

APPENDIX 4.3-A
DRAFT WILDLAND FIRE PROTECTION PLAN

WILDLAND FIRE PROTECTION PLAN

January, 2023



KORTUM RANCH

CALISTOGA, CA



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I – EXECUTIVE SUMMARY

This wildland fire protection plan for the Kortum Ranch subdivision is intended to meet the requirements established by the Calistoga Fire Department. The purpose of the plan is to describe actions needed to prevent ignitions, maintain vegetative fuels in a fire-safe condition, and provide adequate fire response and evacuation opportunities. To make vegetation management easier to implement, the plan (1) delineates fuel management zones, (2) establishes appropriate treatments for each, plus (3) documents maintenance requirements and mechanisms for enforcement.

This wildland fire protection plan addresses homeowner emergency preparedness in the event of an emergency, as well as fire-resistant and drought-tolerant landscaping that homeowners can use to protect their properties against wildland fire.

The various elements in the fuel management portion of the plan (e.g., fuels, access, and construction) all comply with local ordinances. All buildings will have interior fire extinguishing sprinklers. Construction will be of ignition-resistant materials and design, based on non-combustible, or large dimension materials. Access and water supply are similarly compliant with local ordinances and anticipated emergency water demands.

II – PROJECT DESCRIPTION

a. PROPOSED PROJECT LOCATION

GENERAL LOCATION OF THE PROJECT

The proposed Kortum Ranch project site is located low on the northeastern slopes of the Mayacamas Mountains that form Napa County's border with Sonoma County, lying just within the southwestern limits of the City of Calistoga, approximately 1000 feet south of the Napa River. The 30.11-acre subdivision off Kortum Canyon Road, which runs southwest directly off State Highway 128/State Highway 29/Foothill Blvd. The Kortum Ranch site abuts open space and viticultural areas to its south, east, and southwest, with residential neighborhoods in the City of Calistoga facing it across Foothill Blvd to the north.

The western boundary of the residential properties is also the City of Calistoga boundary.

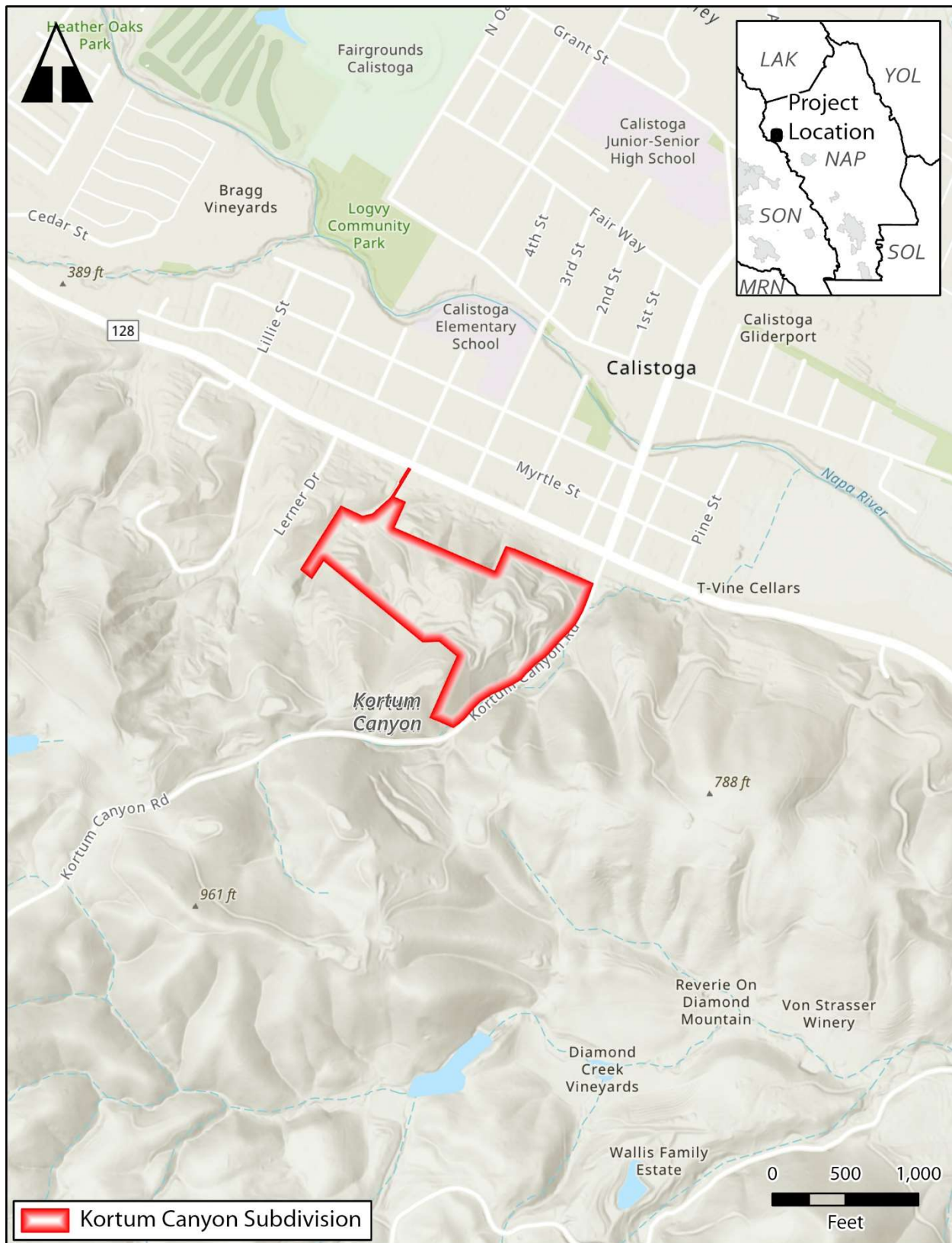


Figure 1. General location of project site showing regional watershed.

DESCRIPTION OF ADJACENT PROPERTIES

The project site wraps around a north-facing hillside into a northeast-southwest-running canyon that runs into the Mayacamas Mountains, placing the site at the interface between residential neighborhoods, agricultural lands, and vast open space extending west to Healdsburg, Windsor, and Larkfield-Wikiup and southeast to Sonoma.

The project is immediately surrounded on the north by mixed, low-density residential and commercial land uses in the City of Calistoga, which is bisected by a strip of riparian woodland surrounding the Napa River. As Figure 2 below demonstrates, the proposed subdivision will be one of few residential neighborhoods in Calistoga to the south of Foothill Blvd/Highway 128/Highway 29. Most land uses to the south, west, and east are open spaces dominated by oak woodlands and coniferous forests, with large patches of land zoned for agriculture – mainly used for viticulture – lying roughly 1500 feet to the southwest, 500 feet to the northeast, and immediately next to the property's southeastern corner.

Residential properties abut the project site to the northwest and northeast, with lot sizes ranging from approximately .2 acres along Foothill Rd (Hwy 29) to 2.5 acres for parcels accessed by Lerner Dr. Large residential parcels (in unincorporated Napa County) form the western border the southwestern portion of the development. One large parcel (101 acres) is the Calistoga Hills Resort, which is a Planned Unit Development. While not immediately adjacent, the project, The Jackson Family Estates vineyards 39 acres (approx. 25 acres planted) as well as the Sori Bricco Vineyards 163 acres (approx. 60 acres planted) to the West of Kortum Ranch do provide a substantial agricultural fuel break for the project. Similarly, to the South the adjacent vineyard lands of 1520 Acquisition LLC and Diamond Mtn Vineyard Company create substantial fuel separations from surrounding wildlands.



Figure 2. View of the City of Calistoga east of the project site

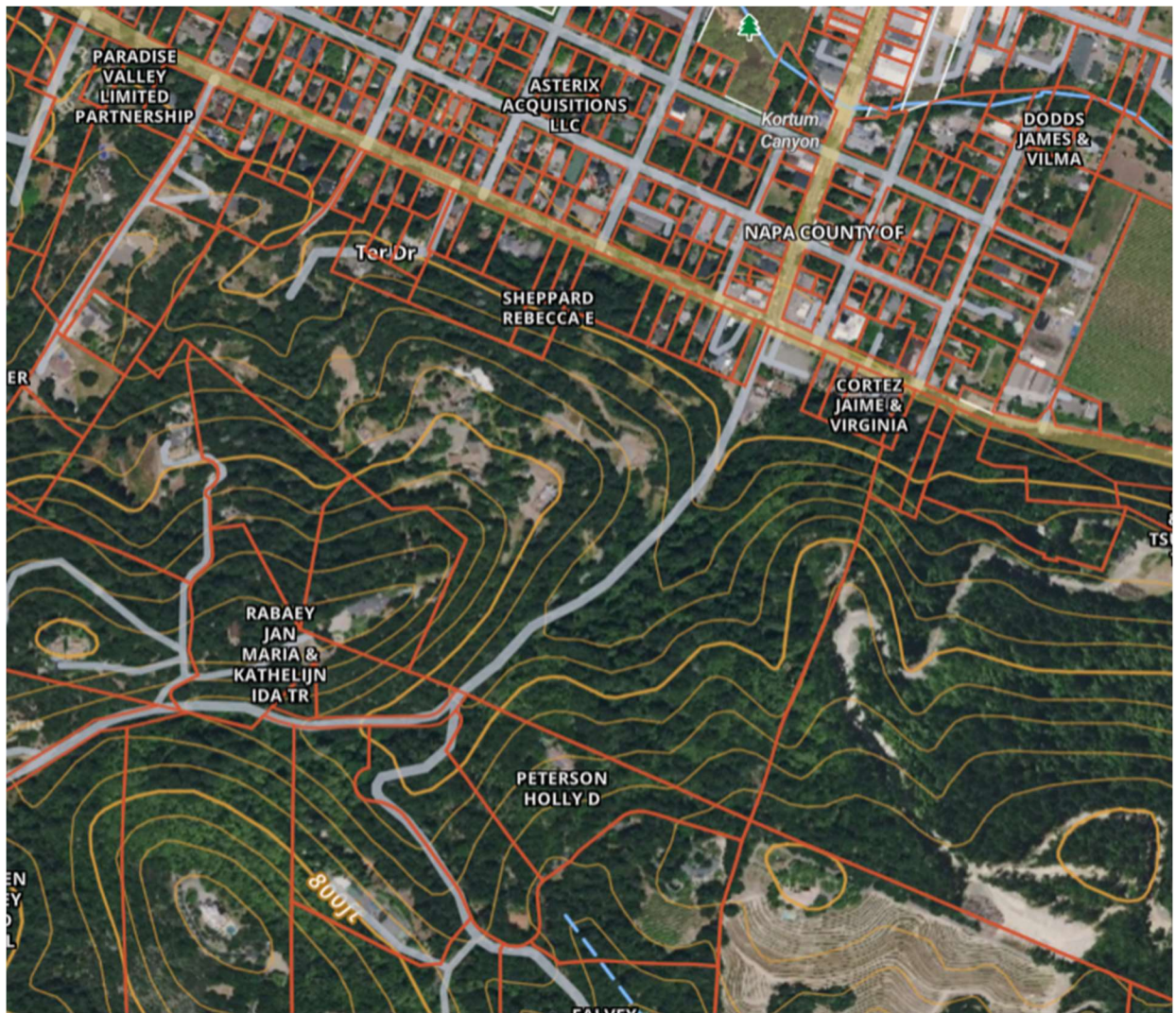


Figure 3. Land development pattern near Kortum Ranch

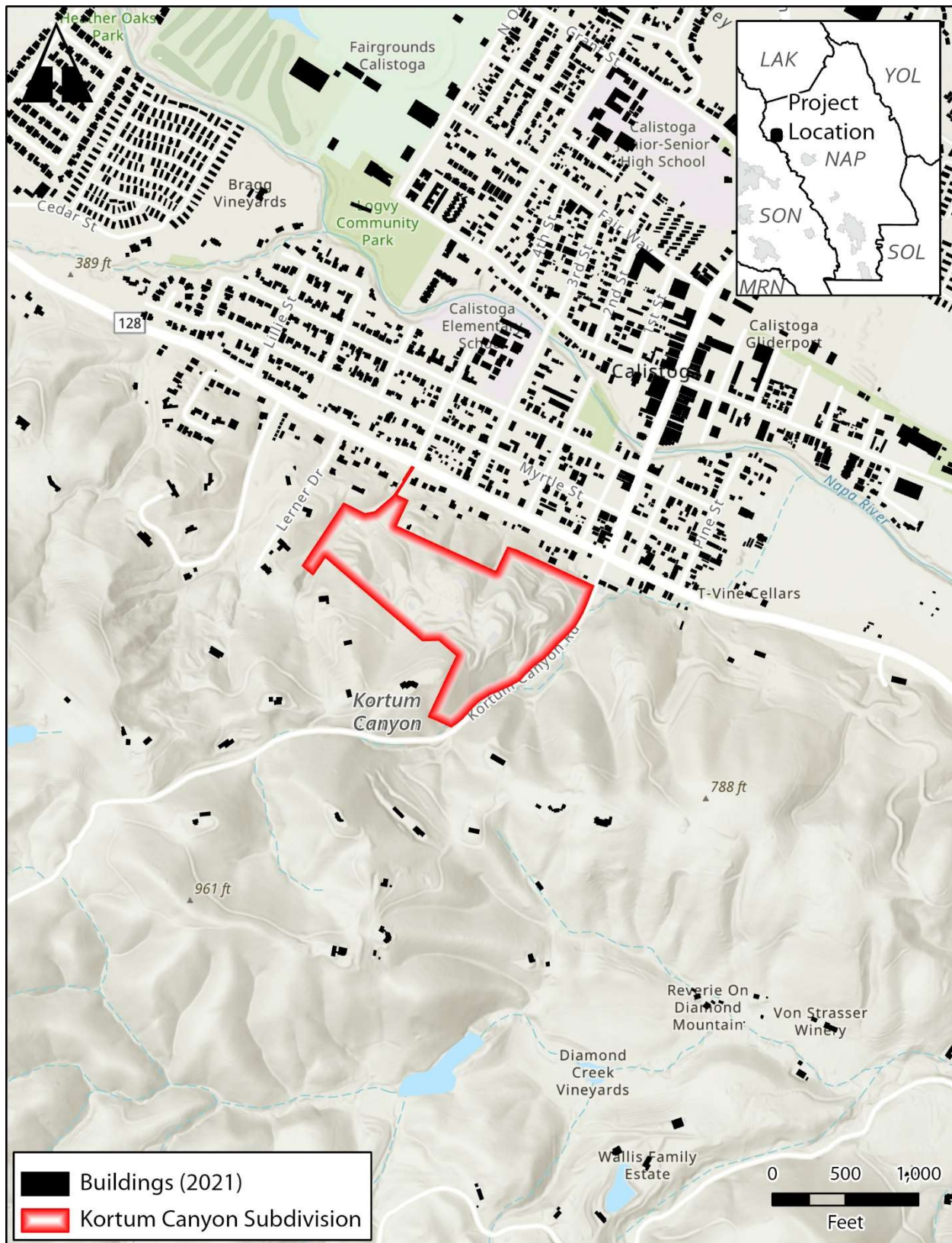


Figure 4. Map of the project site and surrounding vicinity showing existing structures as of 2021.

The project creates 20 homes on as many lots on 30.11 acres of the site. All but three of these homes are designed to be clustered in the middle of the property on existing graded areas, leaving large undeveloped areas to the west, northwest, south, and northeast of the subdivision. A utility easement cuts through Lot 2 and continues along the boundaries of Lots 1 and 3 to connect Kortum Canyon Road to the subdivision's proposed central thoroughfare; another utility easement bisecting Lot 8 and 9 also runs along the boundary lines between Lots 5, 7, 8 and 19. The open space areas on the 20 parcels will be maintained by the homeowners association (HOA).

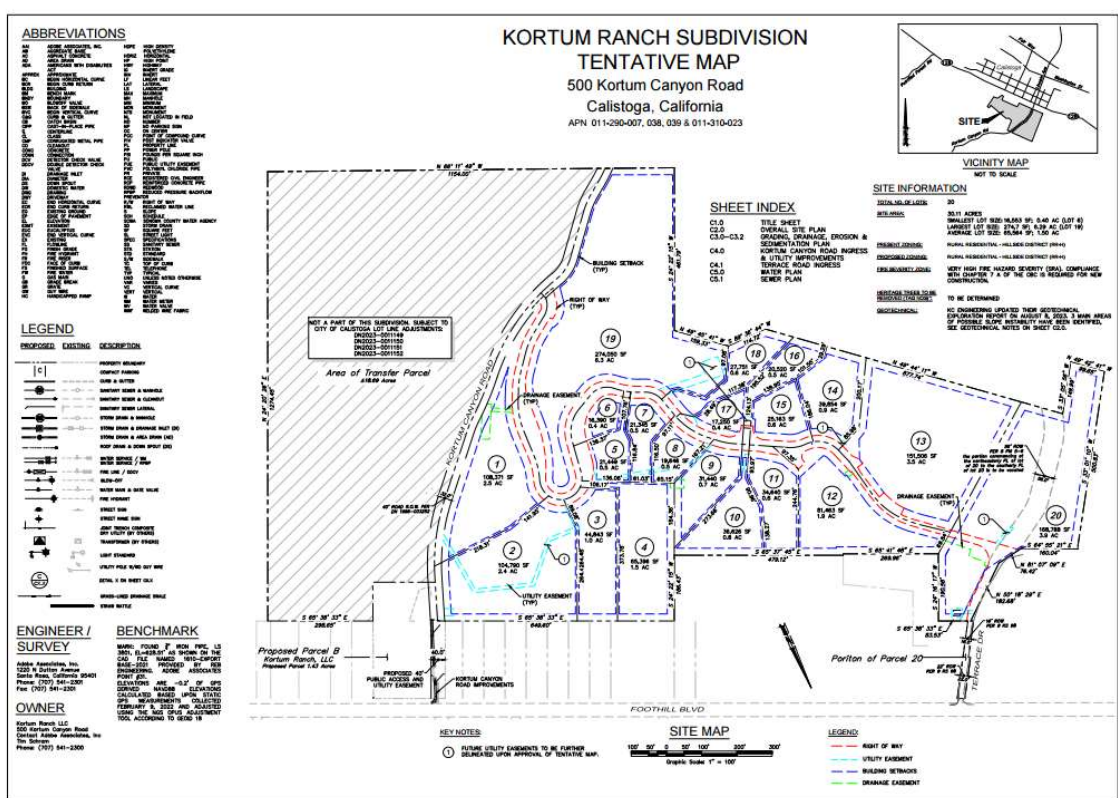


Figure 5. Map of project site with lot boundaries and sizes indicated.

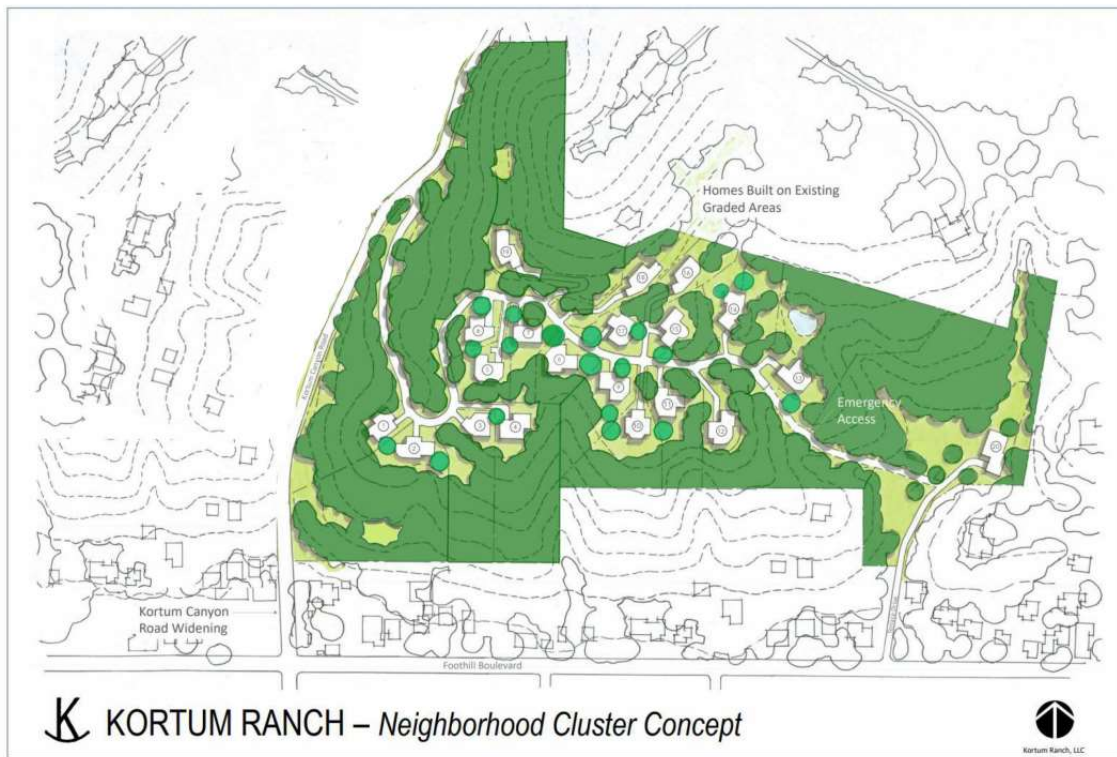


Figure 6. Map of project site showing proposed land uses.

b. PROPOSED ACCESS

ACCESS TO THE PROJECT SITE

Vehicular access to the 20 building sites as well as the open space is provided by Kortum Canyon Road which departs from Highway 29/128 Foothill Blvd at the Lincoln Street Intersection and heads southwest with the entrance to the proposed site on the right. There is an additional access route from the Terrace Drive which is the next street after the Lincoln intersection. The Kortum Ranch development has one proposed thoroughfare with individual driveway spurs to each homesite.

VEHICULAR ACCESS AND EGRESS TO AND FROM THE PROJECT SITE

Access and egress to and from the project site is provided via Kortum Canyon Road and Terrace Drive. Lot 20 is effectively given access on Terrace Drive while the remaining 19 sites are on the primary Development road.

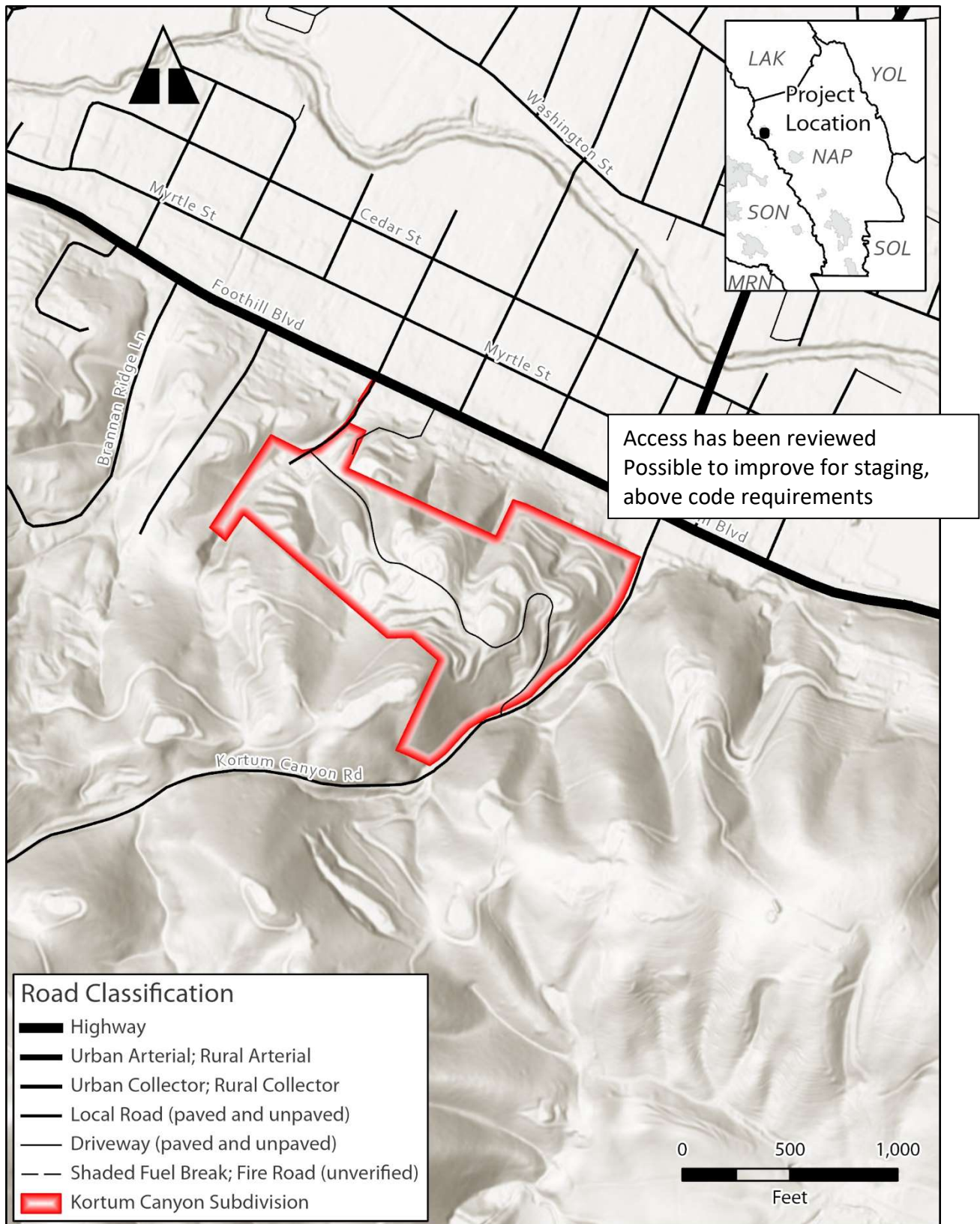


Figure 7. Map of access roads in project vicinity.

ACCESS WITHIN THE PROJECT SITE

Access within the project site has been reviewed and is compliant with current code. In addition, possibilities for fire response staging are being explored; this is in addition to any requirements. Homesites are located along one main road which departs from Kortum Canyon and trends roughly North Northwest. Proper radial access will need to be considered from Kortum Canyon to ensure that emergency vehicles including Type 1 fire apparatus are able to safely navigate the hairpin turn from Kortum Canyon into the site throughfare. The primary thoroughfare will be 26 ft. in width), and the driveway spurs should have adequate width. The primary thoroughfare empties onto Terrace Drive. Terrace drive may benefit from improved turning radius sufficient for Type 1 apparatus to turn around and for responding vehicles to stage in the event of an emergency response scenario. Grade does not exceed the maximum allowable of 15% on any of the access road. Driveways to each site are short and comply with Calistoga/Napa County Code.

Upon complete build-out of the project, an estimated forty-four vehicles would be added to the traffic on Highway 29 for evacuation needs. Residents, visitors, and emergency responders have three ways to access and egress the site. Vehicles can use Kortum Canyon Road, and Terrace Drive to reach Highway 29. Vehicles can also use Kortum Canyon Road to travel east to the Sonoma border.

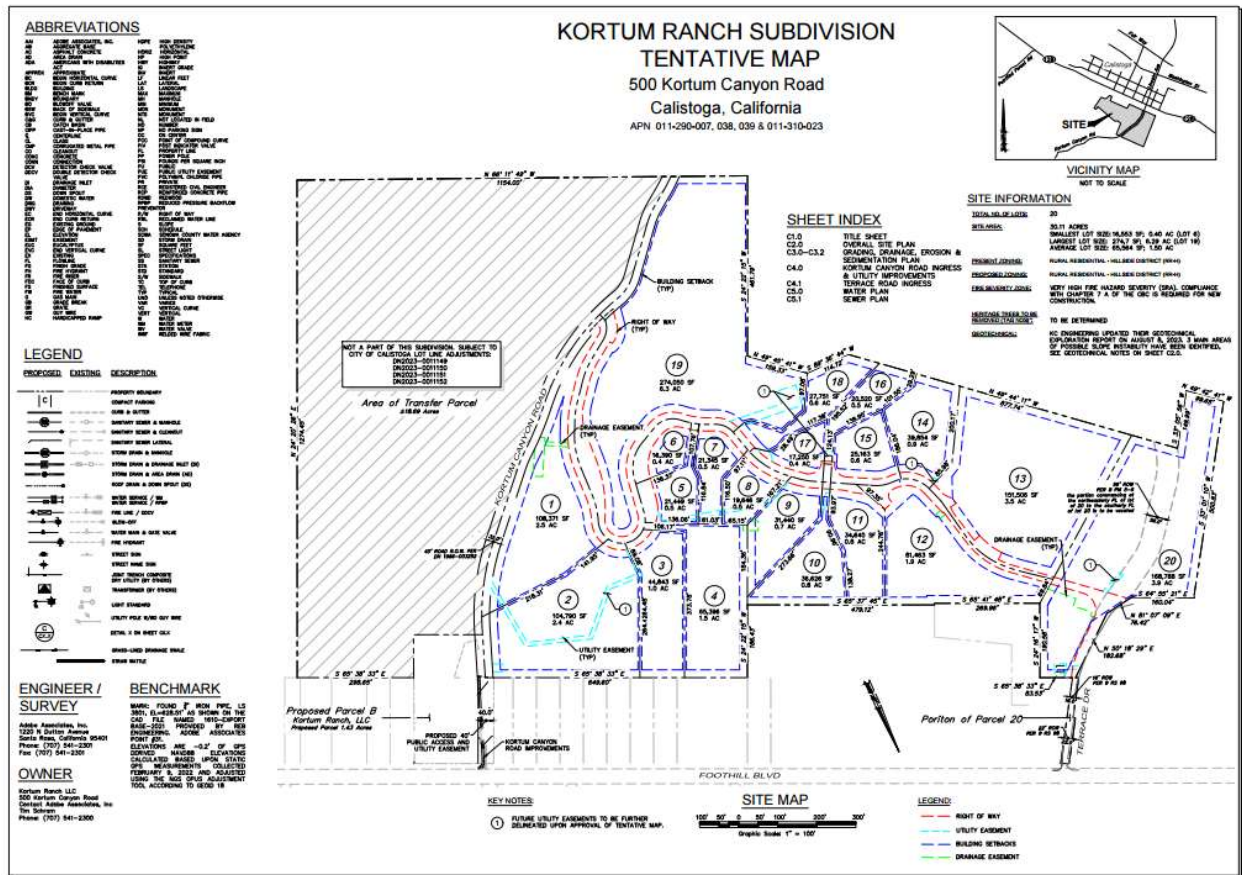


Figure 8. Kortum Ranch site plan showing parcel divisions and street access.

III – EXISTING CONDITIONS

a. FACTORS TO CONSIDER IN THE FUEL MANAGEMENT PLAN

TOPOGRAPHY

Topographic features - such as slope, aspect (orientation with respect to sun and wind), and the overall form of the land - have a profound effect on an area's ecology and the pattern of heat transfer in a wildfire. Topography affects a wildfire's intensity, burning rate (consumption of fuels), direction, and rate of spread. An area's topography also affects local winds, which are either "bent" or intensified by topographic features. Topographic features can also induce diurnal upslope and downslope winds. The speed, regularity, and direction of winds directly influence the direction of wildfire spread and the shape of the flame front. The project site provides commanding vistas of the Northern Napa Valley.

The slopes are generally less than 30 percent in grade. The project rises on both sides of Kortum Canyon Road. The previous landowner graded large pads, and as a result, much of the site is relatively flat. Steep slopes are located below proposed homesites, which could facilitate fire

spread to these structures. The undeveloped parcel south of Kortum Canyon rises from the valley floor near 300-ft elevation, and reaches the highest elevation on the project, at more than 750-feet in elevation.

The site sits above Foothill Rd, which could be an ignition source. Because the site is buffered from the road by a line of residences, this is of lesser concern since fire suppression is expected to be effective on these residential parcels.

An important topographical feature of the site is the existence of six topographical draws. These present an important fire behavior characteristic known as a chimney. These small canyons have substantial fuel and steep terrain on either side. In a wildland fire event this can cause accelerating fire and concentrated flame impingement and radiant heat behavior. The chimneys wrap around the development and can be numbered to orientate the relative risk to particular structures. In addition to the draws there are specific areas which have more gradual or extreme slopes which need to be considered relative to fuel density. Figure 8 below shows each draw represented by a colored arrow. Specific fuel remediation steps can be found for specific structures near those chimneys.



Figure 9. A topographic draw, or “chimney” that justifies fuel treatment.

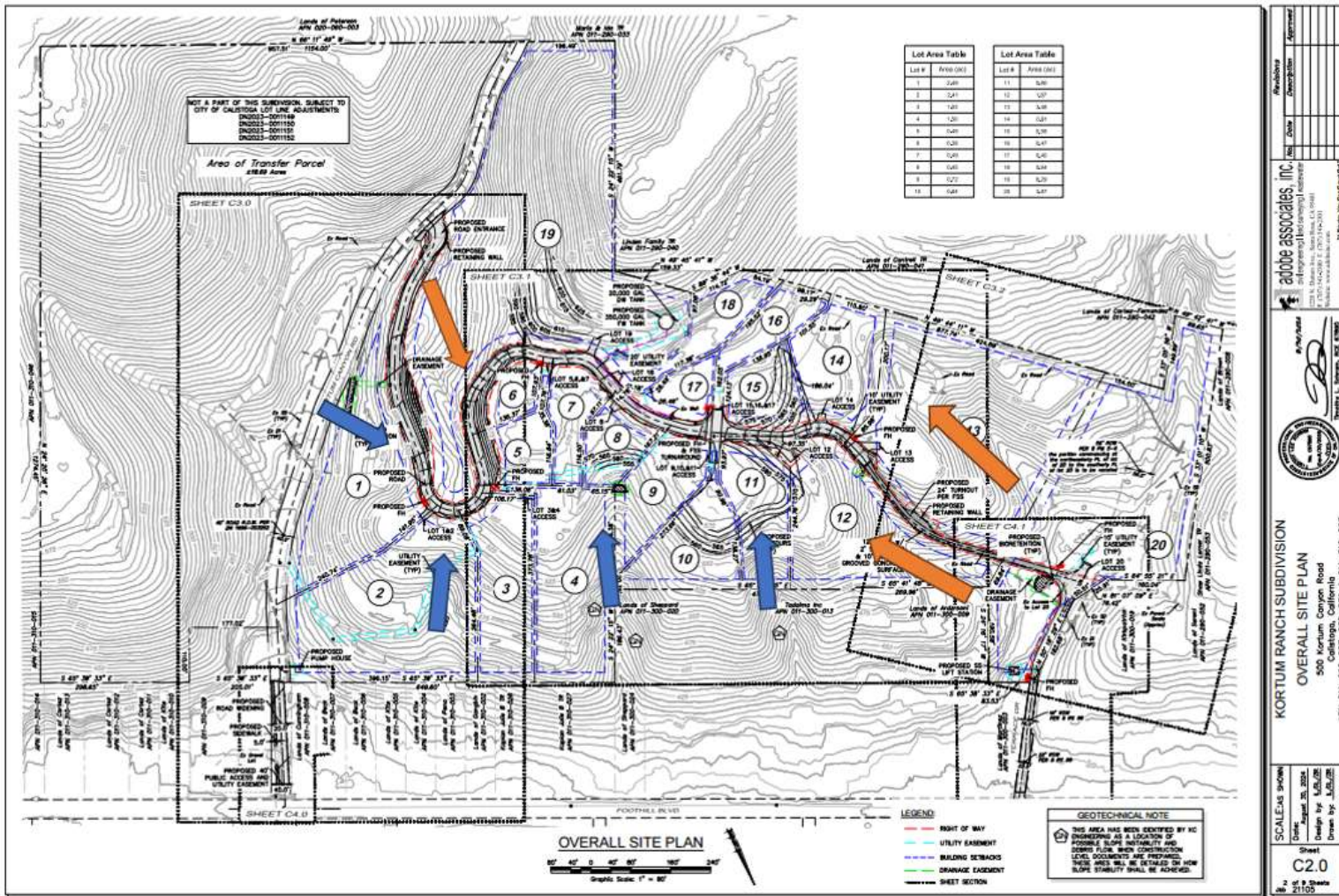


Figure 10 Kortum Ranch site plan showing topographic 'chimneys'

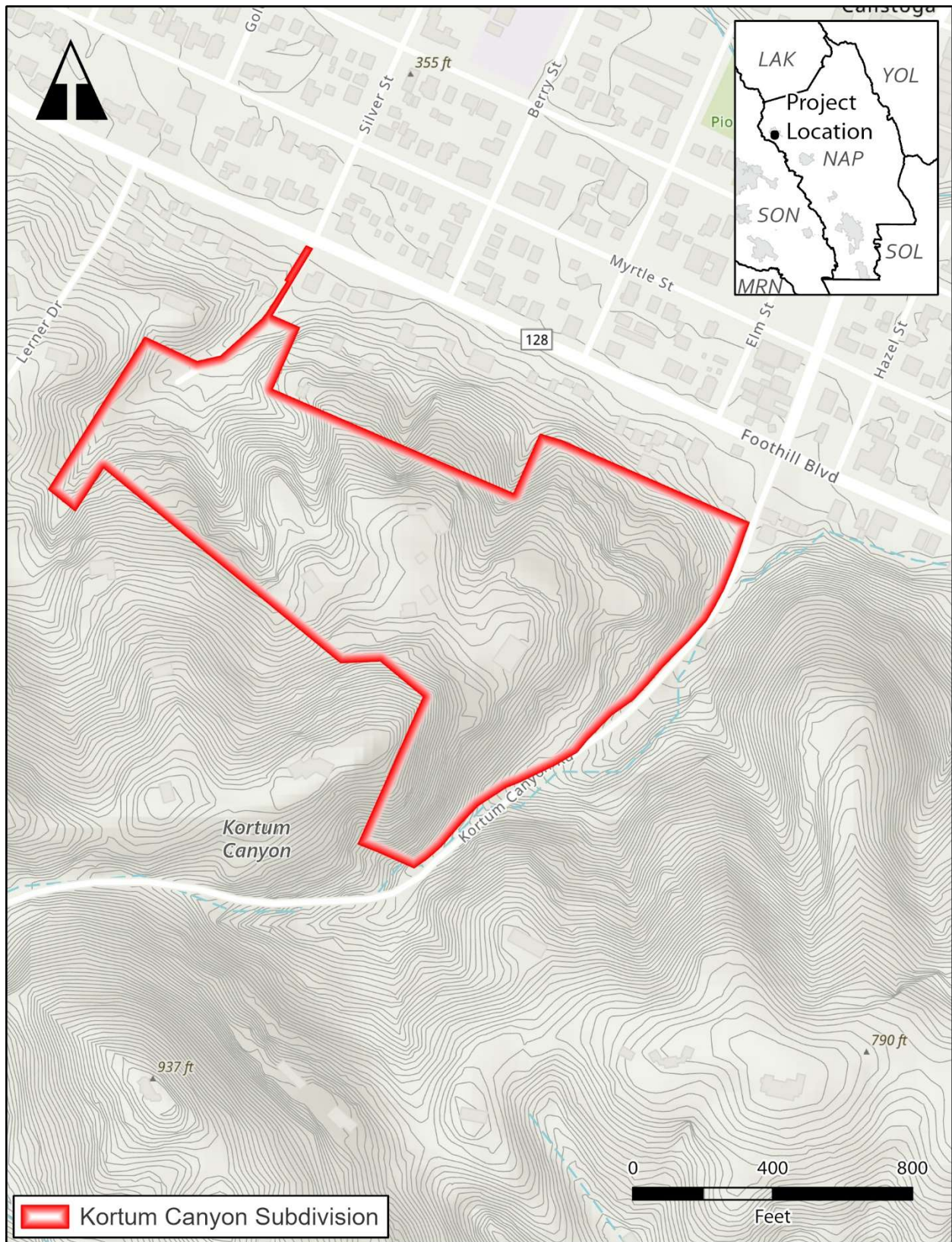


Figure 11. Topographical map of the project site and surrounding vicinity.

FUELS

The term “fuel” is used to describe any material that will burn, whether vegetative or structural component. A single fire may consume shrubs, grasses, trees, woodpiles, and homes as fuels.

Fire Behavior in Different Fuels

Fire managers in virtually all US agencies (as well as in other countries where wildland fire hazards are significant) use fuel model systems for computerized fire behavior prediction systems (FBPS). Information regarding fuel volumes and fire-behavior descriptions is based upon fuel models described in *How to Predict the Spread and Intensity of Forest and Range Fires*, by Richard C. Rothermel (1983), published by the USDA Forest Service Intermountain Forest and Range Experiment Station, General Technical Report INT-143. Fuel models relevant to the Kortum Ranch project include oak woodland and coniferous forests (with and without an accumulation of dead woody biomass). Each fuel model is given a number designation, which is interpreted by fire managers across the continent to mean the same thing.

Fuel models describe vegetation structure in addition to typical species composition. The most significant factor is the amount and distribution of smaller-diameter fuels, because these materials generally spread wildland fires.

Another important factor is the amount of dead biomass and the ratio of live-to-dead material in brush and tree stands, since dead biomass contributes fine fuel litter as well as carry flames more readily. Fuel models include these considerations.



Figure 12. Vegetative fuels on southeastern portion of the project site, comprised of mostly hardwoods with some Douglas fir trees.



Figure 13. Vegetative fuels on the western portion of the project site, comprised on coniferous fuels, classified as “Timber Litter”

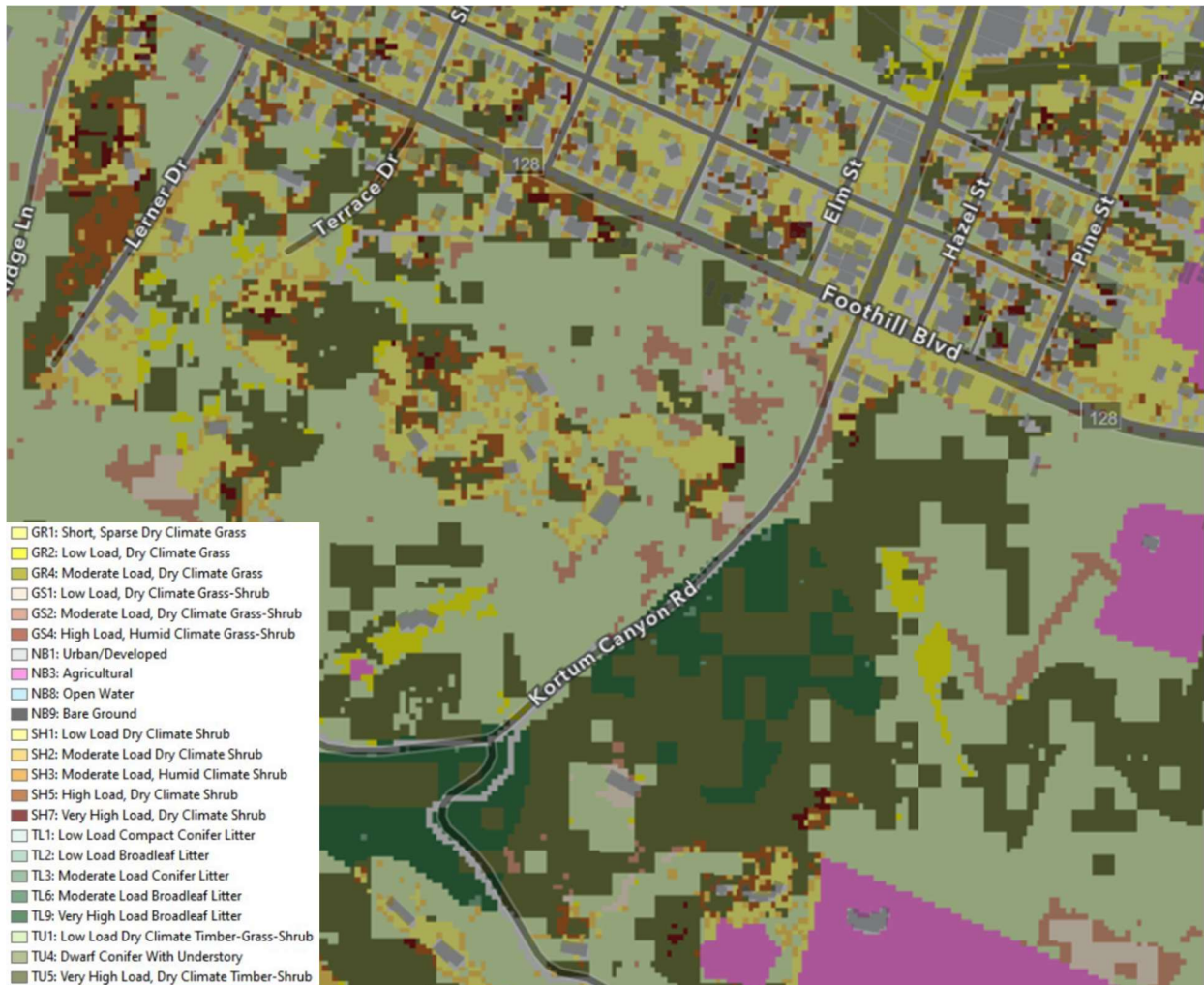


Figure 14. Map of fuel models in the project site and surrounding vicinity.

Most of the Project site north of Kortum Canyon Rd is classified as a Timber-Litter Fuel type, as shown in light green. Areas of grass are shown in yellow. Darker green indicates a cover of

conifers, either with a well-developed understory with fuels that may carry a fire to the canopy, or places where an understory is absent. Pink indicates vineyards, an area that is not predicted to burn. Vineyards are also located near and above the project (covered by the legend).



Figure 15. Map of vegetation in the project site and surrounding vicinity. Vineyards, in light yellow are located west of the project area

WEATHER

General Weather Information

Weather conditions significantly impact both the potential for fire ignition and the rate, intensity, and direction in which fires burn. The most important weather variables used to predict fire behavior are wind, temperature, and humidity.

Wind direction and velocity profoundly affect fire behavior, but wind is considered the most variable and unpredictable weather element. Wind increases the flammability of fuels both by removing moisture through evaporation and by angling the flames so that they heat the fuels in the fire's path. The direction and velocity of surface winds can also control the direction and rate of the fire's spread. Aloft winds, defined as those that blow at least 20 ft above the ground, can carry embers and firebrands downwind. These burning fuels can ignite spot fires that precede

the primary front. Gusty winds cause a fire to burn erratically and make it more difficult to contain.

The winds that create the most severe fire danger, known as the "Santa Ana" or "Diablo" winds, typically blow from the northeast.

The site sits above and west of the City of Calistoga. Most of the site is protected from westerly winds by the ridge dividing Sonoma and Napa, westerly winds can flow through Kortum Canyon itself. Because it is east-facing, it is exposed to northly winds; embers distributed from fires during a Diablo wind event are likely to land on these east-facing slopes. Spread of such small fires are facilitated by wind blowing upslope to the developed portion of the site (thus making defensible space and fuel modification important).

FIRE HISTORY

Napa County has been beset with increasing rates of increasingly serious fires in recent decades, with the 2020s already facing multiple major fires so far, including the Glass Fire and Hennessey Fire of 2020, which collectively burned 367,000 acres and destroyed over 2,100 structures. While no fires on record have burned the Kortum Ranch site, the Glass Fire swept through open space, agricultural, and urban areas to the project site's south, east, and northeast, while as Figure 11 demonstrates below, several other major fires in the past sixty years have burned areas that completely encircle the proposed subdivision.

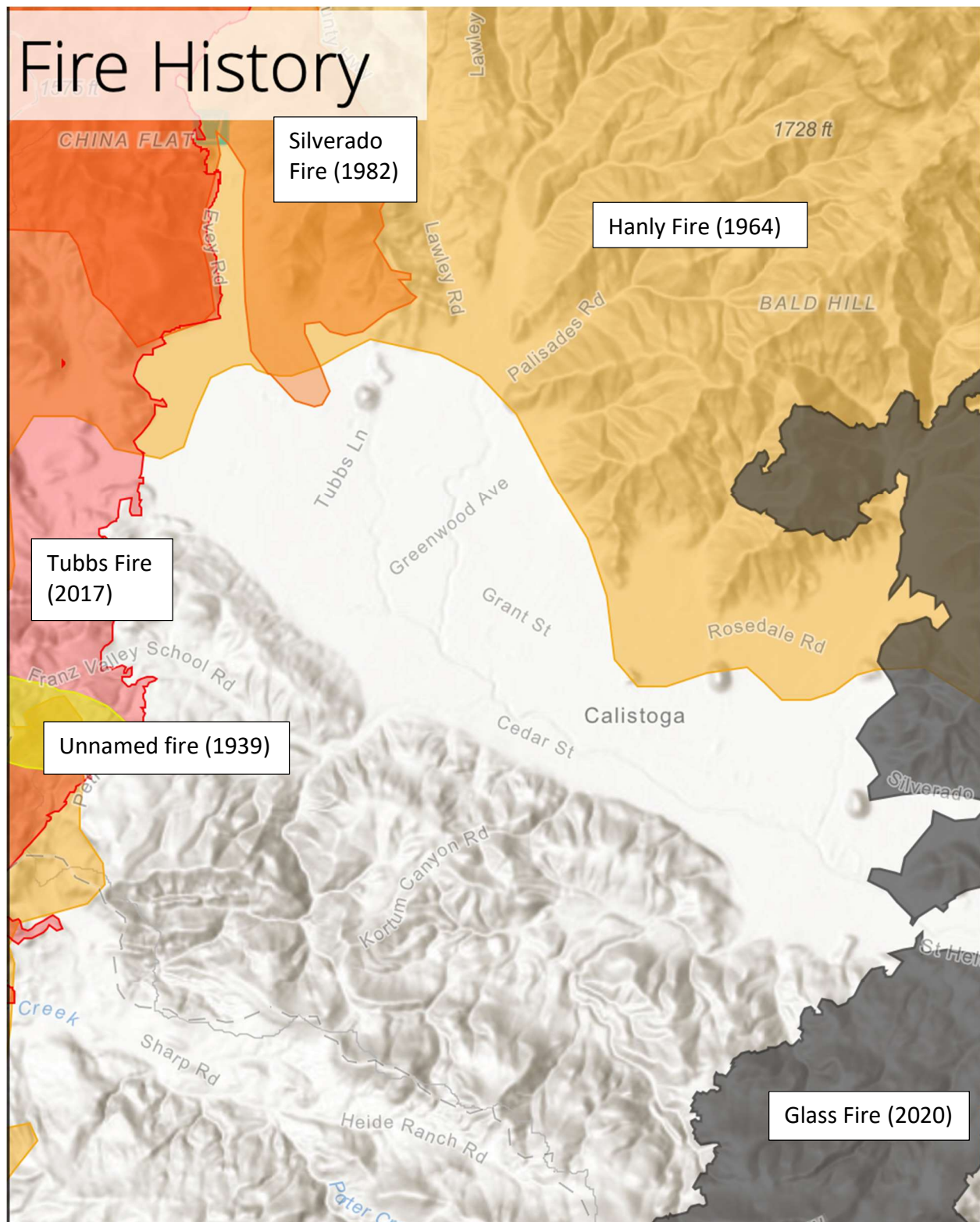


Figure 16. Fire history map of the Calistoga area, including Kortum Canyon.

b. SUMMARY OF FIRE HAZARD AT THE PROJECT SITE WITHOUT MITIGATION

Site-Specific Fire Behavior Information

Flame Length

Flame length is often correlated to the ability to control a fire. A flame length of four feet is the limit of what can be attacked with hand crews or other forms of direct attack, and eight feet is usually looked at as a cut-off point for strategic firefighting decisions on whether to attack the fire directly, or instead attempt control through indirect methods. Attacking the fire directly involves efforts to slow the flaming front at its head – where it is advancing fastest – or “anchor, flank, and pinch” fire control efforts along the fire’s flanks. Indirect attack involves fire control methods well ahead of the fire (using backfires or retardants).

Flame lengths are often used as a proxy for fire intensity because they are highly correlated to higher natural resource impacts. Flame length is the result of one other fire prediction output: fireline intensity times a constant. Fireline intensity is the result of two fuel model inputs (heat yield or the BTU/lb of fuel and the weight of available fuel) along with one other fire prediction output (rate of spread). Flame length, reported in feet, is the numerical characteristic that encompasses the flaming front of a fire and its interaction with wind and the fire’s radiation and convection heat transfer to adjacent fuel.

Figure 12 below is a map of expected fire behavior, in terms of flame length, on the Kortum Ranch project site and surrounding vicinity. As shown in the map, the entire project site is predicted to burn, with most of the site predicted to burn with flame lengths less than 4 feet. However, the coniferous forests in much of the steeply sloped eastern third of the property are expected to burn with flame lengths between 4.1-8 feet, and the oak woodlands on the northwestern and northeastern flanks of the property are predicted to burn intensely, with predicted flame lengths longer than 12 feet.

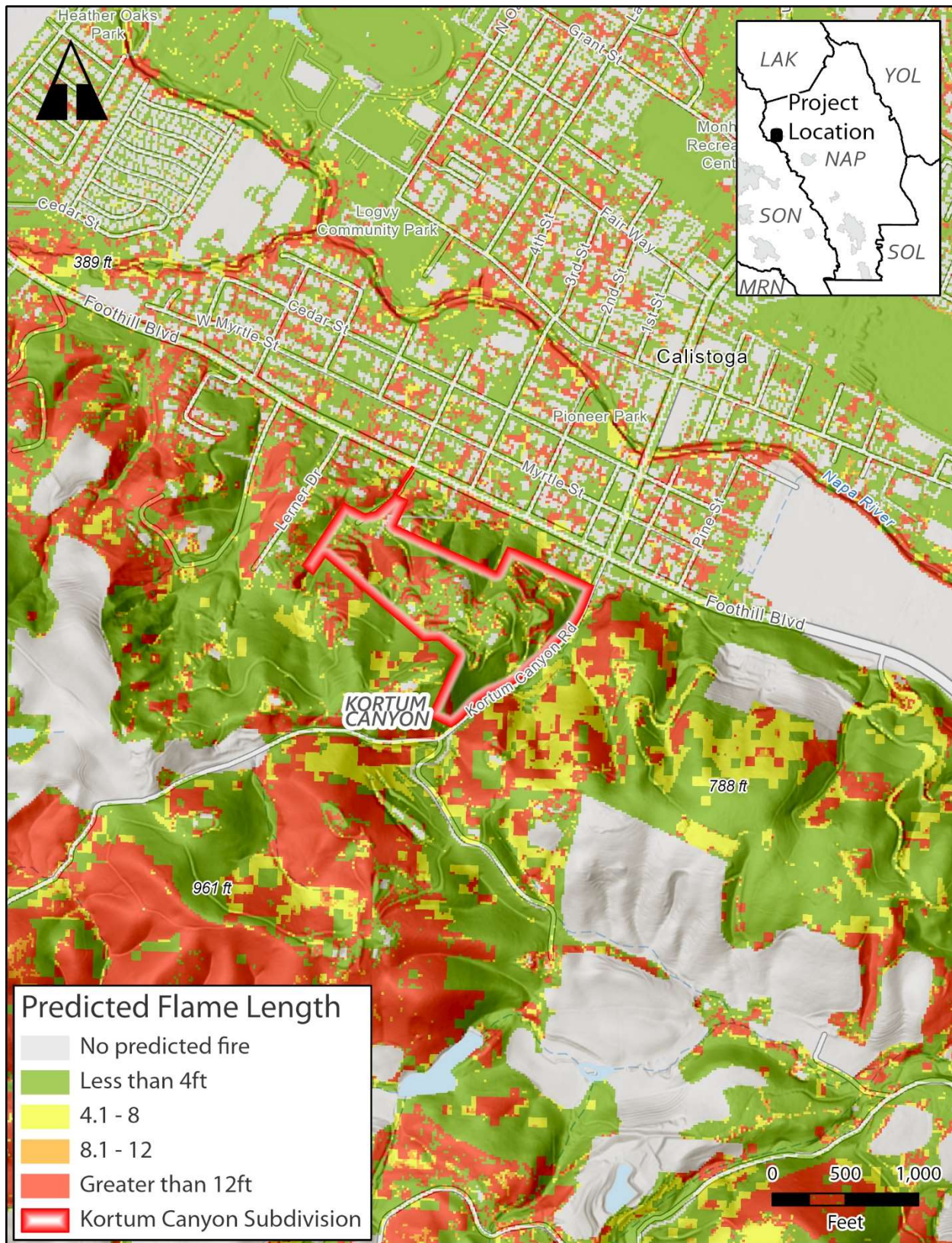


Figure 17. Map of predicted flame lengths on the project site and surrounding area.

Crown Fire Activity

The description of crown fire activity includes four possible model outputs: crown fire, torching fire, surface fire, or no predicted fire. Crown fire indicates locations where fire is expected to spread into and possibly consume the canopy of trees or shrubs.

Modeling how a surface fire makes the transition to some form of crown fire is based on the fireline intensity, canopy base height, and foliar moisture content. This transition is known as torching, or “passive crown fire.” Fire spread from tree crown to tree crown is considered “active crown fire,” and is based on rate of fire spread, the density of the tree crown, and wind speed. Surface fires are limited to fire burning in grass, short shrubs, and the understory of a treed environment, or locations with tall shrubs.

It is important to keep in mind that crown fires and torching can occur only where there are trees and tall shrubs. Short shrub stands can burn intensely and still not torch.

When a fire burns through trees or tall shrub crowns, countless embers are produced and are distributed, sometimes at long distances. These embers can start new fires called “spot fires,” which can each grow and confound the finest fire suppression forces. “Spotting potential” or “crowning potential” describes the propensity of vegetation to create and disperse embers that have the potential to start new fires well in advance of the main fire. In terms of ecological effects, prediction of torching or crown fire is highly correlated with fire severity and greater environmental impact.

While grass fires do not produce torching or crown fires, they can still produce embers, posing a risk to structures and other valuable resources. Hence, while the “spotting potential” of grass fires is significantly less than that of tree- or shrub-dominated fuel types, embers from grass fires are still hazardous.

As represented in Figure 13 below, in the event of a wildland fire, the majority of the Kortum Ranch project area is expected to produce surface fires, with significant torching or “passive crown fires” predicted in the oak woodland-dominated western and northeastern portions of the property. Some small patches of “active crown fires” are predicted on the steep western slopes of Kortum Canyon, should the coniferous forests that dominate that part of the property catch fire.

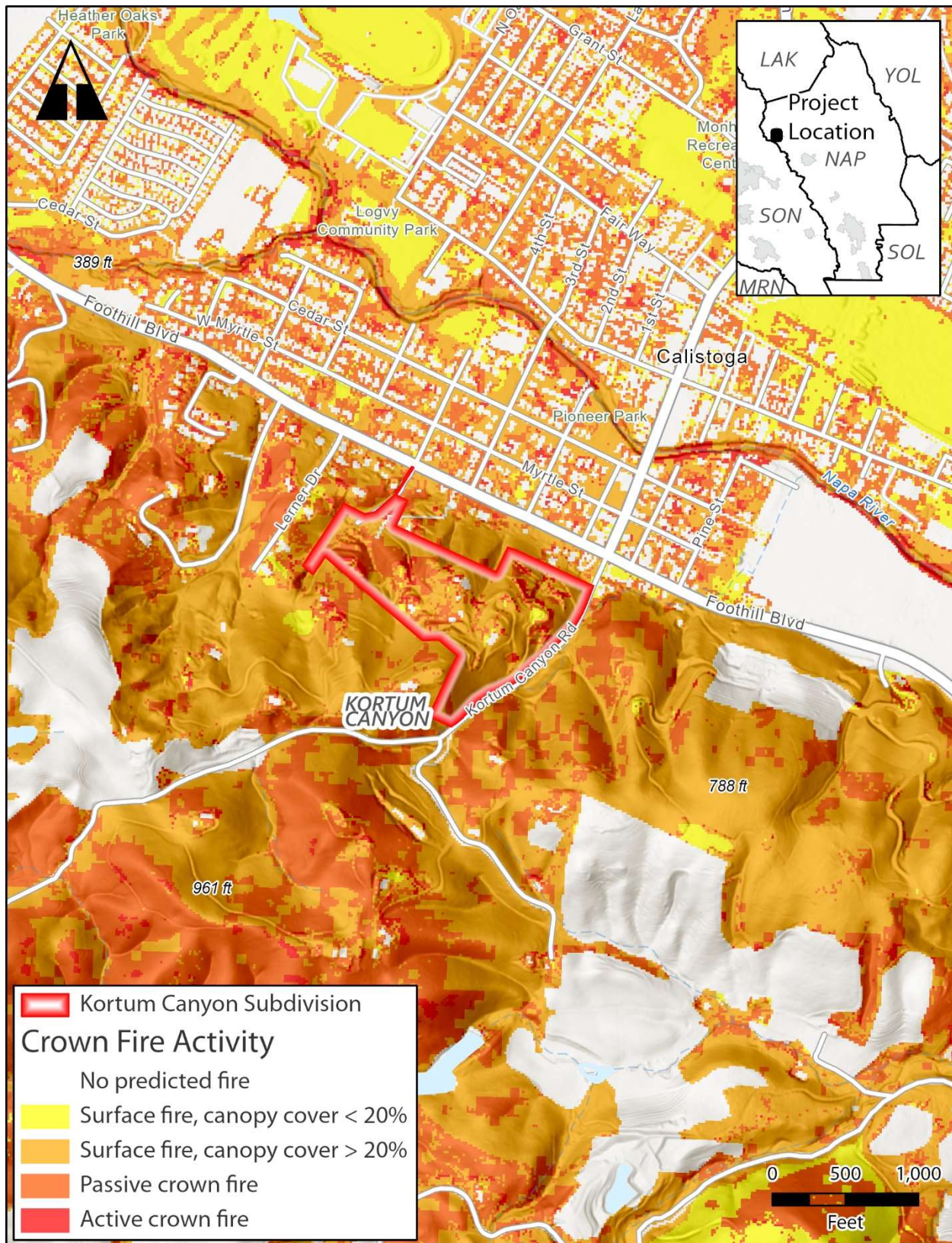


Figure 18. Map of predicted crown fire activity on the Kortum Ranch site and surrounding vicinity.

Fire Hazard Severity Zones

Public Resources Code 4201 - 4204 and Government Code 51175-89 direct CAL FIRE to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. Fire hazard is a measure of how a fire will behave, based on the physical conditions. These zones, referred to as Fire Hazard Severity Zones (FHSZ), define the application of various mitigation strategies to reduce risk associated with wildland fires. The hazard is ranked in three categories: moderate, high, and very high as well as non-wildland, non-urban, and urban unzoned.

Mapping is also categorized by who is responsible for fire suppression. For example, where the Federal government is fiscally responsible for fire suppression, it is categorized as Federal Responsibility Area. The Kortum Ranch project lies within a Local Responsibility Area, where the Calistoga municipal government is fiscally responsible for fire suppression.

As shown in Figure 14, the entirety of the proposed subdivision is mapped as a Very High Fire Hazard Severity Zone. The rating is based on the steep slopes in the eponymous Kortum Canyon as well as the presence of structures nearby and oak woodland on portions of those slopes.

In addition, embers from fires in poorly maintained landscaping or shrubs/trees once the property is developed could land anywhere on the project and cause new ignitions. The project site is also directly susceptible to fire starts off Foothill Blvd., which is a major thoroughfare, should irrigated landscaping fail to extinguish ignitions.

Winds from the east and northeast are the worst-case scenario. If a fire were to advance from the east, it could easily spread down the steep slopes of the proposed open space in Kortum Canyon, creating passive and active torching fires with noticeable ember cast in the oak woodlands and coniferous forest that dominate the canyon.

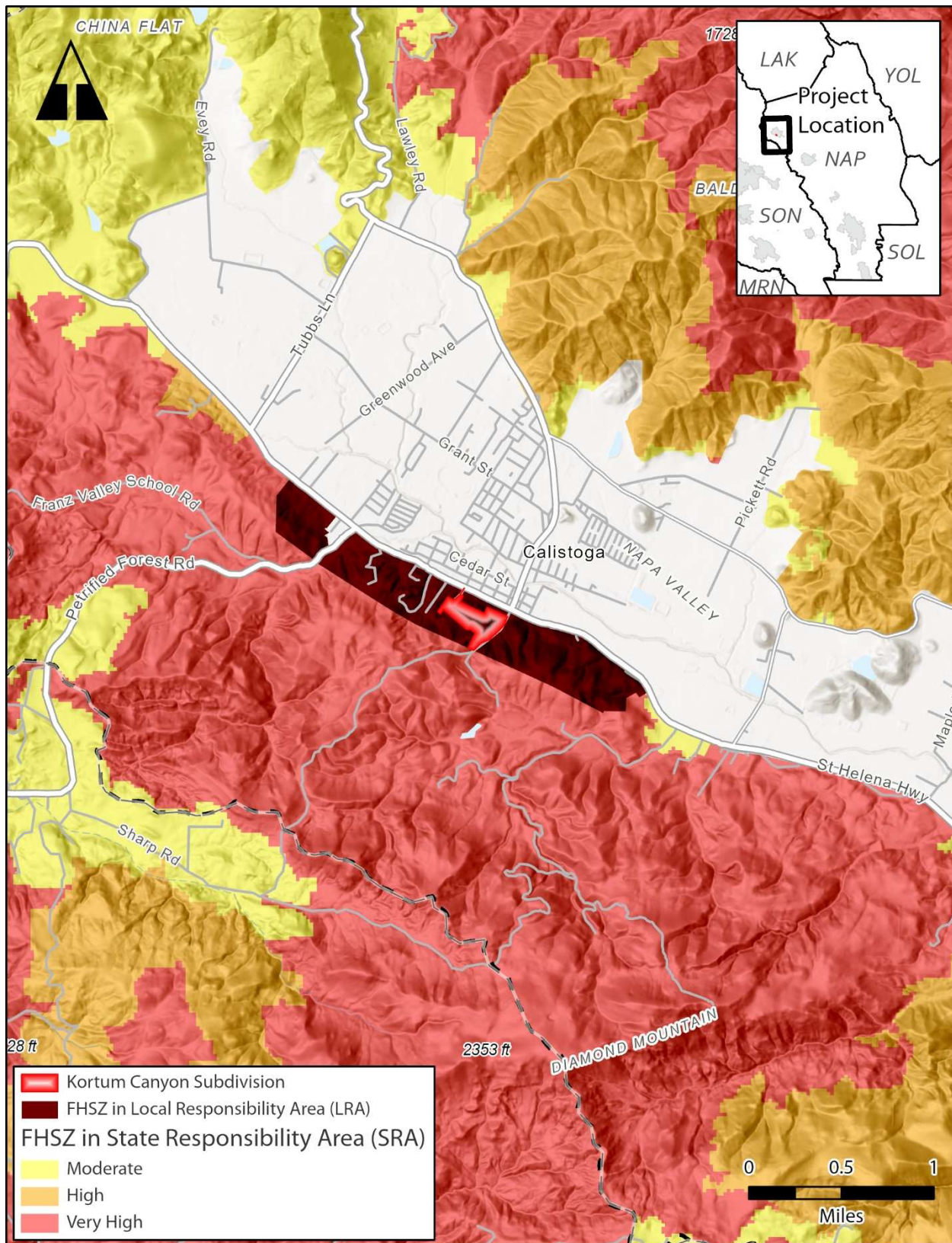


Figure 19. Map of Fire Hazard Severity Zones covering the Kortum Ranch project and surrounding vicinity.

IV – REVIEW OF EXISTING CODES

Because the Project area's western border abuts unincorporated Napa County a comparative review for fire related building codes between Napa County and City of Calistoga was completed prior to the passage of Ordinance 757, when a new Fire and Building Code was adopted. This new code has not yet been published. The assessment revealed four overlapping areas that presented minor distinctions. The areas included: Fire Access, Address Identification, Hydrant Placement and Sprinkler Systems. In addition, differences between hydrant outlets, along with requirements for defensible space were noted. A reference schedule is included with pertinent sections of each code and any distinction between the two. The following are brief statements about each.

- 1) Fire Access. Both requirements appear to be aligned; the City of Calistoga's code¹ included added language about the need for all access to be clearly marked and the markings to be maintained.
- 2) Address and Identification. Primary differences appear to be specifications on number size for non-residential structures. Calistoga has a provision requiring that numbers be illuminated
- 3) Hydrant Placement. Both code requirements appear similar. The Napa County code specifies that it must be consistent with the Development Guidelines², which state the hydrant must be between 30- to 150-ft from structure or as determined by the fire code official. The Calistoga City Code appears to reference both 100 ft to fire connections and 50 ft to fire connections.
- 4) Sprinklers. Both Napa County and Calistoga Fire codes reference requirements for sprinkler systems to be installed in one- and two-family dwellings.

In addition, Napa County requires that the owner of land within 100-ft of a structure must create and maintain defensible space for the structure. Thus, lands in the project area that are within 100-ft of a structure on neighboring parcels are required to treat vegetative fuels so as to maintain defensible space for the adjacent landowner.

New residential structures in Napa County require a 4" discharge with 2.5" adapter, whereas the City of Calistoga Code states hydrants will be comprised of modified steamers (1-4.5 inch outlet and 2-2.5 inch outlets) capable of flowing a minimum of 2000 GPM at 20 PSI.

¹ <https://www.ci.calistoga.ca.us/city-hall/ordinances>

²

<https://services.countyofnapa.org/AgendaNet/DownloadDocument.aspx?type=BOS&doctype=ATTACHMENT&id=40366>

Fire code	County of Napa Fire Code 15.32	Calistoga 15.36
Application	Section 101.6 is added to Division II of Chapter 1 of the fire code to read as follows: 101.6 Application - Napa County. This code shall apply to all unincorporated areas of Napa County for the purpose of establishing minimum fire safety requirements for development in unincorporated Napa County.	WHEREAS, use of the most up-to-date codes is necessary and proper to ensure 25 uniformity in the implementation of building regulations for new construction, alterations, 26 repairs, demolition, maintenance, and use of any building or structure in the City of 27 Calistoga; and
Access	15.32.070 - Section 503.1—Where required, modified Section 503.1 of the fire code is amended to read in full as follows: 503.1 Where required. Fire apparatus access roads shall be provided and maintained in accordance with Sections 503.1.1 through 503.1.3 and the Napa County Road and Street Standards.	CHAPTER 5 FIRE SERVICE FEATURES California Fire Code Section 503.3 is amended as follows: 503.3 Marking. Where required by the fire code official, approved signs or other approved notices or markings that include the words NO PARKING – FIRE LANE in accordance with the California Vehicle Code shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. The means by which fire lanes are designated shall be maintained in a clean and legible condition at all times and be replaced or repaired when necessary to provide adequate visibility
Address Identification	15.32.073 - Section 505.1—Address identification, modified Section 505.1 of the fire code is amended to read in full as follows: 505.1 Address identification. New and existing buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall not be less than 6 inches (152 mm) high with a minimum stroke width of ¼ inch (19 mm), except that for one- or two-family dwellings, each character shall not be less than 4 inches (102 mm) high with a minimum stroke width of ½ inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.	Address identification. New and existing buildings shall be provided with approved illuminated address identification. The address identification shall be legible and placed in apposition that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numerals or alphabetic letters. Numbers shall not be spelled out. Each character shall be a minimum of 4 inches (102 mm) high with a minimum stroke width of ½ inch (12.7 mm). Character size and stroke shall be in accordance with Section 501.2.1 through 501.2.2. Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response in accordance with this code and Section 501.3. Where access is by means of a private road and the building cannot be viewed from the public way or when determined by the fire code official, a monument, pole, or other approved illuminated sign or means shall be used to identify the structure. Address identification shall be maintained. California Building Code Section 501.2.1 is added as follows: 501.2.1 Numbers for one- and two- family dwellings. Each address identification character shall be not less than four (4) inches high with a minimum stroke width of one-half (0.5) inch. California Building Code Section 501.3 is added as follows: 501.3 Complex directory. Where two or more buildings cannot be viewed from the public way or when determined to be necessary by the fire code official, an illuminated complex directory, monument, pole, sign or means approved by the fire code official shall be used to identify the structures at the main entrances to the property.
Hydrant	15.32.075 - Section 507.5.7—Fire hydrant specifications, modified A new Section 507.5.7 is added to the fire code to read in full as follows: 507.5.7 Fire Hydrant Specifications. Fire hydrant size and outlets shall be in accordance with Napa County Fire Development Guidelines or as approved by the fire code official. 15.32.210 - Appendix C, Section C103.1—Hydrant spacing, modified Section C103.1 of Appendix C of the fire code is amended to read in full as follows: C103.1 Hydrant spacing. Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 of the California Fire Code shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is required, the distance between required fire hydrants shall be in accordance with the County of Napa Development Guidelines or as approved by the fire code official.	California Fire Code Section 507.5.1.1 is added as follows: 507.5.1.1 Hydrant for fire department connections. Buildings equipped with a water-based fire protection system installed in accordance with Sections 903 through 905 shall have a fire hydrant within 100 feet of the fire department connections, or as approved by the fire code official. (Also see Section 912.2) California Fire Code Section 912.2 is amended to read as follows: 912.2 Location. With respect to hydrants, driveways, buildings and landscaping, fire department connections shall be so located that fire apparatus and hose connected to supply the system will not obstruct access to the buildings for other fire apparatus. The location of fire department connections shall be within 100 feet of a fire hydrant or approved by the fire chief code official (Also see Section 863 507.5.1.1) Appendix C Fire Hydrant Locations and Distribution California Fire Code Section C102 is amended by adding the following section: C102.2 Fire Department Connections. A fire hydrant shall be located within 50 feet of all Fire Department Connections (FDC), or as approved by the fire code official
Sprinkler Systems	automatic fire systems; Section R313.2—One- and two-family dwellings automatic sprinkler systems. A.For the purposes of this section "building area" shall have the meaning set forth in chapter 2 of the building code, except where modified for Accessory Dwelling Units by Government Code Section 65852.2. "Existing" is defined as "previously permitted and approved building areas that: 1) are attached to the structure under review; and 2) maintain all structural elements in place, before, during and after construction".B.Section 903.2 of the building code is hereby amended to read as follows: 903.2 Where required. In addition to the requirements of section 903.2.1 through 903.2.12 and 903.2.14 through 903.2.21, an approved automatic fire sprinkler system shall be installed and maintained in all	California Residential Code Chapter 1 Section R313.2 is amended to read as follows: R313.2 One- and two-family dwellings automatic fire sprinkler systems. An automatic sprinkler system shall be installed in throughout all one- and two-family dwellings. Exceptions: 1. An automatic residential fire sprinkler system shall not be required where additions or alterations are made to existing buildings that are not already provided with an automatic residential fire sprinkler system. 2. Detached Group U occupancies up to 1,000 sq. ft. in floor area. 3. Detached pool houses up to 1,000 sq. ft. in floor area within 50 feet of the pool and limited to a single bathroom. 4. A room above a detached garage used for storage only that does not contain a bathroom, cooking or refrigeration facilities or connections for such facilities. 5. Carports of non-combustible construction.

V – PROPOSED FUEL MANAGEMENT PROGRAM

a. SUMMARY OF FUEL MANAGEMENT ZONES

There are three treatment zones in this fuel management plan:

- The Defensible Space/Landscaping Zone
- Roadside Vegetation Management Zone
- The Fuel-Modification Zone

The Defensible Space/Landscaping Zone encompasses the space nearest the structures and is designed to reduce ignitions near structures, support structural survival during a wildfire, and reduce the chance that an ignition will move off site. This zone constitutes Defensible Space as defined by CAL FIRE and the City of Calistoga. The Fuel-Modification Zone is designed to limit fire intensity and spread by means of the pruning of trees, and reduction of understory plants. The Roadside Vegetation Management Zone consists of vegetation near the roads and is designed to assist evacuation and emergency vehicle access and to limit roadside ignitions. The standards and actions to comply with both the Defensible Space/Landscaping Zone and the Roadside Vegetation Management Zone are the same, with one exception. In the Roadside Vegetation Management Zone there must also be a 15-foot vertical clearance created by tree-trimming the entire length of the roadway.

The Fuel Modification Zone encompasses the remainder of the project site (open space) and ensures the fuels are such that they do not exacerbate fire hazards to adjacent landowners and structures.

b. STANDARDS FOR DEFENSIBLE SPACE/LANDSCAPING ZONE (ZONE I)

This proposed set of maintenance standards will be used to certify compliance and to direct maintenance activities in the zone for the entirety of the of the single-family residential lots and within 100-ft of structures on adjacent to residential lots. These vegetation management actions comply with the California State PRC 4291 and the Calistoga Municipal Code Title 15, and in particular, Section 36.

Defensible Space standards apply to all privately held residential parcels.

1. Remove all dead plants and dry vegetation to establish and maintain a defensible space. The following actions will provide the same level of fire safety as removing all combustible material.

a. Cut grass and weeds yearly to less than 4 inches in height when 30% of the grasses have cured. Beginning April 15, inspect the grass on a weekly basis to determine the state of grass curing. Cut the grass within the week when 30% of the grass cover is cured, and no later than June 1. Re-mow if late-season rains promote grass growth after the first cutting. Optionally, delay

cutting of native grass and wildflowers until after seed set if they do not constitute a means of rapidly transmitting fire to any structure.

b. Keep the ground, roofs, decking, and balconies free of dead leaves or other plant debris.

c. Clear leaves, bark, and humus under trees and shrubs (including vines and semi-woody species) every year. At no time should a buildup of leaves and humus exceed 1 inch in depth anywhere in a landscaped area. However, do not expose bare earth in over 50% of the site.

d. Remove dead material that drapes over ground cover (including leaves, bark, and branches) annually, before June 1.

e. From mature trees, remove all vines, loose papery bark, dead branches, and live branches smaller than 3 inches in diameter to a height of 8 ft above the ground.

f. Remove all dead branches from within live ground covers, vines, shrubs (including semi-woody species), and immature and landscape trees.

2. Prune trees and large tree-form shrubs (e.g. oaks, toyon) that are being retained to provide clearance of three times the height of the understory plant material, or 8 feet, whichever is higher. Prune limbs that are smaller than 3 inches in diameter up to 8 feet above the ground; in young trees, prune these branches the lower one-third of the height of the tree. (Thus, if a tree is 10 feet tall, prune the lower 3–4 feet and keep the understory plant material to less than 1 ft in height. Then as it grows to 24 feet in height, it can achieve the 8-foot distance from the ground, and the understory plant material can reach 2.5 feet in height.) Do not disturb or thin the tree canopy, because these actions promote growth of more flammable vegetation. Remove all branches within 10 feet of any chimney, flue, or stovepipe. Maintain 5 feet of vertical clearance between roof surfaces and overhanging portions of trees.

3. Do not locate plants that are replacing ones that die, or oaks planted as a mitigation measure, under trees. To avoid creating "ladder fuel situations" (in which a fire can climb from one vegetation layer to the next higher one), do not plant shrubs (including vines, semi-woody species, and all chaparral species) under trees.

4. Make sure that all landscaping and replacement plants are fire-resistant in nature. Prohibit planting of plants that are highly ignitable and burn with intensity. The website <https://firesafemarin.org/create-a-fire-smart-yard/firescaping/> provides a source of information on fire-resistant and flammable plants, and appropriate design. See also Appendix B on Fire-resistant landscaping.

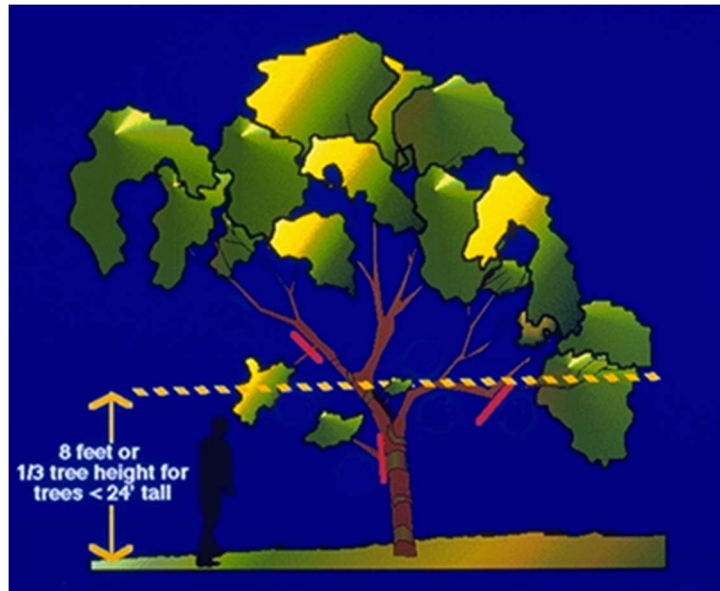


Figure 20. Prune branches to a height of 8 ft above the ground. In young trees, prune branches on the lower one-third of the height of the tree. Do not disturb or thin the tree canopy. This promotes growth in the understory, which is more easily ignited.

5. Manage individual plants or shrub masses to maintain adequate horizontal spacing. Design distinct groupings of shrubs (including vines, semi-woody species, all types of brush, and all chaparral species) to dampen the spread of fire. Make sure that the plant groupings are small enough to provide adequate horizontal separation between groupings and to allow proper maintenance; groupings should measure no wider than two times the grouping height, or 120 square feet (however, one row of shrubs in a linear band with a maximum width of 7 feet, located at least 10 feet from the structure, need not comply with the 120 square foot area limit.) The space between islands should be greater than three times the height of the shrubs, or 12 feet at a minimum. On emerging trees, clear a spacing of 12 feet from the edge of the canopy.

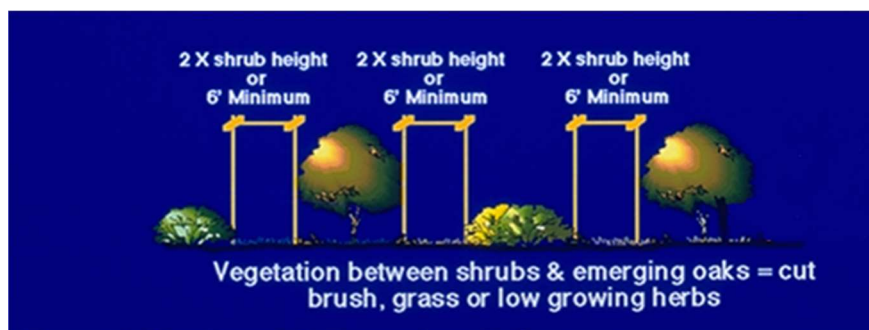


Figure 21. Shrub island spacing. Design groups of plants small enough to provide horizontal separation between groups. This allows proper maintenance and helps slow the spread of fire. Each shrub or group of plants should measure no wider than two times its height, or less than 120 sq. ft. (or 6 ft x 20 ft). The space between groups should be greater than three times the height of the shrubs, or at least a 12 ft. distance

6. Remove and safely dispose of all cut vegetation and hazardous refuse.

7. Allow chipped materials to remain on the site, provided the mulch layer is no greater than 2 inches in depth

c. STANDARDS FOR FUEL-MODIFICATION ZONE (ZONE II)

The open space within the Kortum Ranch project should be managed to minimize the growth of small Douglas fir trees and volumes of understory shrubs. Both of these would increase the fuel load and potential fire hazard.

In addition to fuel management throughout the open space, perimeter fuel management is necessary to prevent fire from spreading to adjacent landowners. This will be in the form of mowed strips of 30 ft width a maximum 4-inch height. Trails and/or vehicular access (fire trails) can be incorporated into the perimeter firebreak to minimize the area of disturbance.

Careful attention should be paid to fuel loads in and adjacent to the 7 identified topographical draws or chimneys. Those features should be maintained to ensure adequate fuel spacing and to avoid accumulations of excessive ladder fuels or crowded canopies. Homesites 1,8,9,12 and 15 all sit at the head of a draw and will benefit from orderly fuel spacing and hardened home construction considerations.

1. In any area where trees are present,
 - a. Clear leaves, bark, and humus under trees and shrubs (including vines and semi-woody species) every year. At no time should a buildup of leaves and humus exceed 1 inch in depth anywhere in a landscaped area. However, do not expose bare earth in over 50% of the site.
 - b. Remove dead material that drapes over ground cover (including leaves, bark, and branches) annually, before June 1.
 - d. From mature trees, remove all vines, loose papery bark, dead branches, and live branches smaller than 3 inches in diameter to a height of 8 feet above the ground.
 - e. Remove all dead branches from within live ground covers, vines, shrubs (including semi-woody species), and immature trees.
 - f. Prune trees and large tree-form shrubs (e.g. oaks, toyon) that are being retained to provide clearance of three times the height of the understory plant material, or 8 feet, whichever is higher. Prune limbs that are smaller than 3 in. in diameter up to 8 feet above the ground; in young trees, prune these branches the lower one-third of the height of the tree. (Thus, if a tree is 10 feet tall, prune the lower 3–4 feet and keep the understory plant material to less than 1 feet in height. Then as it grows to 24 feet in height, it can achieve the 8-foot distance from the ground and the understory plant material can reach 2.5 feet in height.) Do not disturb or thin the tree canopy, because these actions promote growth of more flammable vegetation.

- g. Chipped materials can remain on the site provided the mulch (or duff) layer is no greater than 2 inches in depth.

d. STANDARDS FOR ROADSIDE VEGETATION CLEARANCE

The standards for Zone I will apply to the strip of land within 30 feet of the pavement edge from both sides of the roadways. In the Roadside Vegetation Management Zone there will also need to be an unobstructed vertical clearance of 15 feet over along the entire length of the roadway.

e. PREDICTED FIRE BEHAVIOR WITH MITIGATING MEASURES IN PLACE

Once the suggested fire-mitigation measures have been implemented on the site, fire behavior in the parcels north of Kortum Canyon, and south of Kortum Canyon within 100-ft of structures should exhibit less than two-foot flame lengths. The area within the project, and directly beneath the project, to the east, is included in a grant application that, should it be funded, will treat vegetative fuels within 1000-feet from Foothill Blvd (Hwy 29). The treatments of the fuels will be designed such that flames will be shorter than two feet throughout the bend.

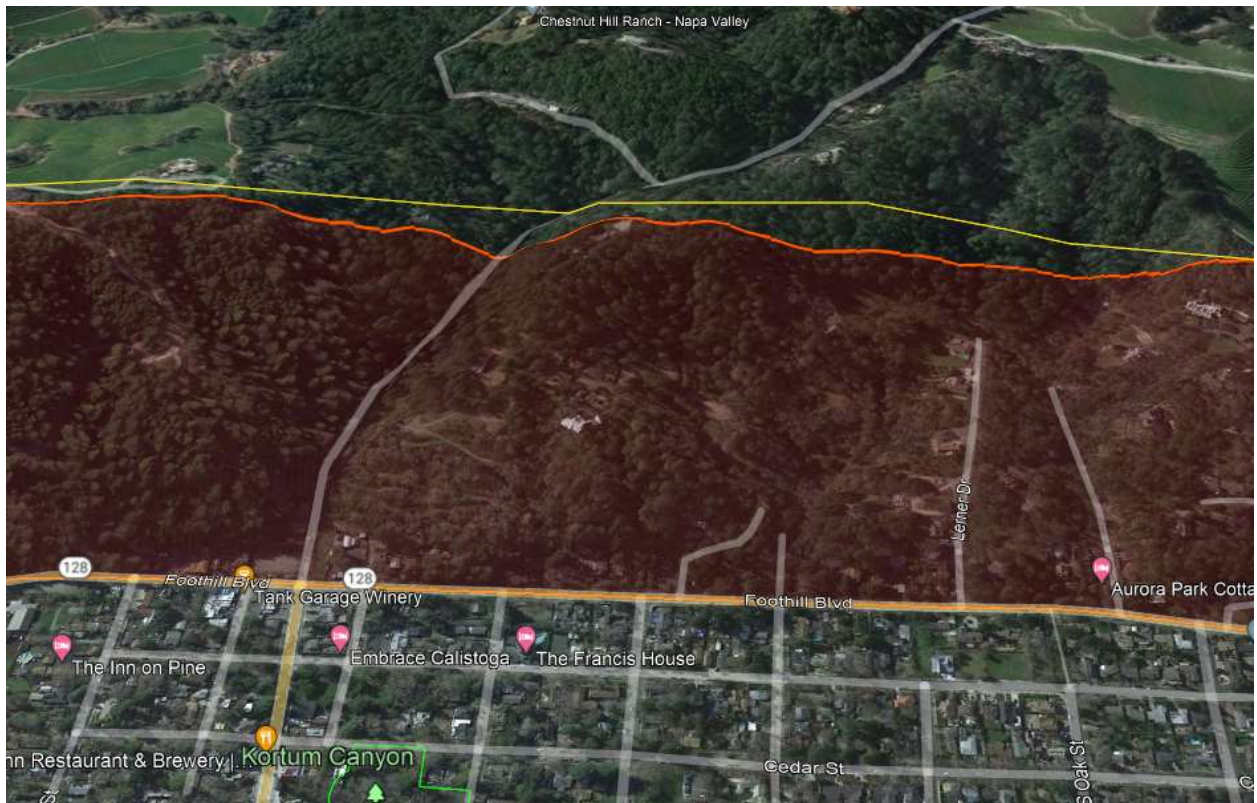


Figure 22. Area of proposed fuel treatment, as in 2022 Napa County FEMA BRIC grant proposal.

Flame lengths of less than 2 feet typically do not threaten structure survival. Also, because available fuels will either be kept mowed or will be compact in nature, any ignited fire(s) should travel only at easily containable speeds.

Flame lengths produced further away than 100 feet from a structure on the parcel south of Kortum Canyon would be slightly greater but crowning and torching of trees is minimized.

Structures are minimally exposed to ignition from embers because of ignition resistant construction, a band of non-combustible materials immediately next to the structure and landscaping of low fuel volume.

Section VI: RECOMMENDATIONS FOR STRUCTURE IGNITION RESISTANT FEATURES

a. INTRODUCTION

The following recommendations not only comply with construction standards for structures as referenced in the Calistoga Fire Code, these are recommendations that provide additional protection above and beyond such codes. Any new structures or improvements shall be subject to the California Building Code and Uniform Fire Code as adopted by the City of Calistoga.

b. WATER

SPRINKLERS

All residences in this Project will be constructed with automatic interior fire sprinkler systems in conformance with the NFPA 13D (modified) standard. Fire sprinkler protection shall be provided within all living spaces, garages, attic space, under crawl spaces, under attached decking and balconies built with combustible materials, and under porches, foyers, and any other areas within the structure deemed necessary by the Calistoga City Fire Department. Kortum Ranch is encouraged to explore systems such as installation of exterior gel/phosphate retardant systems for the entire site or for specific homes at the tops of topographical chimneys. Fixed Gel mixing units, hurricane sprinklers and fixed nozzles would provide substantial protections to homes in the event of a wildland fire.

Fixed systems would require adequate hardline plumbing to provide water at a head pressure of 100PSI. A centralized system could supply water to gel mixers and hurricane sprinklers that are placed in multiple strategic locations for fire response. Alternatively, water conveyance could be provided to an array of pumps providing the required head pressure for an appropriately dispersed system.

Available systems and service providers designing and implementing these types of fire response Fixed capabilities include: CR Buildworks, Code3Water, and Dakota Fire System's Thermo-Gel.

The Thermo-Gel® is a concentrate that gets added to water and then is transformed into a gel that absorbs heat and will adhere to any surface. It will protect structures from heating, charring, and flame impingement. It can also help to protect any other surface, such as shrubs, trees, grass, utility poles, and vehicles. It will not cause any damage to structures or anything else it is applied to and is environmentally safe.

The gel will not start to char until after all of the water in the gel has evaporated, however, with just a light misting of water on the gel, it will last for days, providing extended coverage and protection. This unique fire suppression system can be used to not only protect against a fire, but also extinguish a fire. Thermo-Gel® is used for fighting Class A fires, with less water than using foam; however it cannot be used to fight Class B fires, such as petroleum or diesel. The best thing about Thermo-Gel® is that it can be washed off quickly just by using water.

When used with the DakotaFire Systems™, Thermo-Gel® becomes one of the most powerful fire suppression systems on the market and can both save firefighters lives, as well as valuable property and structures. It can be stored for up to three years from the date of purchase, so it is good to stock up on. It is portable and is perfect for rural areas that may have volunteer fire departments

HYDRANTS

Hydrants will be installed in accordance with the 2013 California Fire Code Appendix B at a distance no greater than every 400 ft, and within 50-ft of fire department connections. Hydrants will be comprised of modified steamers (1-4.5 inch outlet and 2-2.5 inch outlets) capable of flowing a minimum of 2000 GPM at 20 PSI. See code comparison in Section IV.

c. BUILDING MATERIALS AND DESIGN

All structures will comply with the California Building Code, Chapter 7A as amended by the Calistoga City Fire Department.

PROJECTIONS

Preferably, all projections – including decks, exterior balconies, porches, and exterior stairs – will be constructed of noncombustible materials. Alternatively, any combustible projections will be protected as follows:

- a. Projections will be constructed of materials capable of resisting fire for one hour. A noncombustible surface will be applied to the underside of all exposed edges, or
- b. "Heavy timber" construction will be used for construction. Heavy timber is defined in Section 2105 of the Uniform Building Code as the following timber sizes:
 - 6-in. nominal minimum dimension columns
 - 6-in. by 8-in. nominal minimum dimension horizontal supports
 - 2-in. nominal minimum dimension spaced decking, or

c. A "skirt" wall with a one-hour fire-resistive capability will be built to extend down from the projection surface to the adjacent grade and completely enclose the projection.

d. Automatic interior fire sprinkler systems in conformance with the NFPA 13D (modified) standard will be required under attached decking and balconies built with combustible materials: porches and foyers and any other areas within the structure deemed necessary by the Calistoga Fire Department.

ROOF EAVES

Roof overhangs extending more than 10 in. will be protected by one of the following materials:

a. One-hour fire-resistive materials with a noncombustible surface on the underside and exposed edges;

b. "Heavy timber" construction; or

c. Any other noncombustible material approved by the Building Official and Fire District. Roof overhangs that are constructed of noncombustible materials or combustible roof overhangs projecting less than 10 in. from the exterior face of the exterior wall need not be protected.

EXTERIOR SIDING

Exterior siding materials will consist of "stucco" or any exterior one-hour fire-resistant-rated wall material with a noncombustible surface or any other noncombustible material approved by the Building Official and Fire District. Trim of 1-in. minimum size may be applied on walls. Untreated wood shingles and wood shakes of any kind are not allowed.

VENTS

Structures will include either Brandguard vents (<https://www.brandguardvents.com/index.php>), which use 1/8-inch mesh metal screens and 26 ga G90 galvanized steel to block flying embers from entering structures. Alternative vents include Vulcan vents <https://www.vulcanvents.com/>

FENCES

Backyard fences will be constructed of either noncombustible material or of timbers with a minimum of one-inch nominal thickness. If fences are to be made of wood, a five-foot span of non-combustible materials should separate the structure from the rest of the fencing. Side fences may be of one-inch nominal thickness. Typical back yard fencing might include "view fencing",

consisting of open wire-mesh with four-inch posts and stringers that have a minimum one-inch nominal thickness.

SIGNAGE

Signing and building numbering must comply with Title 14, Division 1.5, Chapter 7, Section 1274.01–1274.10 of the California Government Code. Street, road, and building-address signs must be visible within 100 ft traveling from both directions, will have a minimum letter height of 4 in. and be fabricated with reflective backing and numbers when illuminated. If not illuminated the signs must be of 6 in. width, reflectorized, and painted with a color contrasting with the background color of the sign.

Signs identifying traffic access or flow limitations—including but not limited to weight or vertical clearance limitations, dead-end road, one-way road, or single land conditions—will be placed at the intersection preceding the traffic-access limitation and no more than 100 ft before the traffic-access limitation.

ACCESSORY BUILDINGS

Garden Structures – such as gazebos, spas, or other outbuildings – will meet the same minimum standard for materials, timber size, and other requirements as described above for other structures.

Built-in fireplaces should be either no farther than 15 ft from a water source or be equipped with a fire extinguisher. All associated chimneys will be fitted with a spark arrestor.

Barbecues (built-in or portable) must be surrounded by at least 10 ft radius of noncombustible materials and be located 10 ft away from all overhanging structures or trees. Barbeques must not be left unattended when in use. No structures or trees should overhang the use area within a distance of 10 ft. A fireplace of any kind that is under or within six feet of a an overhand will have a chimney with ¼ inch scree,. The barbeque should be located no farther than 15 ft from a water source (including a garden hose).

d. DISCUSSION OF SETBACKS AND HOUSE-TO-HOUSE IGNITION

Recent studies and guidances discuss structure separation as a way to prevent house-to-house ignition, and prevent ignitions, in general.

A study published by the National Institute of Safety and Technology (NIST) recommended a structure separation of at least 60-feet, however other sets of best practices, published by the University of California Cooperative Extension and the Office of Planning and Research advise cluster development. On October 10, 2022, the state Attorney General issued guidance that prefers clustering of homes, much like the lot layout in Kortum Ranch. In all such studies, the exterior construction materials and design are paramount.

VII – PROPOSED EMERGENCY PREPAREDNESS AND NOTIFICATION

Many of the impacts of structure fires and wildland fires can be minimized with awareness and good planning. We encourage Kortum Ranch development to consider a range of measures which will enhance emergency preparedness for the residents of this beautiful location.

a. CONNECTIVITY AND ALERTS

Much progress has been made around alarms, alerts, and notifications regarding fire. Steps should be taken to ensure that residents of Kortum Ranch have access to the needed cellular coverage and high-speed internet that should come from the development site's proximity to Calistoga city. Residents should be encouraged to enroll in notification systems like Nixle <https://www.nixle.com/> and Watch Duty <https://www.watchduty.org/>

b. HARDENED AND REDUNDANT UTILITIES

During an emergency event failure of key utilities can hamper a proper response. Site development should consider the potential opportunities for system redundancy for key utilities like electricity and water. Whether centralized or decentralized, power generation and adequate fire response water storage is integrated into site development plans. Individual landowners may have electrical generators to serve as power back-up; a site-wide power generator is not contemplated.

c. SITE PLANS FOR FIRST RESPONDERS

Many developments have successfully developed key informational artifacts that depict key site resources like site maps, hydrants, water storage and the locations of utility panels at each site and any back-up utilities including solar battery shutoffs. These site maps can be located at the driveway entrances on Kortum Canyon road and Terrace Drive. Locked knox key boxes that are accessed by fire fighter knox keys are typical.

d. OWNER EDUCATION AND COMMUNITY ENGAGEMENT

Throughout Napa County a solid framework of community organizations exists to provide resources and support to county residents about the risks of wildland fire and steps that can be taken to minimize those risks. Kortum Ranch is within the boundaries of the Calistoga Fire Safe Council. Integration of Kortum Ranch into the community fabric of the Fire Safe Council framework strengthens the fire resiliency of the Kortum Ranch residents.

See the appendices for a homeowner emergency preparedness education and notification program. Current materials for homeowner education and notification are also available from the Ready for Wildfire program, also available at www.readyforwildfire.org.

VIII – IMPLEMENTATION

a. DELEGATION OF FUEL MANAGEMENT RESPONSIBILITIES

FUEL MANAGEMENT

Every individual landowner will be responsible for conducting fuel management on their own parcel. The landowner will be responsible for compliance with local wildland fire codes.

Any trail system will be maintained by the road management entity/Community Association.

UTILITY BACKUP/REDUNDANCY

Individuals may have their own utility backup system for their own individual needs. Any community-wide backup systems (i.e. to provide pumping capacity for a water tank) would be run by the Community Association if the project is not part of a City-wide utility redundancy system.

ACCESS MAINTENANCE

Access and the right-of-way will be maintained by the Community Association.

EASEMENT MAINTENANCE

Maintenance of easements, i.e. of trails, or access to water tanks, will be performed by the Community Association.

b. SCHEDULE OF INITIAL MAINTENANCE RESPONSIBILITIES AND VEGETATION MANAGEMENT

Upon fire department issuance of building permits the fuel management standards will apply to the lot encompassed by the building permit. Roadside standards will be enforced at the time the first parcel is sold. Responsibilities for roadside work along Kortum Canyon Rd are in force now.

INITIAL TREATMENT (YEAR 1)

- Initial vegetation management actions for any lot will be completed before framing of the first parcel begins (if framing takes place between June 15 and Nov. 1). These actions include tree removal, tree pruning, removal of eucalyptus trees smaller than 8 inches in diameter, and grass cutting or grazing.
- The Community Association is responsible to ensure fuel management is completed within 100-ft of the building under construction, regardless of land ownership.

MAINTENANCE PHASE

- All required clearing and grass cutting will be completed before June 1 of each year; if grazing has not achieved the standards set in the defensible space standards, the grass will be mowed to a height of approximately four inches.
- Grass cuttings and clippings will be removed the day they are cut. No clippings are permitted to remain in piles or scattered, unless so approved by the CFD. All brush piles and tree clippings are to be removed within one week of cutting. No brush or clippings are permitted to remain in piles, unless so approved by the CFD.
- Annual vegetation management measures include:
- Removal of all combustible vegetation along roadways, driveways, access roads, and trails according to stated standards
- Maintenance of the emergency-access easement
- Maintenance of the defensible space around structures according to stated standards for the various fuel management zones.
- Assessment of conditions in the eucalyptus stands to determine whether any action, such as additional pruning or seedling or sprout removal, is required.

SUMMARY OF FREQUENCY OF FUEL MANAGEMENT

Annual management

- Re-establish vertical clearance in Defensible Space Zone
- Remove weeds, all dead material in Defensible Space Zone
- Mow or graze grass near structures, and under trees and shrubs
- Hand crew cut shrubs and weeds in along Kortum Canyon Rd
- Inspect trees and large shrubs for deadwood, vertical clearances within 30-ft of roads (both Kortum Canyon and within the developed area of the project)
- Monitor site for weed and shrub encroachment, maintain horizontal spacings between shrub masses in trail easement

Management on the parcel south of Kortum Canyon that will start as an initial treatment 1 Year 1, then occur every 3 - 5 years

- Remove new understory shrubs and Douglas fir seedlings
- Remove dead wood and branches from mature trees
- Prune trees of lower branches to re-establish vertical clearance

A rotation of pruning may be scheduled so that approximately 1/7th of the area is treated yearly.

c. PROCESS FOR PLAN REVISION

While this plan presents recommendations that cover future actions, the Calistoga Fire Department will have authority to review periodically the condition of vegetative fuel, in order to provide input and direction. Potential issues that should be addressed during this review include:

- Changed fuel hazard conditions including: height of tree branches, size, density or species of vegetation, or fuel load and erosion control or slope stability conditions.
- Lot line adjustments that may change the distances and areas for which the Property Owner is responsible.
- Changes in land use of adjacent properties.

An initial three-year interval of review is recommended, with a five-year interval review thereafter. For example, if the expansion of shrub cover warrants additional action, this process provides for revisions of required maintenance options. Input of the Fire Department would be based on site visits, results and observations from the annual inspections conducted by the Department and experiences from recent wildfires or changes in ordinances or regulations.

If any changes are proposed, the Homeowner Association will submit this plan, along with suggested revisions, to the Calistoga City Fire Department for their input. The fire district input will be incorporated, and the plan revised. The revised plan would be implemented the following year.

IX – APPENDICES

APPENDIX A: HOMEOWNER EDUCATION PROGRAM

For additional fire preparedness information, consult the references Read-Set-Go, Your Personal Action Plan available at https://www.napafirewise.org/wp-content/uploads/2019/04/Ready_Set_Go.pdf

THE ANNUAL FIRE THREAT

The actions to take are to trim lower tree branches, shorten the height of grasses and shrubs to reduce the chance of spreading the fire, and to reduce the overall quantity of fuel available to burn.

ACTION PLAN

The higher the hazard, the greater the risk to your house, and the more you need to do to assure survival from an approaching wildfire.

Quick Fixes

These are relatively inexpensive and easily carried out by the homeowner. No matter which level of hazard, these should be done immediately, not when a fire is approaching—do them now!!

Plants near your house

- Vigorous and smaller is better; don't keep older, larger, and dying plants within 6 feet of your house—get rid of them!
- Maintain your plants; get rid of dead branches and dead material under the plants; make sure they are watered regularly, preferably with a drip system
- Do not plant or keep fire hazardous plants—see the web site for a list of less flammable plants. See <https://firesafemarin.org/create-a-fire-smart-yard/plants/>
- Make sure that you minimize any plants under windows, near decks, or at inside corners

Other plants and trees on your lot

- No trees should have branches within 6 feet of your roof—cut the branches or remove the tree if necessary
- Create islands of vegetation so that fire does not have a path to your house. Be sure that no large bushes are under trees—these could cause a crown fire
- Lawn grass is great, but be careful of using a lot of landscaping bark and mulch—this could cause smoldering of embers
- Annual grasses are a major hazard in the fall when they cure, especially if you have grasses on a slope leading up to your house. Cut these or get them grazed **before** they die!

Other combustibles

- The area within 6 feet of your house is especially hazardous—do not store firewood and other burnable stuff within this zone, especially under decks
- Keep that barbecue propane tank as far away from the house as possible!

- Clean your gutters regularly, especially when the rainy season is over and you're more likely to not think about gutter debris; better still, cover your gutters with metal screening

Spacing between shrubbery, with materials like grass or gravel will provide a fire break. Create green islands instead of large clumps of vegetation. The gaps should be greater as you approach the house.

Prefire Readiness

There are several options if a fire threatens your home that depends on your degree of readiness and capability. If you have taken measures such as the Quick-fixes, some of the important Long-term actions, and have done your Prefire planning (below), you should be ready if a fire threatens your house.

Know your Zone for evacuation and be aware of the wildfire situation. Check for updates of weather at windy.com, and wildfire locations on apps such as Wildfire Tracker. Evacuate well in advance of a wildfire and before an evacuation is officially called for. Evacuating early takes you out of harms way, and helps firefighters concentrate on fire suppression, not getting you out or accounting for you. The following items are good pre-fire preparedness practices, in case wildfire blocks an evacuation route and requires you to stay.

- a. Keep your lot fire-safe! Rake dead leaves, trim shrubs, and make sure all combustibles are away from any structures.
- b. Make a list of places where water is or can be stored: swimming pool, buckets, bathtubs, toilet tanks, etc. These will serve as your reservoirs for putting out fires once the front has passed. Some will also provide drinking water—don't assume that you will have water pressure. A suggestion is to have a number of "fire" labeled buckets nested together and stored inside.
- c. Make a list of important items that you want to assemble in the event of a necessary evacuation. Don't wait for the fire to arrive and then try this.
- d. Do an attic survey to see how well you can inspect it to locate embers during a fire. Particularly note accessibility of areas near vents and make a drawing, showing how you will inspect the attic after the fire front has passed.
- e. If you have pets, make sure that you have a carrier for each.
- f. Consider a self-powered water pump that could be used for hoses and yard sprinklers. Yard sprinklers can be effective, but they use very large volumes of water. If you consider this option, you should make a practice run with the pump and your water reservoir (don't assume that you will get water from the mains, but plan on using it as long as it comes).
- g. You may want to obtain a portable spray tank (at least two-gallon capacity).

- h. Make sure that you have a wet mop (fabric type) or burlap bags that can be used to put out brands. Set these aside for fire use only!
- i. Protective clothing: gloves, boots or heavy work shoes, coveralls (long sleeve), a hat, goggles for eye protection.
- j. At least two ladders, one that can reach your roof and another to permit you to enter the attic (both stored inside).
- k. Assemble an emergency kit consisting of:
 - 1. A list of all the equipment and materials that might be needed for fire protection
 - 2. Flashlight and spare batteries (plus a rechargeable one if it would be locatable)
 - 3. Several screwdrivers (for attaching covers—don't assume that you will have power or a fully charged portable screwdriver). Have enough so that everyone can help
 - 4. Battery powered radio
 - 5. Telephone numbers for relatives
 - 6. Attic survey map
 - 7. Face masks to filter smoke particulate

Fire Response

Become familiar with the "What It..." publication at <https://www.napafirewise.org/wp-content/uploads/2019/04/WHAT-IF.pdf>. The following are preparation measures when a wildfire is reported:

- a. Evacuate any children, elderly, or disabled persons long before the fire arrives, preferably at the first indication that a fire is anywhere in your area
- b. Place blankets and water in car for evacuation and determine alternate routes to leave
- c. If you have precut materials ready for windows and vents, get them nailed or screwed in place
- d. Plug your downspouts with something like socks filled with sand or dirt, and fill your gutters with water
- e. Remove all materials on your decks, porches, or landings
- f. Make sure that your "water reservoirs" and portable tanks are filled, and have mops and hoses readied, but keep these inside
- g. Remove any inside window coverings such as drapes or furniture that might catch on fire from radiation through the windows or after window breakage

- h. Check your emergency kit and related supplies (hoses, ladders, etc) and have at a convenient place
- i. Gather your protective clothing
- j. Have your hose connected to your supply and under pressure
- k. Have your roof ladder ready to go; set up your attic ladder to be able to easily enter the attic area
- l. Survey the outside to make sure that everything is in readiness

Fire Suppression

These measures are intended to help you cope with the fire. In case you are forced to stay and you have done everything listed above in preparation, you have an excellent opportunity to save your home, but you must be prepared for an emotionally draining experience.

The preparation must be done well in advance of the fire season. For some of these items, you need a fair amount of time under unstressed conditions. If these are not done, you may be at risk in remaining with your house!

Typically in a wildfire, there are three stages of exposure of your house:

- a. Firebrands (embers) arrive well in advance of the main firefront. Since the fire will be wind-driven, so will the brands and many can arrive long before you think your home is threatened. It is critical that these brands not be permitted to get into crevices or ignite vegetation.
- b. The firefront arrives with big flames, a lot of noise, and high radiation intensity. This is a pretty scary time and usually causes panic. If you are forced to stay because the evacuation route is blocked, stay in the house; don't go out and expose yourself to the radiation—this is one of the greatest threats to life safety. The house will protect you! Also, be aware that the front passes very quickly, usually in 10 minutes or less.
- c. The post-firefront period. Once the front has passed, there is a great opportunity to put out spot fires that have occurred or will still occur until everything has settled down. Brands are likely to still arrive by riding wind currents.

Just before the fire comes, wet down the side of the house that appears to be the most vulnerable. Be sure to get water into any crevices, including around windows, inside corners, siding, etc.

Wait until the firefront has passed and it is safe to venture outside. Put on your protective clothing and go out with the portable water supply to make an assessment of the immediate

dangers and put out any spot fires. Be careful when going out so that you do not breathe superheated air.

Be prepared to be on patrol near your house for four hours or more. It will be hot and very uncomfortable, so drink lots of water—every ten minutes is a good rule of thumb.

Your attic is a particularly vulnerable area that must be regularly checked for any embers that have entered. These embers might not be as obvious if they filter down through the insulation.

Experience in many parts of the world has shown that prepared and able-bodied residents can cope with wildfires that threaten houses!

APPENDIX B: FIRE-RESISTANT LANDSCAPING

Many communities are promoting the use of fire-safe plants and implementing projects to demonstrate techniques for reducing fire risk to structures. Although there have been relatively few research results on the fire resistance of landscape plants, we can provide several important generalities. First, the spacing and design of the garden is more critical than the species planted. Leaving horizontal spaces between planting masses, specimen trees, and the house helps create a fire-safe landscape. Similarly, leaving vertical spaces between tree branches, shrubs, ground cover, and the structure (particularly windows) is important in designing a fire-safe garden.

Second, good maintenance of landscaped areas requires removing dead material and maintaining the vertical and horizontal spaces that create a fire-safe design. The significance of proper plant and landscape maintenance cannot be overemphasized. Design landscapes to discourage the creation of "fuel ladders"—a continuous fuel path by which a fire can climb from the ground to a shrub, to a tree, and ultimately to the structure. Continuous removal of any potential fuel ladders needs to be part of routine landscape maintenance. *Poorly maintained landscapes can easily become fire hazards, even if many of the plants are favorably recommended for fire performance.*

SPECIES SELECTION

Domestic landscapes typically incorporate fall into a spectrum of fire hazards:

1. Landscapes are moist, and therefore won't burn; or
2. They contain large amounts of fuel, which will burn with great intensity; or
3. They contain fire-resistant plants, and will burn slowly with little resistance to control, or
4. They are maintained to be of low fuel volume, so provide little heat when they do burn.

Problems to avoid in landscaped areas are poor maintenance, breakage in irrigation pipes, and unremoved dead plant material. These problems can result in a large dead-fuel component amounting to a large volume of fuel.

Desirable landscaping plant species have a low fuel volume and high foliar moisture and do not have a tendency to produce and "hold" dead wood. They also have a proper growth form: for example, ground covers or fruit trees (which inherently have adequate vertical spacing or branches).

Some common landscape species are explosive and can exhibit dramatic fire behavior. For example, a juniper that is 6 sq ft in area can produce flames over 15 ft in length. The Appendix A of this report contains a list of such prohibited plants.

Factors that must be considered in rating the fire performance of plants include:

- Total volume. The greater the volume of plant material (potential fuel) present, the greater the fire hazard.
- Moisture content. The moisture content of plants is an important consideration; high levels of plant moisture can both lower fire risk and act as a heat sink if a fire occurs, reducing its intensity and spread.
- Amount and distribution of dead material. The amount of dead material in a given plant influences the total amount of water in the overall plant; the dead material is usually much drier than living tissue. Whereas dead material rarely has a moisture content higher than 25%, live foliage moisture content ranges from 60 to 80% for chaparral species in xeric conditions to a high of 200 to 400% for succulent plants or plants under irrigation.
- Size of leaves, twigs, and branches. Materials with large surface areas (such as needles, twigs, or large flat leaves) dry more rapidly under fire conditions than materials with lower surface ratios (such as branches and fleshy leaves).
- Geometry and arrangement of the plant (overall spatial distribution of the biomass). The shape of a plant and the way in which the biomass is distributed throughout the plant is important because this bulk density affects the air flow and heat transfer through the plant. The arrangement of material within the plant affects its fuel continuity and its tendency to undergo preheating and promote fire spread.

All of the above-mentioned plant characteristics are related to maintenance issues. Plants with a higher moisture content generally have a lower fire risk. For example, the moisture content of a plant is absolutely influenced by regular and proper irrigation, and large amounts of dead material lower the plant's overall moisture content. To increase the plant's overall moisture content, it is important to remove and properly dispose of dead material. In addition, regular fire-prevention maintenance should include thinning or pruning to reduce fuel volume and improve plant geometry.

An appropriately landscaped and maintained defensible space will reduce the fire hazard and the fire risk to structures. A landscape environment that is inconsistently or improperly maintained does not function as defensible space, and it contributes to the fire hazard. Consult a nursery or landscape professional for their recommendations on plant spacing, pruning, aeration, fertilization, irrigation, and other cultivation practices.

THE CHARACTERISTICS OF FIRE-SAFE PLANTS

Many communities are promoting the use of fire-safe plants and implementing projects to demonstrate techniques for reducing the fire risk to structures. It is clear that numerous factors must be considered in rating the fire performance of plants, including:

Total Volume – The greater the volume of plant material the greater the fire hazard. More fuel is provided for the fire.

Moisture Content – The moisture content of plants is an important consideration because high levels of plant moisture can lower fire risk and act as a heat sink, reducing the intensity and spread of fire.

Amount and Distribution of Dead Material – The amount of dead material found in a plant influences the total amount of water in the overall plant because the dead material is usually much drier than living tissue.

Size of Leaves, Twigs, and Branches – Materials with large surface areas (e.g. needles, twigs, or large, flat leaves) dry more rapidly under fire conditions than materials with lower ratios (e.g. branches, fleshy leaves).

Geometry and arrangement (overall spatial distribution of the biomass) of the plant – The shape of a plant and how the biomass is distributed throughout the plant is important because this bulk density affects the air flow and heat transfer through the plant. The arrangement of material within the plant effects the fuel continuity and the tendency for preheating and fire spread.

Plant Maintenance – The significance of proper plant and landscape maintenance cannot be overemphasized. *Poorly maintained landscapes can easily become fire hazards even if many of the plants are favorably recommended for fire performance.*

All of the previously mentioned plant characteristics are related to maintenance issues. Plants with a higher moisture content generally have a lower fire risk. For example, the moisture content of a plant is absolutely influenced by regular and proper irrigation and large amounts of dead material lower the overall moisture content of the plant. Dead material should be removed and properly disposed of to increase the overall moisture content of the plant. Regular maintenance should include the removal of dead material, thinning or pruning to reduce fuel volume and improve geometry to lower the fire risk.

Plant spacing, pruning, aeration, fertilization, irrigation and other cultivation practices should be consistent with a nursery's or landscape professional's recommendations.

The positioning of plants relative to each other and structures is also very important. Landscapes should be designed and maintained to discourage the creation of "fuel ladders" – a continuous fuel path by which a fire can climb from the ground to a shrub, to a tree and ultimately to the structure. Removal of any potential fuel ladders needs to be part of the routine landscape maintenance.

An appropriately landscaped and maintained defensible space will reduce the fire hazard and the fire risk to structures. A landscape environment that is inconsistently or improperly maintained cannot be considered defensible space and contributes to the fire hazard.

For reference on fire-resistant species, see: <https://firesafemarin.org/create-a-fire-smart-yard/plants/>

SPECIES LIST FOR PROHIBITED LANDSCAPING PLANTS

The following list of plants shall be incorporated as an addendum to the Fire Management Plan, as prepared by Wildland Res Mgt., Inc. Due to their combustible nature, these plants shall be prohibited from the lots.

<u>Botanical Name</u>	<u>Common name</u>
Abies spp.	fir
Acacia spp.	acacia
Adenostoma fasciculatum	chamise
Adenostoma sparsifolium	red shanks
Artemisia californica	California sage
Baccharis pilularis consanguinea	coyote brush
Bamboo spp.	bamboo
Cedrus spp.	cedar
Cortaderia selloana	pampas grass
Cupressus spp.	cypress
Dodonaea viscosa	hopseed bush
Eriogonum fasciculatum	California buckwheat
Eucalyptus cladocalyx	sugar gum
Eucalyptus globulus	blue gum
Eucalyptus viminalis	Manna gum
Hedera canariensis	Algerian ivy
Juniperus spp.	juniper
Pennisetum setaceum	fountain grass
Picea spp.	spruce
Pinus spp.	pinos
Salvia mellifera	black sage
Schinus spp.	California pepper tree

In addition, plants should not be established which could invade nearby regional parks and open spaces. Refer to the Vegetation Management Almanac for a list of species which should not be planted because of their invasive nature. The list includes:

Blackwood acacia	ivy
coyote bush	holly
Pampas grass	Monterey pine
cotoneaster	pyracantha
Italian hawthorn	blackberry
eucalyptus	vinca major
broom	
mayten	

APPENDIX C: KEY TERMINOLOGY

Defensible space – the area within the perimeter of a parcel, neighborhood or community that provides a key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires

Canopy – The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.

Canopy Base Height – The lowest height above the ground above which there is sufficient canopy fuel to propagate fire vertically. It is a measure of a group of trees, not an individual tree. This measurement incorporates ladder fuels, such as tall shrubs and small trees.

Crown Fire – A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Dozer Line – Fireline constructed by the front blade of a dozer.

Fire Behavior – The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Hazard Severity – Fire hazard severity zones are based on the combination of vegetation, topography, weather, crown fire potential, ember production and movement, and the likelihood of an area burning. Buildings constructed in Very High Fire Hazard Severity Zones are required to be built using fire-resistive features.

Fire Intensity – the amount of heat released by a fire in an area in any given time period. Fire intensity is usually related to the flame lengths of a fire.

Firebrand – Any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels. Also known as embers.

Fuel – anything that will burn easily, such as vegetation or small woody material

Fuel Model – Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified. Vegetation is grouped into a set of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Fuel Modification – Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling, and burning).

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.

Fuel Type – An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Fuelbreak - Fuelbreaks are man-made areas with a reduced fuel load that act as barriers to stop or slow down fire spread. They are also designed to provide firefighters access and to act as a retreat for personnel and equipment to escape injury.

Hazard - Hazard means an event or physical condition (fire) that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Rate of Spread – The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Response time – The time between notification of a wildfire and the arrival of firefighters at the scene.

Retardant – A substance or chemical agent which reduces the flammability of combustibles.

Risk - Risk, or fire risk case, is defined as the likelihood that a threat (fire) will harm an asset with some severity of consequences.

Shaded Fuel Break – Fuel breaks built in timbered areas where the trees on the break are thinned and pruned to reduce the fire potential yet retain enough crown canopy to make a less favorable microclimate for surface fires.

Topography – geographic elements on an area, such as slope steepness, aspect, existence of hills, canyons and rough terrain

Spotting – Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire.

Torching – The burning of the foliage of a single tree or a small group of trees, from the bottom up.

Vegetation Treatment – Activities that modify the vegetation, often to reduce the fire hazard. Manual labor, machinery, prescribed fire and herbicide use are all used as vegetation treatments. Vegetation treatment may achieve several types of goals, such as the installation of defensible space, shade fuelbreaks, or firebreaks

Wildland – areas which are not developed or farmed