfilled, the property owner will be issued a “Notice to Proceed” by the Fire Department. Only reroofing work commenced AFTER the property owner receives a “Notice to Proceed” shall be eligible for reimbursement. The property owner will have three (3) months to complete authorized reroofing work from the commencement date entered on the Notice to Proceed. Failure to complete the reroofing work within three (3) months may void the property’s eligibility for reimbursement.

Each property owner shall ensure that the chosen roofing contractor obtains all required permits and inspections by the applicable jurisdiction. Periodic progress checks will be conducted by the MAST organization prior to a final inspection. The property owner shall provide approval from the Building & Safety Department that the roofing work has been completed in accordance with the California Building Code and local code amendments. The MAST organization and/or his/her designee shall “review and approve” or “review and deny” reimbursement based upon completeness of information submitted.

APPENDIX G

Fuel Treatment Techniques

Excerpted, *East Bay Regional Parks Wildfire Hazard Reduction and Resource Management Plan*. 2015.

This appendix provides a detailed discussion of the following fuel treatment methods and techniques:

- Hand Labor
- Mechanical Treatment
- Chemical Treatment
- Grazing

Hand Labor Techniques

Hand labor techniques vary significantly and can include pulling weeds and shrubs from the under-story, cutting saplings and chaparral, removing ladder fuels, and conducting mosaic thinning (which entails the removal of fuels within specific physical spaces to inhibit wildfires from torching trees). More common hand labor techniques to manage fuel loads are described below.

Weed Whipping

This technique uses a hand-held tool (normally gas-powered) that cuts grass and very small shrubs with a plastic line or cutting blade. Weed whipping is typically used annually after grasses have dried or cured so that the grass does not grow back. This technique reduces the height of the fuel, but does not create areas of bare soil, as the vegetation is not completely removed. However, while most large woody stems are not cut by the treatment (which limits its application on vines such as vinca, ivy, and Himalayan blackberry) seedlings can be severely damaged by the cutting line. Weed whipping is often the only type of "mowing" treatment possible in steep wooded areas or landscaped slopes. Heavier weed-whipping machines can be fitted with plastic or steel knives or serrated saw blades, such as brush cutters or brush saws. Utilizing a cutting blade enables the mulching of cuttings in a single process and allows treatment of woody stems, but this option is limited to pieces under 1 inch diameter in size.

Brush Removal

Hand labor can also involve the use of chainsaws and other instruments to masticate or remove brush and break apart brittle materials that can act as ladder fuels. Fallen branches and material cut from brush can then be further broken into compact mulch and distributed across the site or removed for disposal.

Ladder Fuel Reduction

Ladder fuel reduction entails removing or reducing the amount of understory shrubs, small trees, and small lower limbs of trees to create a vertical separation (i.e., discontinuity) between surface fuels and the tree canopy overhead. Ladder fuel reduction lowers ignitability, decreases available fuel, decreases the potential for spotting, and reduces heat output from understory fires, which in turn reduces the potential for fires to move from the ground up to "ladder" fuels and into the tree crown.

Thinning

Thinning dense stands of trees by removal of trees up to 10" dbh is a common hand labor technique. Such thinning is done to improve the health and vigor of the residual stand, including desirable understory

components, by reducing inter-tree competition for water, light and nutrients, and to make the stand more resilient to future fires by reducing the quantity and continuity of live and dead fuels that would otherwise contribute to rapid rates of spread, high intensity burning and extreme fire behavior.

Several types of thinning techniques exist to reduce the overall amount of fuels in an area, and can include (among others) low, crown, mechanical, mosaic, and drip-line thinning. Low thinning involves the removal of smaller, less vigorous trees in a stand. Crown thinning removes stems and branches to increase light penetration and air movement throughout the crown of a tree or stand. Mechanical thinning removes a selected number of trees according to a predetermined spacing amount or pattern and is particularly useful prior to harvesting or yarding operations. Mosaic thinning is a hand removal technique for fuel reduction where retained trees are variably distributed throughout the treatment area; rather than removing saplings, shrubs, and grasses evenly across an area. Tree “clumps” are alternately thinned to varying degrees to create a mosaic of plantings.

Drip-line thinning is a technique that involves removing shrubs and smaller trees that exist within the drip lines of overhead trees to prevent torching. In both cases removing smaller trees and shrubs, such as poison oak or coyote bush, is usually done with a hand-held chain saw; trees smaller than 3 inches in diameter may be removed with loppers as well. Because the material removed during these operations typically consists of smaller trees and shrubs that result in larger debris sizes, chipping or off site hauling is usually required.

Mulch Application

The application of mulch, such as wood chips from pruning operations, can slow the growth of grasses, shrubs, and saplings for up to one full season and acts as an effective temporary fuel reduction method. Mulch at depths of 2 inches or more increases the growth necessary for seedlings to reach the sunlight, thereby suppressing the number of plants that actually reach the surface.

Mechanical Treatment Techniques

Mechanical treatments tear or cut vegetation, rearranging the fuel’s structure and compacting the debris that is left behind. Specific techniques, such as those described below, can break apart or cut up vegetation into small pieces, tear up and bury the resulting debris, or remove plants entirely and pile the debris for burning or removal.

Grading

This technique is often used to maintain fire trails through wildlands, creating a strip of land absent of fuel. A tractor with an attached blade can effectively produce a firebreak 8 to 12 feet wide with one to two passes of the vehicle. Treatment is usually done in the spring after the ground is fairly dry but before grass is entirely cured (so that a fire cannot occur before the scraping is done).

Removal of all vegetation in the area disturbs water drainage patterns where the side banks of the graded land interrupt cross-slope water travel, and may also accelerate water travel inside the graded lane. The disturbance created by annually graded fire trails can result in excellent establishment sites for weed species, which also should be taken into consideration when considering this technique.

Mowing

Mowing using a tractor or similar equipment with a mower attachment, such as a rotary or flail mower, reduces fuel height which in turn reduces the flame length and possibly the rate of spread in a grass fire.

Timing of mowing has an impact on the type of grasses promoted; late mowing after annual grasses have cured enhances growing conditions for perennial native grasses, provided mowing does not occur during seed production. Mowing at the appropriate time to a height of approximately 4 inches minimizes weed and brush encroachment and reduces the amount of manual work needed to maintain the site, but should be avoided when birds are actively ground nesting in the area. Mowing of weeds and native grasses is typically required annually. Mowing may be used in conjunction with other techniques, such as disking, to require a thinner strip of disked area.

Mechanical Tree Removal

Feller-bunchers can be used to harvest or remove trees in a short period of time. The main advantages of using this equipment include a higher production rate, improved safety, reduced residual stand damage due to controlled felling, higher skidding productivity, and lower remaining stump height. Their disadvantages include distinct limits of stem size capability, higher initial capital investment, stability limitations on steep slopes, and limitations on operational areas due to rough terrain, boulders, or dense residual stand spacing. Feller-bunchers may need to be supported by skidders to move trees and materials to a landing, and by loaders and log trucks to remove trees and other materials from the site.

Mechanical Cutting and Crushing

A tractor or similar equipment can be used to crush fuel materials using a blade that is kept slightly off the ground. A variety of attachments include rollers (e.g., brush hog), a horizontal cutting blade (which operates similar to a large mower), or a set of chains to flail the material being treated. Grinding machines with an articulated arm to grind off woody material, and in some cases shatter or crush shrub roots, can also be used to reduce the overall size of materials.

Chipping or Mulching

This mechanical technique sometimes is used subsequent to other removal techniques and reduces the size of materials by passing them through a series of high-speed blades. The smaller-sized materials produced may then be removed from the site or redistributed as mulch. Natural compaction of this layer presents a fuel structure that is less likely to ignite. Larger grinders, such as tub grinders, can chip logs up to 24 inches in diameter.

Chemical Treatment Techniques

(Ed. Note: Chemical treatment is a controversial topic. It's inclusion here as a vegetation management tool is included for comparison's sake, and does not represent an endorsement or recommendation of the practice).

Chemicals that prevent seed germination (i.e., pre-emergence chemicals) and kill sprouted plants (post-emergence chemicals) can be used to establish firebreaks and in roadside treatments, or to assist in the restoration of less flammable native vegetation by inhibiting the growth of non-native species. Two primary treatment techniques are used:

- **Cut Stump Application:** To maximize the efficacy of treatment the tree must be cut leaving a stump not more than four (4) inches in height above soil surface and the cut surface of the stump must be treated with an herbicide within minutes of the cut. Garlon 4 Ultra is applied to the exposed cambium (zone of living transport tissue) layer of the tree. The herbicide is translocated to the roots and disrupts the transportation of nutrients and water, causing the plant to die.
- **Basal Bark Application:** This treatment consists of spraying at very low pressure a solution of Garlon 4 Ultra mixed with esterified vegetable oil to the lower 12 to 15 inches of the resprout. This

application method permits the operator to selectively treat resprouts without injury to adjacent vegetation, and is particularly effective on resprouts less than 6 inches in diameter.

Grazing Treatments

Although the concept of grazing is the same regardless of which type of animal is used, how each animal type conducts its grazing varies significantly. As a result, not all animals will be ideally suited for grazing treatments in all areas.

Cattle

Using cattle for grazing treatments is appropriate in large grassy areas (typically with a minimum of 100 acres) with a less than 35 percent slope. Cattle do not usually eat shrubby material, and so cannot be used to create fuel reduction zones. They will, however, easily maintain a grassland area. Cattle grazing for commercial production can be cost-effective, and even revenue-generating depending on the use agreement.

The availability of alternative pastures on public open space or private property in the vicinity of treatment areas where livestock can be moved following attainment of target use levels is critical to reducing potential adverse impacts. Fencing must be used to prohibit grazing animals from venturing into areas outside the treatment area. However, fencing is typically the major expense in utilizing livestock for fuel management. As a result, ranchers and others supplying grazing animals are typically asked to provide and repair fencing during treatment. Additionally, water sources are required for animals and need to be provided if an insufficient number are available at the treatment site. Exclusion fencing to prevent livestock from gaining access to riparian zones and wetlands may be necessary to prevent degradation of water quality and habitat.

Horses

Grazing with horses is another effective way to reduce fire hazards because they prefer grass and other plant materials that constitute flashy, ignitable fuels during summer months. Horses can be grazed on slopes over 35 percent, making them an ideal complement to cattle grazing, but erosion can be a problem in small acreages where bare dirt is exposed as a result of high hoof traffic. Horses do not usually prefer shrubby material, and so cannot be used to completely clear areas as firebreaks. Horse grazing in areas open to the public may generate user conflicts as well.

Sheep

Sheep will eat both forbs and grasses, will graze steep slopes, and are more likely to eat shrubs than horses or cattle. Their herding instinct allows grazing without the installation and maintenance of permanent fences, but requires that a shepherd and dogs be present.

Sheep grazing also requires that drinking water sources be present, which typically are provided through hauled water tanks. A combination of sheep and goats can be a viable option when a mixture of grass and shrubs are present in the area to be treated.

Goats

Conversely to cattle and horses, goats prefer to “browse” on woody vegetation (e.g., tree leaves, twigs, vines, and shrubs) and will eat materials up to 6 feet above the ground. This grazing pattern creates a desirable vertical separation between the canopy and ground cover, but is best used in areas with low numbers of plants intended for retention, since goats will indiscriminately damage most plants (the bark of large-diameter trees is typically not affected, however). Goat grazing is also preferable in areas of steep

terrain, where other grazing animals are less-suited for the topographic conditions and are therefore less effective in grazing to achieve the desired vegetation management results.

Goats can utilize a variety of forages including the light and heavy fuels discussed above. Goats are also active and explorative eaters, often climbing trees in pursuit of food and nutrition. This propensity towards variety coupled with an uncanny ability to consume unlikely feedstuffs such as low lying branches, small trees, grasses, weeds, chaparral, shrubs and a panoply of fire-hazardous exotic and invasive species, creates the unlikely but none the less perfectly suited fire fighting tool in the goat.

As a goat moves through a fire prone area it will begin to target the light fuels while browsing on the branches of trees and shrubs as high as it can reach (up to approximately five feet). This vegetation is the ladder fuel, the vegetation which allows fire to spread upwards from ground, to trees, to homes. Slowly but efficiently the goat will increase the distance between combustible vegetative materials.

Portable electric fences are commonly used to help control the herd and the outcome of their grazing. Measures may also be taken to prevent girdling of small trees that can result from the goats browsing on tree bark. A herd of 200-300 goats can graze up to 1 acre per day. Herd movement has the advantage of breaking off dead material in a stand as well as punching a humus layer into the soil (if the ground is somewhat moist) and thereby removing available fuel. Plans should include goals and implementation actions to ensure that timing of grazing treatment is optimal to prevent the spread of seeds from invasive and other targeted species and to maximize fuel reduction. The plan should also provide a range analysis to determine the optimum stocking rate and duration. Monitoring should be conducted by qualified personnel to determine when utilization and fuel load objectives are attained so that grazing animals are removed in a timely manner.

APPENDIX H

All Hazards Annex

Although wildfire is among the most significant risks to the community of Sleepy Hollow, additional hazards exist with potential life-safety and infrastructure risks. The *All Hazards Annex* identifies the most significant non-wildfire hazards and provides additional resources for assessment and mitigation.

Major Hazards

Earthquake

Research conducted since the 1989 Loma Prieta earthquake by the U.S. Geological Survey (USGS) concludes that there is a 70% probability of at least one magnitude 6.7 or greater quake, capable of causing widespread damage, striking the San Francisco Bay region before 2030, emphasizing the urgency for all communities in the Bay region to prepare for earthquakes.⁸

A significant seismic event could result in severe property damage to public and private infrastructure including electric distribution lines, telecommunications infrastructure, water, and gas lines in Sleepy Hollow. The Marin County Local Hazard Mitigation Plan estimates that damage from a rupture generated by a magnitude of a 7.3 earthquake on a nearby fault is predicted to damage large numbers of housing units in Marin, rendering a significant number uninhabitable.

Based on selected earthquake scenarios for the Bay Area's vulnerability, the Association of Bay Area Governments (ABAG) has developed estimates of potential losses in specific geographic areas, based on earthquake scenarios on specific local fault lines. Potential damage and shaking is estimated using the Modified Mercalli Intensity (MMI) scale. The entirety of Sleepy Hollow would be subject to Level VII or VIII shaking during a significant earthquake along the San Andreas Fault⁹, indicating "*slight damage in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.*"

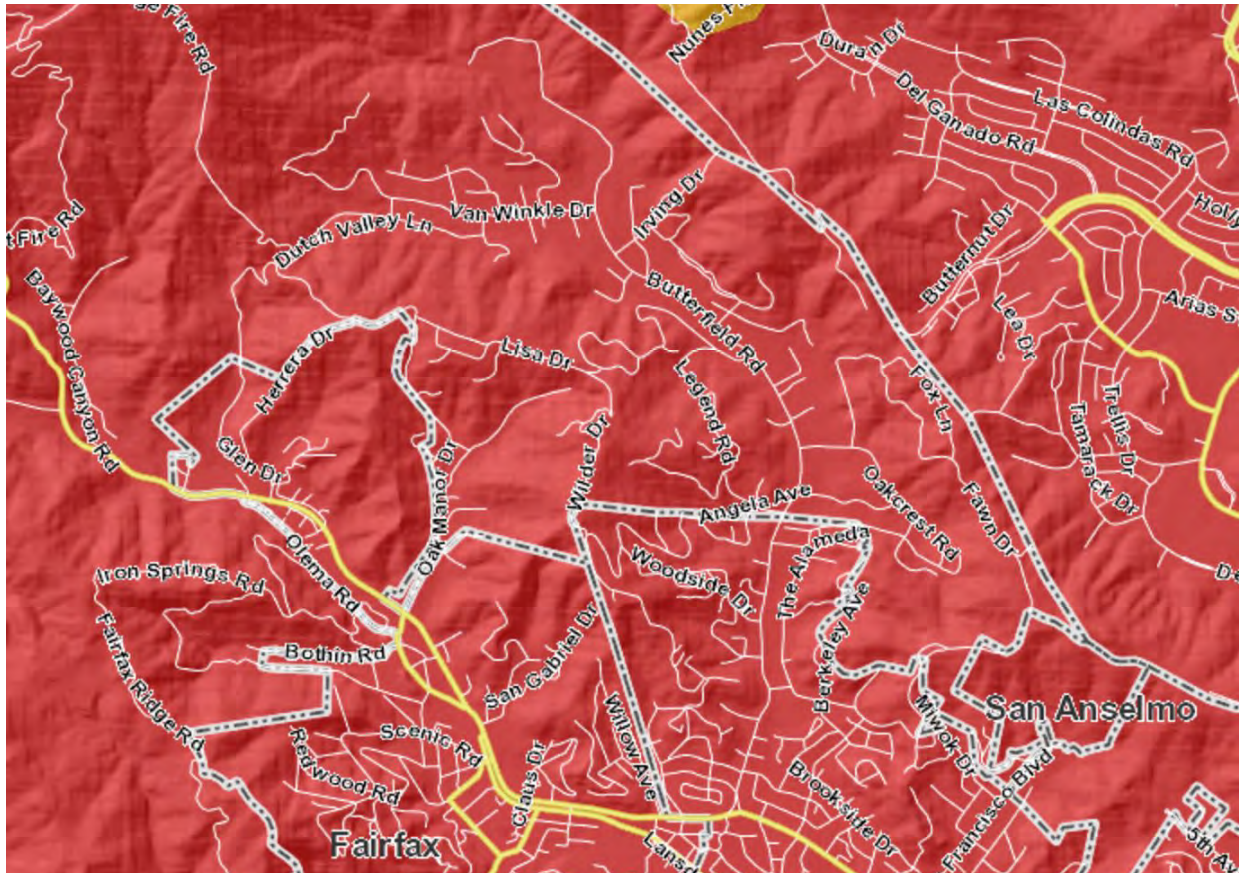
Liquefaction happens when loosely packed sandy or silty materials saturated with water are shaken hard enough to lose strength and stiffness. Liquefied soils behave like a liquid and are responsible for tremendous damage in an earthquake, causing pipes to leak, roads and airport runways to buckle, and building foundations to be damaged. **No areas of Sleepy Hollow are subject to liquefaction.**¹⁰

⁸ <http://resilience.abag.ca.gov/earthquakes/>

⁹ <http://gis.abag.ca.gov/website/Hazards/?hlyr=northSanAndreas&co=6041>

¹⁰ <http://gis.abag.ca.gov/website/Hazards/?hlyr=liqSusceptibility>

Modified Mercalli Intensity (MMI) Scale Damage Estimation In Sleepy Hollow



San Andreas (All Northern Segments) (M7.8)

Shaking Severity

- Light - MMI 5
- Moderate - MMI 6
- Strong - MMI 7
- Very Strong - MMI 8
- Violent - MMI 9
- Very Violent - MMI 10

Earthquake Preparedness

As a resident of the Bay Area earthquakes are a part of life, but there are some simple steps you can take now to help your family survive and recover from the next big quake. Follow the steps below to prepare and plan.

Retrofit Your Home or Apartment

- [Guide to earthquake vulnerable housing types](#)
- [Steps for strengthening your home](#)
- [Find a retrofit contractor, engineer or home inspector](#)
- [Standard plan set for seismic retrofitting \(Plan Set A\)](#)
- [Frequently Asked Questions about retrofitting](#)
- [Find a retrofit program in your city](#)
- [View retrofitted homes and buildings in your neighborhood](#) – add yours!
- Consider [earthquake insurance](#) to help you rebuild and get back on your feet. This is especially important if you are a renter or live in an area susceptible to liquefaction or landslides

Secure Your Home Contents

- [Secure your water heater, cupboards, and furniture](#)
- [Chimney safety](#)
- [Video of house contents on a shake table](#)

Make a Family Emergency Plan

- [Make a plan and know what to do](#)
- [Make an earthquake kit](#)
- [Natural gas safety and gas shutoff valves](#)
- [Plan for water and sewer disruption](#)
- [Plan for driving after disasters](#)
- [Resources for special needs and vulnerable populations in disasters](#)

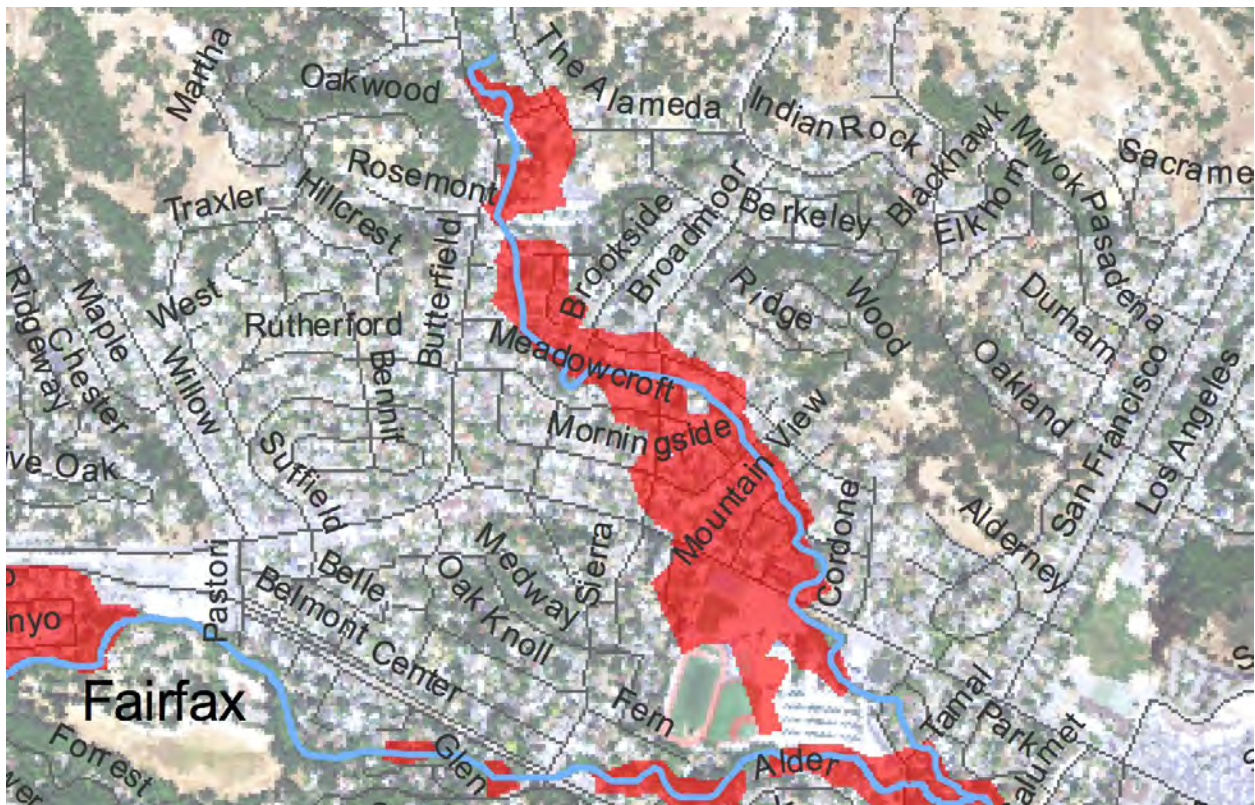
Resources

- [USGS Earthquake Facts](#)
- [Major Quake Likely to Strike Between 2000 and 2030](#)
- [Earthquake FAQ's](#) from the United States Geological Survey (USGS)
- [Earthquake Maps & Information](#) from the Association of Bay Area Governments (ABAG)
- [Liquefaction Maps & Information](#) from ABAG
- An historical perspective from the [1906 San Francisco Earthquake](#)
- [Recent earthquakes](#) in the SF Bay Area
- [National Earthquake Hazards Reduction Program](#)
- [The California Earthquake Authority](#) (CEA) is a publicly managed, privately funded, not-for-profit organization that provides residential earthquake insurance and encourages Californians to reduce their risk of earthquake damage and loss.

Flood

Flooding poses a variety of risks to people and the environment. In recent history, the winter storms of 1970, 1973, 1982, 1983, 1986, 1998, 2005 and 2006 caused significant damage in Marin, including Sleepy Hollow. Corte Madera Creek, of which Sleepy Hollow Creek is a tributary, has a history of flooding with the largest recorded flow in the winter of 1982. High flows in December 2005 and January 2006 caused severe damage, with San Anselmo, Ross, Fairfax, and Mill Valley most heavily impacted. Power outages, schools closures, mudslides, road closures and infrastructure damage are common during winter storms and flood events.

In Sleepy Hollow, FEMA has designated all parcels located in the floodplain as *Flood Zone X*, defined as “areas determined to be outside 500-year floodplain, and/or determined to be outside the 1% and 0.2% annual chance floodplains.”¹¹ The Ross Valley Flood Protection & Watershed Program identifies no parcels within SHFPD as being inundated during a 100-year flood event. Minor localized flooding, with associated property damage, was recorded in 1982 and 2005/6 in Sleepy Hollow, primarily in the Green Valley Court neighborhood and isolated parcels adjacent to the creek.



Ross Valley Flood Protection & Watershed Program 100 Year Flood Map ¹² of areas **adjacent (SE) to SHFPD**. Note that SHFPD's area is not pictured, as no flooding is predicted in District.

¹¹ <http://www.floodmaps.com/zones.htm>

¹² http://www.marinwatersheds.org/documents/Plate3-5_RossValleyEcon_100yr.pdf

Types of Floods

Waterways

Floods are generally classed as either slow-rise or flash floods. Slow-rise floods may be preceded by limited warning time. Evacuation, sandbagging and other preventative measures for a slow-rise flood may lessen flood-related damage. Conversely, flash floods are difficult to prepare for due to extremely short warning time. Flash flood warnings usually require immediate action within the hour. All flood waters can cause road closures and sweep away objects and people.

Debris Flow

Debris flow, including landslides caused by excessive rainfall, can cause serious damage. Sleepy Hollow hillsides are subject to landslides and debris flows.

Coastal Flooding

Not identified as a risk in Sleepy Hollow.

Tidal Flooding

Not identified as a risk in Sleepy Hollow.

Although restrictions exist for development in flood-prone areas as they apply to the County's Floodplain Management Ordinance, recurring flooding occurs throughout the county due to the unpredictability of tides and heavy rainfall. In Sleepy Hollow, a history of minor flooding routinely causes property damage along the Sleepy Hollow Creek corridor.

The Lower Sleepy Hollow Creek Project Improvements are a portion of the Ross Valley Flood Protection & Watershed Program administered by the Marin County Department of Public Works. The select improvements are described in the Capital Improvement Plan Study¹³ for Flood Damage Reduction and Creek Maintenance for Flood Control Zone 9/Ross Valley (Study) by Stetson Engineers dated May 2011. Most of the improvements are proposed outside of SHFPD in the Town of San Anselmo, along Sleepy Hollow Creek from Broadmoor Avenue Bridge down to the Taylor Street Bridge as shown on the overview map¹⁴. The goal of all the improvements is to create additional creek flow capacity to contain a 25-year flow. Conceptual improvements include bridge replacements, retaining wall replacements, bank stabilization, building relocation or removal, creek channel enlargement, concrete removal from the creek bed, and flood barriers along the top of bank as shown on the three detailed maps below. The Study indicated that further study is needed to refine the conceptual improvement options. The Study also indicated that detention basins are not needed along Sleepy Hollow Creek to provide 100-year flow capacity if all elements of the Program are constructed as described in the Study.

¹³ http://www.marinwatersheds.org/pubs_reports_ross_valley.html

¹⁴

http://www.marinwatersheds.org/rossvalleywatershed-org/documents/LowerSleepyHollow_areamap_201600706_detailmapextents.pdf

However, detention basins are required with these project to offset the additional creek flows downstream of the Lower Sleepy Hollow Creek Improvements.

Potential sites for alternative flood detention basins, such as at Hidden Valley Elementary School, might be considered within the boundaries of SHFPD.

Flood Preparedness

Sleepy Hollow Residents are advised to prepare for potential flooding and winter storms by reviewing local resources:

- [Ross Valley Flood Protection and Watershed Program](#)
- [Ross Valley Fire Department Creeks and Storm Information](#)
- [Ready Marin](#)
- [Real-Time Rainfall, Creek Stage, and Weather Data](#)

When you hear on the radio or TV that there is a “Flood Watch” or a “Flood Warning” it’s already too late to begin preparing for the high water. Please prepare for the possibility of flooding ahead of time. Following are some things to do now as well as resources and links to helpful information:

- Rake fallen leaves and dispose regularly in a green bin, to prevent backups in gutters and storm drains.
- Sign up to receive emergency calls, text, and/or email notification alerts using AlertMarin at www.alertmarin.org.
- To check where to purchase sandbags in your area, please visit the Sheriff’s Office of Emergency Services webpage, www.marinsheriff.org. To obtain further information on training and education to keep you and your family safe, warm, and fed in the event of a flood please visit the website www.readymarin.org
- Buy a NWS radio (see below for a recommendation) to be ready for weather updates
- Put a flashlight, radio and spare batteries in an easy place to find if the power goes out
- Remove hazardous materials (paints/chemicals, etc.) from flood prone areas such as garages and sheds
- The National Weather Service recommends having a NOAA weather radio, such as the Midland WR-100B SAME Weather and All Hazards Alert Monitor. NOAA weather radios can be purchased online or at a local electronics store.

Minor Hazards

Other hazards in Sleepy Hollow include threats with limited historical data as a basis to assess vulnerability.

Public Health Emergencies

Public health emergencies include disease and pandemics. For more information visit the Marin County Public Health Preparedness page¹⁵, and the [Emergency Medical Services Disaster Response](#) page.

The excellent guide “Expanded Medical Preparedness: A guide for Neighborhoods” is available from the Marin County Department of Public Health.

- [Complete Guide](#)
- [First Section](#)
- [Appendix A - First Aid Stations](#)
- [Appendix B - Position Checklists](#)
- [Appendix C - Forms](#)

Tsunami

Not identified as a risk in Sleepy Hollow. A Tsunami Ready™ program, currently being developed by Marin County OES, provides a solid basis for response and mitigation planning in other Marin locations subject to Tsunamis.

Terrorism

Since the September 11, 2001 terrorist attacks, the threat of terrorism has become a significant concern in the United States. Terrorism has been defined by the FBI as “the unlawful use of force or violence against persons or property to intimidate or coerce a government; the civilian population; or any segment of it, in furtherance of political or social objectives.” Terrorism is the most difficult hazard to predict and assess, and this activity is done at a different jurisdictional level.¹⁶

Preparation for a possible terrorist attack should follow the same guidelines as preparation for preparing for any major disaster.

- For more information visit the FEMA: Terrorism website - <https://www.ready.gov/terrorist-hazards>.
- Bioterrorism is terrorism by intentional release or dissemination of biological agents (bacteria, viruses or toxins); these may be in a naturally-occurring or in a human-modified form. For more information visit <https://www.ready.gov/biological-threats>.

¹⁵ <https://www.marinhhs.org/public-health-preparedness>

¹⁶ http://www.marinsheriff.org/assets/downloads/LHMP_2012update_withResolution.pdf

- Marin County's Are You Ready? Terrorism Preparedness Information at <http://www.marinsheriff.org/assets/downloads/Are-You-Ready-Terrorism-Preparedness-Information.pdf>

Power Outages

A power outage is disruptive to all those affected. Power outages due to rolling blackouts or caused by inclement weather may inconvenience the general public, but people with significant disabilities and others who are sensitive to cold or heat because of age or health conditions are at a greater risk when electrical power is unavailable. Many of the elements of preparing for a major disaster are directly applicable to preparing for a power outage. For the health and safety of all involved, preparation is the key.

For more information visit [Pacific Gas & Electric's Storms, Outages and Safety web page](#) [includes outage maps].

Community Emergency Response Training (CERT)

Neighborhood Preparedness depends on individuals that have completed personal preparedness activities, and can be expanded to include groups of individuals with more extensive training working together to provide care and services within the neighborhood. Expanded neighborhood preparedness in Sleepy Hollow might include:

- Community Emergency Response Training (CERT)
- Neighborhood communication system
- Shelters and local patient treatment areas

In the event of a significant regional emergency, first responders may be overwhelmed. It is critical that citizens be prepared to take care of themselves, their neighbors, and their community for several days without outside assistance. Community Emergency Response Training (CERT) is an organization of volunteer emergency workers who have received specific training in basic disaster response skills, and who agree to supplement existing emergency responders in the event of a major disaster.

The County of Marin Department of Public Health recommends that neighborhoods interested in advancing their preparedness level utilize the CERT curriculum endorsed by the Marin County Operational Area Disaster Council or an equivalent program endorsed by the city or town with jurisdiction (Ross Valley Fire Department participates in the Marin County CERT Program).

Community Emergency Response Team (CERT) training is based on a FEMA Recognized national program¹⁷ developed to train citizens to help fill the gap between a disaster or

¹⁷ <https://www.fema.gov/community-emergency-response-teams>

emergency, and the arrival of professional services. In Marin, the cost is \$45 per individual, with scholarships available.¹⁸

After completing a CERT course, individuals should be able to provide immediate assistance to handle small fires, turn off utilities, give basic first aid, perform light search and rescue, and collect information to provide arriving professional first responders.¹⁹

CERT “teams” require adequate numbers of trained personnel to staff pre-designated positions and the establishment of a neighborhood communication system. The communication system connects CERT teams to each other and to shelters and Treatment Areas. First aid treatment areas, shelters, and disaster supply distribution are set-up by CERT trained individuals who provide support and care using pre-designated supply caches.

Neighborhood-level communication systems, and identification of appropriate shelters, first-aid treatment areas, and rallying points should be identified during the development of a localized CERT plan in cooperation with SHFPD, Ross Valley Fire Department, Marin County Sheriff’s Office, and community volunteers.

¹⁸ <http://www.readymarin.org>

¹⁹ <http://www.readymarin.org>

APPENDIX I

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