Council Agenda Report

To: Mayor Farrer and the Honorable Members of the City Council

Prepared by: Jessica Cleavenger, Associate Planner

Reviewed by: Bonnie Blue, Planning Director

Approved by: Reva Feldman, City Manager

Date prepared: December 18, 2019          Meeting date: January 13, 2020

Subject: Amendments to the Local Coastal Program and Malibu Municipal Code to Foster Fire-Resistant Landscapes Citywide

STAFF RECOMMENDED ACTION: 1) After the City Attorney reads the title, introduce on first reading Ordinance No. 461 (Attachment 1) determining the project is exempt from the California Environmental Quality Act (CEQA) and amending Local Coastal Program (LCP) Local Implementation Plan (LIP) Chapter 3 (Zoning Designations and Permitted Uses) and Chapter 2 (Definitions) and Malibu Municipal Code (MMC) Title 17 (Zoning) to foster the creation of fire-resistant landscapes and repealing Ordinance Nos. 343 and 356, deleting MMC Chapter 9.22 (Landscape Water Conservation), establishing MMC Chapter 17.53 (Landscape Water Conservation and Fire Protection), and amending MMC Section 16.24.020 (Subdivision Design Standards) to eliminate reference to MMC Chapter 9.22; and 2) Direct staff to schedule second reading and adoption of Ordinance No. 461 for the January 27, 2020 Regular City Council meeting.

PLANNING COMMISSION RECOMMENDATION ACTION: Recommend that the Council:

1) Direct staff to prepare the ordinance consistent with Planning Commission Resolution No. 19-74 (Attachment 2);
2) Direct staff to prepare a fire-hardening ordinance that addresses fire resistant building materials and methods;
3) Direct staff to prepare additional fire-resistant landscape ordinance provisions including an analysis of slope with regards to the spread of wildfires, but also accounting for necessary erosion control, and to get comments from the Fire Department on setbacks for plantings along streets and driveways;
4) Create a program for fountain grass eradication which is related to climate change resilience;
5) Direct staff to develop an outreach program that encourages “firescaping” throughout the landscape and emphasizes proper maintenance of existing landscaping and vegetation; and
6) Hold a joint public meeting with the Planning Commission to discuss other important areas to address with respect to fire hardening and landscaping, including commentary by experts in these topic areas.

FISCAL IMPACT: There is no direct fiscal impact associated with the recommended action. There could be a fiscal impact associated with the Planning Commission’s recommended action, including staff time and resources, however, that impact cannot be determined at this time.

WORK PLAN: Development of a Landscape Ordinance was included as item 1j in the Adopted Work Plan for Fiscal Year 2019–2020. The additional recommendations provided by the Planning Commission were not included in the Adopted Work Plan for Fiscal Year 2019-2020. At this time, there is no unassigned staff time or resources to address the additional recommendations from the Planning Commission without Council re-ordering other Work Plan priorities.

DISCUSSION: In November 2018, the Woolsey Fire damaged or destroyed over 480 homes in the City and significant amounts of landscaping and other structures, including decks, hardscapes and fences. Although fires have historically been unpredictable, dependent upon factors such as wind speed, wind direction and fuel load, it is possible that standards could be established to decrease a property’s likelihood of burning and spreading the fire to neighboring properties. Fuels for fires include, but are not limited to, dead plant material, buildings, decks, fences and other flammable materials such as mulch.

This report discusses concepts for amendments that could be made to the MMC and the LCP that would both reduce the fuels available to potential fires and increase the amount of defensible space around structures. Amendments proposed to create fire-resistant landscapes affect two parts of the MMC: First is Chapter 9.22, the Landscape Water Conservation Ordinance, which sets forth landscape design standards. Second is Chapter 17.40, which is Property Development and Design Standards of the Zoning Ordinance. These standards include provisions for fences/walls and gates and provisions for distances between buildings.

Amendments to Chapter 17.40 of the MMC will also necessitate amendments to the LIP Sections 2.1 (Definitions), 3.5 (General Regulations/Development Standards), and 3.6 (Residential Development Standards).

In addition to creating provisions that foster fire-resistant landscapes, Planning Commission Resolution No. 19-74 includes a proposed amendment to move MMC Chapter 9.22 back to Title 17 as a new Chapter 17.53, thereby, placing the Landscape Water Conservation chapter under the Planning Commission’s purview. Prior to 2011, the
Water Conservation Landscaping standards resided in MMC Chapter 17.44. In order to expedite amendments mandated by California Assembly Bill 1881, the chapter was removed from Title 17 and placed in Title 9 (Public Peace and Welfare). Also, a final amendment to MMC Section 16.24.020 (Subdivisions Design Standards) is proposed to remove a reference to MMC Chapter 9.22 and substitute the new MMC Chapter 17.53.

The proposed ordinance aims to reduce fire hazard risk and the spread of fires by creating standards pertaining to landscaping, hardscape and accessory structures. The purpose of the ordinance is to minimize the risks to life and property as a result of fire. The ordinance applies to all new and updated landscaping and development plans throughout the City. The trigger for compliance will be applications for new or updated landscaping plans including modified landscaping that exceeds 2,500 square feet for residential properties and any amount of modified landscaping for commercial properties or properties located in non-residential zoning districts.

Here are some of the key features of the ordinance (Attachment 1):

- Applies citywide for all new and updated landscaping plans
- Creates a five-foot defensible space buffer around structures
- Sets restrictions for planting Palm trees
- Prohibits the planting of highly flammable trees within 50 feet of structures
- Sets provisions for maximum growth height of trees and shrubs planted near overhead power lines
- Creates an incentive to use nonflammable materials to construct front yard fences/walls and gates

This agenda report provides a chronology of the public review associated with the Fire-Resistant Landscape Ordinance, as well as a background discussion of each area of amendement, followed by the recommendations as made by ZORACES, the Commission, and staff. A list of references used to draft the proposed amendments is included as Attachment 3. Additional recommendations are included at the end of the report.

Public Review Chronology

On January 24, 2019, the City Council directed staff to prepare an item discussing potential restrictions on certain flammable plants, trees and materials in landscaping plans.

On October 14, 2019, staff proposed code amendments to the Zoning Ordinance Revisions and Code Enforcement Subcommittee (ZORACES) and requested comments and recommendations on a proposed ordinance. ZORACES recommended that staff move forward with preparation of a proposed ordinance and present it to Planning Commission for further consideration. ZORACES also recommended that staff prepare a list of recommended fire-resistant trees and shrubs (Attachment 4).
On October 28, 2019, the City Council adopted City Council Resolution No. 19-47 formally initiating the ZTA and LCPA and directed staff to establish an ordinance that reduces the fuels available to fires and increases the amount of defensible space around structures (Attachment 5).

On November 18, 2019, the Planning Commission held a duly noticed public hearing on the ordinance, at which time the Planning Commission reviewed and considered the agenda report, public testimony, and other information on the record and adopted Planning Commission Resolution No. 19-74, recommending the Council approve the ordinance with certain modifications. In some areas, the Commission recommended stricter provisions than staff’s recommendations. The main areas where the Commission recommended stricter provisions were 1) to prohibit planting any type of Palm tree, regardless of maximum growth height, and 2) expanding staff’s recommended list of prohibited plants from five tree and shrub species to 33 plant species. The four Commissioners present were split with regards to a proposed amendment that would allow six-foot tall, solid front yard fences/walls and gates if constructed of nonflammable material.

In general, the Commission expressed that, while it understands the urgency and importance of the ordinance, key information was received from the public on the day of the meeting that raised additional questions that they would like to have the opportunity to address with the purpose of furthering the Council’s goal of public safety and fire protection. The Commission also expressed it would be beneficial to have a joint meeting between the Council and the Commission on this topic before moving forward, and that it would be beneficial to have experts present to provide advice before taking action.

The Commission deadlocked several times on whether to move the ordinance forward to the Council or to have it return to the Commission for further refinement and recommendation. Ultimately, the Commission voted to adopt Planning Commission Resolution No. 19-74 and move the ordinance forward to the Council.

A. Proposed Amendments to Add MMC Chapter 17.53

1. **Repeal MMC Chapter 9.22 (Landscape Water Conservation) and Establish MMC Chapter 17.53 (Landscape Water Conservation and Fire Protection)**

   **Background:** The first proposed amendment included in Ordinance No. 461 will move MMC Chapter 9.22 (Landscape Water Conservation) to MMC Chapter 17.53, creating the Landscape Water Conservation and Fire Protection chapter. This amendment will return the landscape ordinance back to Title 17 (Zoning) where it originally resided, thereby, placing the Landscape Water Conservation chapter under the Planning Commission’s purview. No changes to the existing provisions of MMC Chapter 9.22 are proposed, with one exception discussed in Section 17.53.030(B) below. A new chapter, MMC Chapter 17.53 (Landscape Water Conservation and Fire Protection Standards), will be established, and will include MMC Section 17.53.090(C)(Fire Protection Standards).
ZORACES Recommendation: The change to move the standards to Title 17 was proposed after the ZORACES meeting, and was therefore, not discussed by ZORACES.

Planning Commission Recommendation: The Commission agreed with this change to move the standards back to Title 17.

2. Prohibit the Planting of Palm Trees with the Potential to Grow Over Six Feet in Height (MMC Section 17.53.090)

Background: Certain palm tree species, such as Fan Palms and Queen Palms, have been identified as fire hazards both due to the ability of the large palm fronds to carry embers long distances and to a lack of proper trimming and maintenance. When unmaintained, dead leaves or palm fronds form a “skirt” of brown thatch around the base of the plant. Embers from fires can become embedded in the “skirt” and quickly ignite the entire tree. Once ignited, dried fronds and leaf bases can become detached from the trunk and carried by the wind several miles. An article published by the Escondido Fire Department that discusses the fire hazards created by palm trees is included as Attachment 6. Maintenance of palm trees, especially tall varieties, can be difficult for many property owners as removing the dead leaf debris and dried fronds high on the trees can be hazardous. The Los Angeles County Fire Department responds to an average of six deadly palm tree incidents each year due to accidents that occur while trimming. The proposed amendment prohibits the planting of palm trees that have the potential to grow over six feet in height.

ZORACES Recommendation: At the ZORACES meeting, staff originally proposed a prohibition on planting three trees species: 1) Palm, 2) Eucalyptus, and 3) Pine. The subcommittee determined the provision was too restrictive and, instead recommended that staff only prohibit planting palm trees with the potential to grow over 18 feet in height.

Planning Commission Recommendation: The Commission discussed the recommendation made by ZORACES and, instead, recommended that staff propose a provision that prohibits the planting of any species of palm tree, regardless of the projected maximum growth height. The Commission made this recommendation due to its understanding of the way palm trees burn, wherein fire either travels up the trunk of a palm tree or embers land on the large palm fronds at the top of the tree. From there, the tree burns similar to a candle, with the majority of the fire burning at the top of the tree. The Commission indicated that, in order to extinguish the fire, extensive amounts of water must be applied to the top of the tree. The Commission further indicated that attempts to extinguish an 18-foot-tall palm tree would be difficult and that burning palm fronds from any palm would be problematic, and therefore, recommended prohibiting the planting of any palm tree, regardless of height.
**Staff Recommendation:** Understanding the complexities associated with extinguishing and maintaining tall palm trees species, staff is proposing an alternative provision that would prohibit planting palm trees with the potential to grow over six feet in height. Reducing the maximum growth height from 18 feet to six feet would allow property owners to plant ornamental palm varieties that could be easily maintained and more easily extinguished in the event of fire.

3. **Prohibit Highly Flammable Mulch Materials, Trees and Shrubs within Five Feet of Structures to Maintain Defensible Space (MMC Section 17.53.090)**

   **Background:** According to the National Fire Protection Association (NFPA), highly flammable mulch materials, including shredded bark, wood chips, shredded rubber, artificial turf and pine needles, should not be used within five feet of a structure. Ventura County Fire Protection District adopted a similar policy in response to the Thomas Fire. The Ventura County standard prohibits flammable mulch materials within five feet of a structure and limits the use of organic (compostable) mulch within five feet and 30 feet of a structure to areas no greater than 400 square feet with a minimum five-foot separation between mulched areas. The use of nonflammable hardscaping, such as rock, gravel, concrete and pavers, is allowed within five feet of structures.

Table 1 summarizes Ventura County’s allowable mulch application standard. Ventura County Fire Code Standard 14.9.2 is included as Attachment 7.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Distance from Structure</th>
<th>Requirement of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 –  5 feet</td>
<td>Flammable mulch, prohibited. Must use nonflammable materials, such as gravel, decomposed granite, etc.</td>
</tr>
<tr>
<td>B</td>
<td>&gt;5 –  30 feet</td>
<td>Non-continuous use of organic mulch* is allowed (excluding wood chips). A maximum application area of 20 feet x 20 feet, and a minimum five-foot separation between application areas.</td>
</tr>
<tr>
<td>C</td>
<td>&gt;30 – 100 feet</td>
<td>Organic mulch and wood chips allowed. No limitation on application areas.</td>
</tr>
<tr>
<td>D</td>
<td>&gt;100 feet</td>
<td>Same as Zone C or as determined by the Fire Code Official.</td>
</tr>
</tbody>
</table>

*Organic mulch is defined as compostable material limited to landscape waste and crop production byproducts consisting of leaves, yard trimmings, wood waste, branches and stumps, and whole plants/trees, that have been mechanically reduced in size and have been composted prior to application.

The University of Nevada Cooperative Extension published a study (Attachment 8) that analyzes the combustibility of different landscape mulches and discusses the
recommended five-foot defensible space buffer around structures. This study is also available on the Los Angeles County Fire Hazard Reduction Program website: https://www.fire.lacounty.gov/forestry-division/fire-hazard-reduction-programs.

On October 3, 2019, the Los Angeles Times published an article (Attachment 9) that further supports a five-foot defensible space buffer around structures. The article discusses flammable mulch materials and recommends trees and shrubs be planted in zones with the first zone located no closer than five feet from a structure.

This proposed amendment will establish a five-foot defensible space buffer around structures whereby trees, shrubs and flammable mulch materials will be prohibited. This five-foot defensible space buffer coincides with the Los Angeles County Fire Department’s required five-foot walk around requirement around structures.

Non-continuous use of mulch (excluding wood chips and shredded rubber) would be allowed between five feet and 30 feet from a structure. It should be noted that continuous use of mulch over large areas serves as a flammable carpet, whereby fire is easily spread. All mulch materials, excluding wood chips and shredded rubber, would be allowed 30 feet or more from a structure.

**ZORACES Recommendation:** ZORACES concurred with using the Ventura County standards.

**Planning Commission Recommendation:** The Commission concurred with using the Ventura County standards with two changes including a recommendation that the Council prohibit artificial turf, or fake grass, within zero and five feet of a structure. In addition, the Commission recommended that the Council adopt a prohibition on wood chips and shredded rubber anywhere on a site, as well as adding a definition for the term combustible material.

**Staff Recommendation:** Staff further researched the combustibility of artificial turf and found that, even though artificial turf manufacturers claim the product is not flammable, the synthetic materials used to create the product will burn if exposed to intense heat. An article published by NFPA on May 2, 2016 (Attachment 10) discusses the combustibility of outdoor decorations made of synthetic materials including artificial turf. Staff, therefore, recommends using the Ventura County standard, but prohibiting artificial turf within zero and five feet of a structure and prohibiting the use of wood chips and shredded rubber throughout the site. Additionally, staff recommends measuring the five-foot defensible space from the outermost projections of a structure including the eaves and overhangs. The point from which to measure the structure was not previously addressed by the Planning Commission.

Staff also considered the Commission’s recommendation regarding the term “combustible.” As defined, combustible materials are materials that have the ability
to ignite, or burst into flames, when exposed to extreme heat. Flammable materials have the ability to burn when exposed to flames. Additionally, flammable materials catch fire quicker and at lower flash points/temperatures than combustible materials. Therefore, staff recommends using the terms “flammable” and “nonflammable” in the ordinance.

4. Institute a Height Limit for Trees Proposed Near Overhead Power Lines (MMC Section 17.53.090)

**Background:** Utility companies throughout the County are encouraging property owners to choose appropriately sized trees when planting under or near overhead power lines. The California Public Utilities Commission mandates utility companies to perform annual tree trimming of all trees with the potential to grow into overhead power lines. During storms, tree branches can blow into power lines or snap off, creating a dangerous condition or causing a power outage. Tree limbs that grow into and touch power lines can burn and drop hot embers under certain conditions. Additionally, power lines have been known to spark during light rain or mist.

According to the Southern California Edison Right Tree/Right Place project, trees planted below or within 20 feet of an overhead power line should have a maximum growth height of 25 feet. Trees planted within 20 and 50 feet from an overhead power line should have a maximum growth height of 40 feet. Those with the potential to grow higher than 40 feet should be planted more than 50 feet from overhead power lines.

If added to MMC Chapter 17.53, this proposed amendment could be implemented during Landscape Plan Reviews. Applicants are already required to provide a planting plan that includes the potential growth height, along with a survey that shows all easements on the property, including utility easements. Non-compliant landscape plans would be issued a correction to comply with the utility easement planting requirement. The option of keeping trees trimmed in order to meet the height requirement (for trees with the potential to exceed it) would not be an allowed. A condition of approval indicating the maximum growth height would be included on the landscape approval.

**ZORACES Recommendation:** ZORACES concurred with using a maximum growth height of 25 feet for trees planted below or within 20 feet of an overhead power line, and 40 feet for trees planted between 20 feet and 50 feet from an overhead power line.

**Planning Commission Recommendation:** The Planning Commission agreed with ZORACES but specified that the distance should be measured from the center of the trunk.
Staff Recommendation: Staff's recommendation includes the Planning Commission's suggestions.

5. Prohibit the Planting of Highly Flammable Trees within 50 Feet of Structures (MMC Section 17.53.090)

Background/ZORACES Recommendation: ZORACES considered a requirement that would prohibit the planting of highly flammable trees, including eucalyptus trees and pine trees, anywhere on a property. ZORACES determined the proposed amendment was too restrictive and recommended staff remove the proposed amendment.

Upon further research and communications with Juan Rovalo, Senior Ecologist and Integrated Design Specialist of Biohabitats, a biological engineering firm, and the Deputy Forester of the Los Angeles County Fuel Modification Unit, staff drafted an alternative amendment and presented it to the Planning Commission. The alternative amendment would prohibit planting five types of highly flammable trees and shrubs within 30 feet of structures. The five types of trees and shrubs included:

1) Eucalyptus (Eucalyptus, gum tree)
2) Pine (Pinus species)
3) Cypress (Cupressus species)
4) Cedar (Cedrus species)
5) Tree of Heaven (Ailanthus altissima)

These tree and shrub species, as identified in the Santa Monica Mountains Community Wildfire Protection Plan, Fire Resistant Plants - 2010 (Attachment 11), are highly flammable due to flammable oils or sap carried throughout plant. When the oils or fuels heat up, the plant can release flammable gas, which can then easily ignite into an exceedingly hot fire under favorable conditions. In addition to the flammable fuels within the plants, these species are also known to shed bark and dead leaves or dried needles which, if left unattended, can create a pile of tinder at the base of the plant.

Planning Commission Recommendation: The Commission reviewed the alternative amendment proposing a prohibition of the five species listed above within 30 feet of structures. After extensive discussion, the Commission recommended staff expand the list to include all species of plants listed on the Santa Monica Mountains CWPP, Restricted Plant List/Plants to Avoid and to increase the distance from structures to 50 feet. The Commission also discussed the use of certain eucalyptus trees as monarch roosting habitat and the recent reduction in monarch populations in Southern California. The Commission then decided to recommend that an exception be made that would allow Eucalyptus trees to be planted between five and 30 feet of a structure if a qualified expert, as determined by the director, identifies the tree(s) as a monarch butterfly habitat. Finally, the Commission
recommended that distances be measured from dripline of the anticipated mature tree canopy.

Staff Recommendation: In order to avoid an overly restrictive prohibition list, staff recommends limiting the list of trees and shrubs prohibited within 50 feet of a structure to: 1) Eucalyptus, 2) Pine, 3) Cypress, 4) Cedar, and 5) Tree of Heaven. Limiting the list of prohibited trees and shrub species will preserve a property owner’s design flexibility while eliminating plant species that have been repeatedly identified as high fire risks. The entire list provided by the Santa Monica Mountains CWPP could then be more fully vetted for the local area and addressed in a future amendment to the ordinance if needed. Staff agrees with the Commission’s recommendation on measuring distance and an exception for potential monarch habitat eucalyptus trees but used 50 feet to be consistent. Again, staff recommends measuring the distance from the outermost projection of the structure including eaves and overhangs. Staff further recommends posting the entire CWPPP list on a City website designed to encourage “firescaping” along with the proper maintenance of existing landscaping and vegetation.

B. Proposed Amendments to MMC Chapter 17.40 (Property Development and Design Standards and to LIP Chapter 3 (Zoning)

6. Prohibit Hedges and Flammable Fences/Walls and Gates within Five Feet of Structures (MMC Section 17.40.030 and LIP Section 3.5)

Background: Flammable fences/walls, and gates, along with debris from vegetation and mulch that builds up around them, create an excellent source of fuel for fires. This proposed amendment prohibits the use of hedges and flammable fences/walls, and gates within the NFPA-recommended five-foot defensible space around structures, thereby reducing the amount of flammable fuels adjacent to the structure. For fences/walls, and gates within five feet, an alternative material, such as metal or masonry, could be used. Prohibiting hedges within five feet of structures will reduce vegetative debris, including dry leaves and bark, from building up near structures.

ZORACES, Planning Commission and Staff Recommendation: Both ZORACES and the Commission reviewed the proposed amendment and agreed with staff’s recommendation to prohibit flammable fences/walls, and gates and hedges within five feet of a structure, including eaves and overhangs.

7. Prohibit Shade Structures within Six Feet of Buildings (MMC Section 17.40.050 and LIP Section 3.6)

Background: NFPA recommends a five-foot clearance for detached structures from buildings. In this context, a structure would include, but is not limited to, sheds, garden houses, pergolas, and detached canopy shade structures.
MMC Section 17.40.050(A)(2) and LIP Section 3.6(R)(1)(b) currently require a minimum of six feet between accessory buildings and main buildings. Because of the existing definition of “building,” which specifies a roof, this setback requirement would not address certain shade structures, such as a trellis that is open to the sky (see example images below).

An amendment to also apply the setback to “detached shade structure” would clarify the code and ensure its consistent application. A new definition of “shade structure” is also included.

![Example images of trellises](image1.png) ![Example images of trellises](image2.png)

**ZORACES and Planning Commission Recommendation:** Both ZORACES and the Commission reviewed the proposed amendment and concurred that this amendment should be included. The Commission further recommended expanding the definition of Shade Structure to include structures with roofs or coverings made of or supporting plants and vines.

**Staff Recommendation:** Staff has incorporated detached shade structures into the existing setback requirement, along with a definition that includes coverings made of or supporting plants and vines.

8. **Amend the Allowable Height of Front Yard Fences/Walls, and Gates (MMC Chapter 17.40.030 and LIP Section 3.5)**

Staff proposed an additional amendment to ZORACES intended to incentivize fire-resistant fencing and diminish property owners’ desire for tall hedges by allowing front yard fences/walls and gates to be constructed up to a maximum height of six feet of solid material such that they are completely non-view impermeable. Currently, the general development standards in the MMC and LCP allow six-foot high front yard fences/walls and gates, but only the lower 42 inches are allowed to be solid material. The fence/wall and gate height between 42 inches and six feet.

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1 “Building” is defined in the LCP and MMC as any structure having a roof supported by columns or walls and intended for shelter, housing or enclosure of any individual, animal, process, equipment, goods or materials of any kind or nature.
must be “view permeable,” which is defined as “non-view-obscuring.” However, residents consistently express a desire for increased privacy. As a result, many have planted hedges in the front yard that they have left unmaintained or untrimmed in order to achieve increased levels of privacy. These unmaintained hedges pose a fire risk and a code enforcement nightmare.

An amendment to allow front yard fences/walls and gates to be constructed up to a six feet high of solid material such that they are completely non-view impermeable could reduce the desire for an overheight hedge, thereby, reducing plant material available as fuel to potential fires. The amendment would also be paired with a requirement that stipulated that in order to construct a solid fence/wall or gate at that height, the material would have to be non-flammable. This amendment could also assist Code Enforcement with resolving overheight fence and hedge violations. Two important exceptions to this standard would be necessary. First, solid fences/walls, and gates would have to be prohibited within any view corridor required by the LCP. Secondly, an exception to this amendment should be considered for corner lots where a triangular line-of-sight area may still be needed for safety.

ZORACES Recommendation: ZORACES determined the proposed amendment may pose a security risk for property owners as the solid six-foot fence/wall and gate could provide screening for trespassers or intruders hiding on private property and recommended against this amendment.

Planning Commission and Staff Recommendation: Prior to the Planning Commission hearing, staff consulted with local Los Angeles County Fire Department and Los Angeles County Sheriff’s Department staff on whether a six-foot solid fence or wall would create concerns regarding being able to spot a fire or an intruder. The Commission deadlocked on this issue, with two in favor of staff’s recommendation to allow six-foot solid front yard fencing and walls if they are constructed of non-flammable material, and two opposed due to concern about aesthetic impacts on the City and security.

Recommendations Moving Forward

The following is a summary of recommendations made by the Planning Commission for City Council consideration upon adoption of the proposed ordinance.

1. Hold a joint public meeting between the Council and Planning Commission to identify additional important areas to address with respect to fire hardening and landscaping, including commentary from experts in these topic areas.
2. Direct staff to prepare a fire-hardening ordinance that addresses fire-resistant building materials and methods to further combat the spread of fires through the landscape.
3. Direct staff to prepare a second phase fire-resistant landscape ordinance that addresses analysis of slope with regards to the spread of wildfires, but also accounting for necessary erosion control, and also addressing Fire Department preferences for setbacks for plantings along driveways and streets.

4. Create a program to eradicate invasive fountain grass which is related to climate changes resilience.

5. Direct staff to develop an outreach/education program that encourages “firescaping” throughout the landscape and emphasizes proper maintenance of existing landscaping and vegetation street.

Redline of Proposed Amendments Recommended by Staff

Ordinance No. 461 (Attachment 1), incorporates the following changes to MMC Chapters 9.22 (Landscape Water Conservation) and 16.24 (Subdivision Design Standards), and Title 17 (Zoning) and LIP Chapter 3 (Zoning Designations and Permitted Uses) and Chapter 2 (Definitions) (any additions to the MMC and LCP sections are shown in underline text, any text proposed to be removed is shown by strikethrough):

1. MMC Chapter 17.53 shall be established and all provisions located in the existing MMC Chapter 9.22 shall be incorporated within, thereby, repealing Chapter 9.22. This chapter shall be known as “Landscape Water Conservation and Fire Protection.”

2. MMC Chapter 17.53.020 (Definitions) shall be amended to include the following definitions:

   “Application area” means the area, within the landscape, that is covered by mulch.

   “Flammable material” means combustible material capable of igniting at ambient temperatures at or below 37.8 degrees Celsius (100 degrees Fahrenheit).

   “Mulch” means material (such as decaying leaves, bark, compost, gravel, or rocks) spread around or over a plant or within the landscape to enrich soil or suppress the growth of weeds.

   “Non-continuous” means having one or more interruptions in a sequence or in a stretch.

   “Nonflammable material” means material that is not flammable.

   “Power line” means a cable carrying electrical power, especially one supported by pylons or poles.
“Shade Structure” means a structure with a temporary or permanent roof or covering made of or supporting plants and vines which is designed to provide shelter from the heat or glare of the sunlight.

3. LIP Chapter 2 (Definitions) shall be amended to include the following definition:

“Shade Structure” means a structure with a temporary or permanent roof or covering made of or supporting plants and vines which is designed to provide shelter from the heat or glare of the sunlight.

4. MMC Section 17.53.030 - “Applicability”

A. This chapter applies to the following projects for which the City issues an administrative plan review or discretionary permit after the effective date of the ordinance codified in this chapter:

2. A project for a single-family residential use proposing a new or altered landscape area of five hundred (500) square feet or more; in the case of a project associated with an existing single-family residence, the new or altered landscape area is subject to this chapter when the landscape area is two thousand five hundred (2,500) square feet or more.

B. The following projects shall be exempt from the requirements of this chapter:

1. A single-family residence being rebuilt pursuant to a planning verification or administrative plan review following destruction or damage due to a natural disaster, except that such residences shall not be exempt from Section 17.53.090(C).

5. MMC Section 17.53.090 – “Fire Protection Standards”

Section 17.53.090(C) shall read as follows:

C. Fire Protection Standards.

1. Planting Restrictions.

   a. Palm trees with the potential to grow over six feet in height are prohibited.

   b. Trees and shrubs are prohibited between zero and five feet from a structure.

   c. The following trees and shrubs are prohibited within 50 feet of structures: Eucalyptus (Eucalyptus gum tree), Pine (Pinus species), Cypress (Cupressus species), Cedar (Cedrus species), and Tree of Heaven
(Ailanthus altissima).

d. Non-continuous planting of trees and shrubs (except those in (a) and (c) above), is allowed between five feet and 50 feet from a structure.

e. Eucalyptus trees are allowed between five feet and 50 feet of a structure if a qualified expert, as determined by the director, identifies the trees(s) as a monarch butterfly habitat.

f. The distances for trees and shrubs subject to (b) through (e) shall be measured from the dripline of the tree or shrub at its projected maturity to the outermost projection of the structure including eaves and overhangs.

g. Trees planted within or near existing utility easements where overhead power lines are present are limited as follows:

   i. Trees planted below or within 20 feet of a power line shall have a maximum growth height of 25 feet at maturity.

   ii. Trees planted within 20 feet and 50 feet of a power line shall have a maximum growth height of 40 feet at maturity.

   iii. The distances for trees and shrubs subject to this subsection (g) shall be measured from the center of the trunk.

2. Mulch material proposed between zero and five feet from a structure must consist of nonflammable materials, such as gravel and decomposed granite. Flammable mulch material, including shredded bark, pine needles, and artificial turf, are prohibited between zero and five feet of a structure. Use of wood chips and shredded rubber is prohibited anywhere on the site. Non-continuous use of mulch (excluding wood chips and shredded rubber) is allowed between five feet and 30 feet from a structure. The distance shall be measured from the outermost projection of the structure including eaves and overhangs. The maximum application area of mulch located between five feet and 30 feet from a structure is 20 feet by 20 feet with a five-foot separation between application areas. Any mulch materials (excluding wood chips and shredded rubber) are allowed 30 feet or more from a structure with no limitation on application area.

6. MMC Section 17.40.030(A)(11) – General Development Standards:

   MMC Section 17.40.030(A)(11) has been added to MMC Section 17.40.030 to include the following:

   A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:
11. Hedges and flammable fences and walls are prohibited within five feet of a building. For fences and walls the distance shall be measured from the outermost projection of the building to the fence or wall, including eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the building to the canopy of the hedge at its projected maturity, including eaves, overhangs, and second floor balconies.

7. LIP Section 3.5.3(A)(11) – General Development Standards:

LIP Section 3.5.3(A)(11) has been added to LIP Section 3.5.3 to include the following:

A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:

11. Hedges and flammable fences and walls are prohibited within five feet of a building. For fences and walls, the distance shall be measured from the outermost projection of the building to the fence or wall, including eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the building to the canopy of the hedge at its projected maturity, including eaves, overhangs, and second floor balconies.

8. MMC Section 17.40.050 – Distance Between Buildings:

MMC Section 17.40.050 has been reordered and amended to read as follows:

A. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.

1. Distance Between Main Buildings. A minimum distance of ten (10) feet shall be required between all main residential buildings established on the same lot or parcel of land.

2. Projections Permitted Between Buildings, including detached Shade Structures, on the Same Lot or Parcel of Land. The following projections are permitted within six (6) feet of the required ten (10) feet between buildings, including detached shade structures, provided they are developed subject to the same standards as and not closer to a line midway between such buildings than is permitted in relation to a side lot line within a required interior side yard:

   a. Eaves and cantilevered roofs;
   b. Fireplace structures, buttresses and wing walls;
   c. Rain conductors and spouts, water tables, sills, capitals, cornices, and belt courses;
d. Awnings and canopies;

e. Water heaters, water softeners, gas or electric meters, including service conductors and pipes;

f. Stairways and balconies above the level of the first floor.

B. Distance Between Accessory and Main Buildings. A minimum distance of six feet shall be required between any main residential building and an accessory building established on the same lot or parcel of land.

C. Uncovered porches, platforms, landings and decks, including access stairs thereto, which do not extend above the first floor are permitted within the required distance between buildings without distance restriction.

9. LIP Section 3.6(R)(1) – Distance Between Buildings:

LIP Section 3.6(R)(1) has been reordered and amended to read as follows:

1. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.

   a. Distance Between Main Buildings. A minimum distance of ten (10) feet shall be required between all main residential buildings established on the same lot or parcel of land.

   b. Projections Permitted Between Buildings, including detached Shade Structures, on the Same Lot or Parcel of Land. The following projections are permitted within six (6) feet of the required ten (10) feet between buildings, including detached shade structures, provided they are developed subject to the same standards as and not closer to a line midway between such buildings than is permitted in relation to a side lot line within a required interior side yard:

      i. Eaves and cantilevered roofs;

      ii. Fireplace structures, buttresses and wing walls;

      iii. Rain conductors and spouts, water tables, sills, capitals, cornices, and belt courses;

      iv. Awnings and canopies;

      v. Water heaters, water softeners, gas or electric meters, including service conductors and pipes;
vi. Stairways and balconies above the level of the first floor.

c. Distance Between Accessory and Main Buildings. A minimum distance of six feet shall be required between any main residential building and an accessory building established on the same lot or parcel of land.

10. Amended MMC Section 16.24.020 – Design Guidelines:

Currently, MMC Section 16.24.020(C)(4) references MMC Chapter 9.22. With the proposed repeal of MMC Chapter 9.22 and establishment of MMC Chapter 17.53, the provision shall read as follows:

MMC Section 16.24.020(C)(4) – Design Guidelines:

Any manufactured slopes shall be landscaped consistent with the provisions of Municipal Code Chapter 17.53.

ENVIRONMENTAL REVIEW: In accordance with CEQA, the ordinance would be exempt from CEQA under the commonsense exemption of Section 15061(b)(3) that states CEQA review is not required when there is no possibility that the ordinance may have a significant adverse effect on the environment. As the scope of the amendments are limited and the purpose is to reduce the spread of wildfires, there will be no significant effect on the environment. Therefore, it is determined that there is no possibility the amendment will have a significant effect on the environment and the project is exempt from CEQA pursuant to CEQA Guidelines Sections 15061(b)(3) – Common Sense Exemption, and 15308 – Actions by Regulatory Agencies for Protection of the Environment apply. Additionally, in accordance with the CEQA, Public Resources Code Section 21080.9, CEQA does not apply to activities and approvals by the City as necessary for the preparation and adoption of an LCP amendment. This application is for an LCP amendment which must be certified by the California Coastal Commission before it takes effect.

CORRESPONDENCE: Staff has received public correspondence regarding this project. All correspondence has been included as Attachment 12.

PUBLIC NOTICE: On December 19, 2019, a Notice of Public Hearing was published in a newspaper of general circulation within the City of Malibu and mailed to all interested parties.

SUMMARY: Staff recommends that the City Council introduce on first reading Ordinance No. 461 amending the LCP LIP Chapters 2 and 3, amending MMC Title 17 and Section 16.24.020, repealing Ordinance Nos. 343 and 356, deleting MMC Chapter 9.22 to foster the creation of fire-resistant landscapes; 2) Direct staff to schedule second reading and
adoption of Ordinance No. 461 for the January 27, 2020 Regular City Council meeting; and 3) Provide other direction as needed.

ATTACHMENTS:

1. City Council Ordinance No. 461
2. Planning Commission Resolution No. 19-74
3. List of References
4. Recommended Fire-Resistant Trees and Shrubs
5. City Council Resolution No. 19-47
6. Escondido Fire Department: Palm Trees as Fire Hazards
7. Ventura County Fire Code Standard 14.9.2
8. University of Nevada Cooperative Extension: The Combustibility of Landscape Mulches
9. Los Angeles Times article: Want to fireproof your home? It takes a village (published October 3, 2019)
11. Santa Monica Mountains Community Wildfire Protection Plan, Fire Resistant Plants - 2010
12. Correspondence
13. Notice of Public Hearing
ORDINANCE NO. 461

AN ORDINANCE OF THE CITY OF MALIBU DETERMINING THE PROJECT IS CATEGORICALLY EXEMPT FROM THE CALIFORNIA ENVIRONMENTAL QUALITY ACT AND AMENDING THE LOCAL COASTAL PROGRAM LOCAL IMPLEMENTATION PLAN CHAPTER 3 (ZONING DESIGNATIONS AND PERMITTED USES) AND CHAPTER 2 (DEFINITIONS) AND MALIBU MUNICIPAL CODE TITLE 17 (ZONING) TO FOSTER THE CREATION OF FIRE-RESISTANT LANDSCAPES AND REPEALING ORDINANCE NOS. 343 AND 356, DELETING MALIBU MUNICIPAL CODE CHAPTER 9.22 (LANDSCAPE WATER CONSERVATION), ESTABLISHING MALIBU MUNICIPAL CODE CHAPTER 17.53 (LANDSCAPE WATER CONSERVATION AND FIRE PROTECTION) AND AMENDING MALIBU MUNICIPAL CODE SECTION 16.24.020 TO ELIMINATE REFERENCE TO MALIBU MUNICIPAL CODE CHAPTER 9.22

The City Council of the City of Malibu does ordain as follows:

SECTION 1. Recitals.

A. On January 24, 2019, the City Council directed staff to prepare an item discussing potential restrictions on certain flammable plants, trees and materials in landscaping plans.

B. On October 14, 2019, the Zoning Ordinance Revisions and Code Enforcement Subcommittee of the City Council provided recommendations on key elements to amend the Local Coastal Program (LCP) Local Implementation Plan (LIP) Chapter 3 (Zoning Designations and Permitted Uses) and Malibu Municipal Code (MMC) Title 17 (Zoning) and Chapter 9.22 (Landscape Water Conservation) to foster the creation of fire-resistant landscapes.

C. On October 24, 2019, a Notice of Planning Commission Public Hearing was published in a newspaper of general circulation within the City of Malibu and was mailed to all interested parties.

D. On October 28, 2019, the City Council adopted Resolution No. 19-47 and directed staff to prepare a zoning text amendment (ZTA) and local coastal program amendment (LCPA) to establish a citywide fire-resistant landscape ordinance. The purpose of the ordinance is to reduce fire hazard risk and spread by minimizing the fuels available to wildfires in the landscape. Amendments include restrictions on landscape species, spacing and placement, specifications for materials and siting for fences/walls and gates, and mulch/groundcover, and other similar measures aimed at reducing fuel loads, flammability and the potential for wildfire spread.

E. On November 18, 2019, the Planning Commission held a duly noticed public hearing on the draft ordinance, at which time the Planning Commission reviewed and considered the agenda report, reviewed and considered written reports, public testimony, and other information in the record.

F. On December 19, 2019, a Notice of City Council Public Hearing was published in
a newspaper of general circulation within the City and was mailed to all interested parties; regional, state and federal agencies affected by the amendments; local libraries and media; and the California Coastal Commission.

G. On January 13, 2020, the City Council held a duly noticed public hearing on the proposed ordinance, reviewed and considered the staff report, reviewed and considered written reports, public testimony, and other information in the record.

SECTION 2. Environmental Review.

The City Council has analyzed the project proposal described herein and has determined that the project is covered by the general rule that the California Environmental Quality Act (CEQA) applies only to projects which have the potential for causing a significant effect on the environment. Pursuant to CEQA Guidelines Section 15061(b)(3), where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. As the scope of the amendments are limited and the purpose is to reduce the spread of wildfires, there will be no significant effect on the environment. The City Council has thus determined that there is no possibility the amendment will have a significant effect on the environment and that the project is exempt from CEQA pursuant to CEQA Guidelines Sections 15061(b)(3) – Common Sense Exemption, and 15308 – Actions by Regulatory Agencies for Protection of the Environment apply. Additionally, in accordance with the CEQA, Public Resources Code Section 21080.9, CEQA does not apply to activities and approvals by the City as necessary for the preparation and adoption of an LCP amendment. This application is for an LCP amendment which must be certified by the California Coastal Commission before it takes effect.

SECTION 3. Findings for Zoning Text Amendment No. 19-004.

A. The City Council hereby finds that ZTA No. 19-004 is consistent with the General Plan and is designed to protect and promote public health, safety, welfare and quality of life. The ordinance further strives to protect property from damage caused by fires by restricting the fuels available for the spread of fires. The proposed amendment serves to enhance the Malibu General Plan Mission Statement, protect public safety and preserve Malibu’s natural and cultural resources.

B. The City Council hereby finds that ZTA No. 19-004 further advances the General Plan Land Use (LU) Objective 1.3 to develop “land uses consistent with flood, geologic and fire safety requirements” by implementing regulations, such as those used by fire protection districts that minimize the risk of loss of life and property as a result of fire. Land Use Policy 4.1.6 further states that the City shall promote extensive landscaping in new projects while emphasizing the use of native, fire-resistant and drought-tolerant plant materials. This LU Policy was implemented with the adoption of the landscape water conservation ordinance that encourages the use of native, drought-tolerant plant materials. The proposed fire-resistant landscape ordinance will further promote the LU Objective by emphasizing the use of fire-resistant plant and landscape materials.

C. The City Council held a public hearing, reviewed the subject zoning text amendment application for compliance with the City of Malibu General Plan, Malibu Municipal Code and the Malibu Local Coastal Program, and finds that the zoning text amendment is consistent and recommends approval.
SECTION 4. Zoning Text Amendments.

A. MMC Chapter 9.22 (Landscape Water Conservation) is hereby repealed and existing provisions are added to MMC Chapter 17.53 (Landscape Water Conservation and Fire Protection).

B. MMC Section 16.24.020 (Subdivision Design Guidelines) is hereby amended to substitute the reference to MMC Chapter 9.22 with Chapter 17.53.

C. MMC Chapter 17.53 is hereby established to read as follows:

MMC Chapter 17.53 (LANDSCAPE WATER CONSERVATION AND FIRE PROTECTION):

17.53.010 Purpose.

It is the policy of the city of Malibu to promote water conservation. The landscape water conservation standards detailed in this chapter are intended to promote water conservation while allowing the maximum possible flexibility in designing healthy, attractive, and cost-effective water efficient landscapes.

17.53.020 Definitions.

“Application area” means the area, within the landscape, that is covered by mulch.

“Applied water” means the portion of water supplied by the irrigation system to the landscape.

“Director” means the community development director.

“Estimated total water use or ETWU” means the estimated total water use in gallons per year for a landscape area, calculated by summing the estimated water use for each landscape hydrozone as described in the water budget calculations of Section 17.53.060.

“ET adjustment factor” (ETAF) means a factor of 0.55 for residential areas and 0.45 for nonresidential areas that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. The ETAF for a new and existing (nonrehabilitated) special landscape area shall not exceed 1.0.

“ET or evapotranspiration” means the approximate summation of water losses through evaporation from soil and transpiration from the plants during a specified period of time.

“ETo or reference evapotranspiration” means a standard measurement of environmental parameters which affect the water use of plants. ETTo is expressed in inches for purposes of this chapter and is an estimate of the evapotranspiration (or water loss) per year from a large field of four- to seven-inch tall cool season grass
that is not water stressed. ETo is used as the basis for determining the maximum applied water allowance so that regional differences in climate can be accommodated. For Malibu, the ETo is 44.2 inches.

“Flammable material” means combustible material capable of igniting at ambient temperatures at or below 37.8 degrees Celsius (100 degrees Fahrenheit).

“Guidelines” refers to the Guidelines for Implementation of the Landscape Water Conservation Ordinance to be prepared by the city to describe procedures, calculations, forms and requirements for landscape projects subject to this chapter. The guidelines shall also provide information on increasing water use efficiency and avoiding water waste in existing landscapes.

“Hardscapes” means any durable material or feature (pervious and nonpervious) installed in or around a landscape area, such as pavements or walls.

“Hydrozone” means a portion of a landscape area having plants with similar water needs that are served by an irrigation valve or set of valves with the same schedule. A hydrozone may be irrigated or nonirrigated.

“Irrigation efficiency” means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this chapter is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

“Landscape area” means all new or altered landscaping areas proposed as part of a development project. Landscape area shall include the planting areas, turf areas, water features, and design features as allowed in Section 17.53.090(A)(12). The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or nonpervious hardscapes, and other nonirrigated areas designated for nondevelopment (e.g., open spaces and existing native vegetation).

“Maximum applied water allowance or MAWA” means the maximum annual gallons per year of water allowed for a landscape area, calculated as described in the water budget calculations of Section 17.53.060.

“Mulch” means material (such as decaying leaves, bark, compost, gravel, or rocks) spread around or over a plant or within the landscape to enrich soil or suppress the growth of weeds.

“Non-continuous” means having one or more interruptions in a sequence or in a stretch.

“Nonflammable material” means material that is not flammable.

“Plant factor” means a factor that when multiplied by the ETo, estimates the amount
of water used by a given plant species. For purposes of this chapter, the plant factor range for low water use plants is 0 to 0.3; the plant factor range for moderate water use plants is 0.4 to 0.6; and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors used in this chapter are derived from “Water Use Classification of Landscape Species” (WUCOLS).

“Power line” means a cable carrying electrical power, especially one supported by pylons or poles.

“Shade structure” means a structure with a temporary or permanent roof or covering made of or supporting plants or vines which is designed to provide shelter from the heat or glare of the sunlight.

“Special landscape area or SLA” means park and recreational areas, areas permanently and solely dedicated to edible plants, such as orchards and vegetable gardens, and areas irrigated with nonpotable water. A SLA is subject to the MAWA with an ET adjustment factor not to exceed 1.0.

“Turf” means a groundcover surface of mowed grass with an irrigation water need of greater than thirty (30) percent of the ETo, except for low water using alternative turf blend.

“Water budget calculations” mean the maximum applied water allowance and estimated total water use calculations.

“Water feature” means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied). The surface area of water features is included in the high-water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment, habitat protection or storm water best management practices that are not irrigated with potable water and are used solely for water treatment or storm water retention are not water features and, therefore, are not subject to the water budget calculation.

“Water Use Classifications of Landscape Species or WUCOLS” means the document prepared by the University of California Cooperative Extension and available from the State Department of Water Resources at: Department of Water Resources, Bulletins and Reports, P.O. Box 942836, Sacramento, California 94236-0001.

“Water wise plants” means those plants that are evaluated as needing “moderate” (forty (40) to sixty (60) percent of ETo), “low” (ten (10) to thirty (30) percent of ETo) and “very low” (less than ten (10) percent of ETo) amounts of water as defined and listed by WUCOLS. Other sources of water wise plant classifications may be used if approved by the director.

“Weather-based irrigation controller” means an irrigation controller that automatically adjusts the irrigation schedule based on changes in the weather.
17.53.030 Applicability.

A. This chapter applies to the following projects for which the city issues an administrative plan review or discretionary permit after the effective date of the ordinance codified in this chapter:

1. A project for an industrial, commercial, institutional, or multifamily use or a subdivision, any of which propose a new or altered landscape area, including public agency projects.

2. A project for a single-family residential use proposing a new or altered landscape area of five hundred (500) square feet or more; in the case of a project associated with an existing single-family residence, the new or altered landscape area is subject to this chapter when the landscape area is two thousand five hundred (2,500) square feet or more.

B. The following projects shall be exempt from the requirements of this chapter:

1. A single-family residence being rebuilt pursuant to a planning verification or administrative plan review following destruction or damage due to a natural disaster except that such residences shall not be exempt from Section 17.53.090(C);

2. A registered local, state or federal historic site;

3. An ecological restoration project that does not require a permanent irrigation system;

4. A mined land reclamation project that does not require a permanent irrigation system;

5. A botanical garden or arboretum that is open to the public;

6. A cemetery, except that a new or altered cemetery shall meet the irrigation requirements of Section 17.53.090(B).

17.53.040 Administration, enforcement and landscape design guidelines.

A. The community development director (director) shall administer and enforce this chapter.

B. The director shall prepare landscape design guidelines that assist applicants with complying with the requirements of this chapter. The guidelines shall also provide information on increasing water use efficiency and avoiding water waste in existing landscapes.
17.53.050 Compliance requirements.

Applicants for projects covered by Section 17.53.030 (A) shall comply with this chapter as follows, unless an exception is granted pursuant to Section 17.53.070.

A. Prior to construction, the applicant shall obtain approval from the director of a landscape documentation package prepared in accordance with Section 17.53.080 which demonstrates compliance with this chapter.

B. Prior to certificate of occupancy or other final project sign off, the applicant shall obtain approval from the director of a certificate of completion prepared in accordance with Section 17.53.080.

17.53.060 Water budget calculations.

A. New or altered landscaping projects listed in Section 17.53.030 (A) shall comply with the following water budget calculations in the design, installation and maintenance of the landscape area, unless an exception is granted pursuant to Section 17.53.070. In the event that the State Department of Water Resources or other water agency develops a model ordinance with a different ET adjustment factor or enacts other provisions that affect water budget formulas, then that ET adjustment factor or any other water budget formula changes shall be automatically incorporated into this chapter and the guidelines. Abbreviations are defined in subsection D.

B. Maximum Applied Water Allowance (MAWA). New or altered landscaping shall not exceed the MAWA. The MAWA shall be determined by the following calculations:

Residential Landscapes:
MAWA = (ETo)(0.62)[0.55 x LA + 0.3 x SLA].

Commercial Landscapes:
MAWA = (ETo)(0.62)[0.45 x LA + 0.3 x SLA].

C. Estimated Total Water Use.

1. The estimated total water use (ETWU) for the project shall be calculated as the sum of the estimated water use for each landscape area hydrozone, as described in subsections (C)(2) through (C)(4). The ETWU for a proposed project shall not exceed the MAWA.

2. Estimated water use for each hydrozone, except a special landscape area, shall be determined according to the following calculation:
Estimated Water Use = (ETo)(0.62)(PF x HA/IE).

3. Estimated water use for special landscape areas shall be determined according to the following calculation:
Estimated Water Use = (ETo)(0.62)(SLA)
D. The abbreviations used in the equations shall have the following meanings:

\[ E_{To} = \text{Reference evapotranspiration (44.2 inches per year for the city of Malibu).} \]

\[ 0.55 = \text{ET adjustment factor for residential landscapes (ETAF).} \]

\[ 0.45 = \text{ET adjustment factor for commercial landscapes (ETAF).} \]

\[ LA = \text{Landscape area (square feet, including SLA).} \]

\[ 0.62 = \text{Conversion factor (inches to gallons per square foot).} \]

\[ SLA = \text{Special landscape area (square feet).} \]

\[ 0.3 = \text{The additional ETAF for the SLA (1.0-0.7 = 0.3).} \]

\[ PF = \text{Average plant factor for each hydrozone based on whether the hydrozone is classified as high, medium or low water use. The hydrozone classification shall be based on the data included in the landscape and irrigation plans and WUCOLS.} \]

\[ HA = \text{Hydrozone area in square feet.} \]

\[ IE = \text{Irrigation efficiency of the irrigation method used in the hydrozone.} \]

17.53.070 Exceptions.

Exceptions to the requirements of this chapter may be granted by the director upon a finding based on substantial evidence that the exceptions will promote equivalent or greater water conservation than that provided in this chapter. Requests for exceptions shall be in writing and shall be submitted to the director at the time the landscape documentation package is submitted to the city for review. Requests for exceptions shall be accompanied by documentary evidence supporting the finding of equivalent or greater water conservation.

17.53.080 Submittals.

A. Landscape Documentation Package.

1. A landscape documentation package shall be prepared in accordance with the provisions of the California Business and Professions Code relating to the practice of landscape architecture (Business and Professional Code Section 5641 et seq.).

2. The landscape documentation package shall include a statement of compliance in a form approved by the director certifying that the landscape design complies with the mandatory elements of this chapter. The statement of compliance shall be signed by the person who prepared the landscape plan.

3. The landscape documentation package shall be designed in accordance with
the landscape water conservation standards and the guidelines and shall include a landscape design and soils management plan, an irrigation plan and a water budget calculation worksheet.

a. The landscape design and soils management plan shall, at a minimum:

i. Delineate each hydrozone by number, letter or other method, and identify the water use level of each. Temporarily irrigated areas shall be included in the low water use hydrozone for the water budget calculations;

ii. Delineate any existing plant material to be retained or removed by type;

iii. Show the planting areas, plant spacing, plant location and size, natural features, recreational areas, areas dedicated permanently and solely to edible plants, areas irrigated with nonpotable water, surface areas and types of water features and all hardscape areas (pervious and nonpervious);

iv. Have a legend listing the common and botanical plant names and total quantities by container size and species;

v. Describe seed mixes with application rates and relevant germination specifications;

vi. Identify soil amendments, type and quantity, based on soil test results and recommendations. Soils recommendations can be included as a generic specification if significant grading will occur on the site as part of the project prior to landscape installation. However, verification of a soils test, and compliance with soil amendment requirements must be completed after grading is complete and prior to the landscaping installation;

vii. Identify location and installation details of storm water best management practices, as applicable;

viii. Include as a separate sheet, a copy of the project grading plan, when applicable.

b. Irrigation Plan. The irrigation plan shall be a separate document from, but use the same format as, the landscape design and soils management plan. The irrigation plan shall, at a minimum:

i. Identify location and size of separate water meters for landscape;
ii. Identify location, size and type of all components of the irrigation system, including controllers, main and lateral lines, valves, irrigation heads, moisture sensing devices, rain switches, quick couplers, pressure regulators and backflow prevention devices, and power supply, as applicable;

iii. Identify static water pressure at the point of connection to the public water supply, as applicable;

iv. Provide the flow rate (gallons per minute), application rate (inches per hour) and design operating pressure (pressure per square inch) for each station;

v. Show nonpotable water irrigation systems as applicable.

c. Water Budget Calculation Worksheet. A water budget calculation worksheet shall include the following elements:

i. A hydrozone information table that summarizes the hydrozone and irrigation information of the landscape design and irrigation plans, including square footage and irrigation method for each hydrozone;

ii. Identification of the party(ies) responsible for long-term maintenance of the landscape and irrigation systems;

iii. Water budget calculations consistent with Section 17.53.060.

B. Certificate of Completion. Prior to final inspection or other final project sign-off (as applicable), the applicant shall submit to the director for review and approval a certificate of completion. The certificate of completion shall be signed in accordance with the provisions of the California Business and Professions Code relating to the practice of landscape architecture (Business and Professional Code Section 5641 et seq.) and shall include the following:

1. A copy of a landscape management plan for the ongoing operation and maintenance of the landscape and irrigation system, including the water budget calculation worksheet with anticipated total annual water requirements, precipitation rates for the various hydrozones identified in the landscape plan, seasonal irrigation water schedules or procedures for programming of proposed weather-based controllers and certification that these have been provided to the property owner, along with a copy of the final landscape design and irrigation plans;

2. Certification that the landscaping and irrigation system have been installed in substantial conformance with the approved planting and irrigation plans and appropriate soil amendments have been made in accordance with soil tests. Where there have been significant changes to the landscape documentation package during the installation of landscaping or irrigation devices or irrigation system components, the applicant shall submit “as built” plans that show the changes,
along with the statement of compliance required by Section 17.53.080;

3. Certification that the irrigation system and controller have been adjusted to maximize irrigation efficiency and eliminate overspray and runoff;

4. Certification that the water budget calculation worksheet has been provided to the appropriate water agency;

5. Acknowledgement that any changes to the irrigation system, plant materials or location or size of landscape areas that occur in the field due to site conditions or plant material availability must be submitted to the director prior to installation;

6. Installed landscaping found not to comply with the approved landscape plan is subject to correction. Under such circumstances, the director may require resubmittal of all or part of the landscape documentation package in accordance with Section 17.53.080.

17.53.090 Landscape water conservation design and fire protection standards.

All landscaping and irrigation systems associated with development regulated by this chapter shall be designed, installed and maintained in accordance with a landscape documentation package that meets the minimum standards of the guidelines and this section.

A. Planting Requirements.

1. Plants shall be selected to meet a MAWA determined by the water budget calculations and the guidelines.

2. Hydrozones. Plants shall be grouped into hydrozones with plant species having similar water demand and by their soil, sun and shade requirements.

3. The landscape area of projects proposing commercial or industrial uses shall be designed without the use of turf and with one hundred (100) percent water wise plants. Notwithstanding that requirement, projects may use turf where a specific turf type is proposed for any required bio-swale or bio-filter systems, or areas adjacent to pedestrian traffic where walking travel or crossings are expected. These walking areas would include corner lot locations or linear areas located along pedestrian routes. Any landscape trees and shrubs installed on commercial properties situated along public street frontage shall be limited to water wise species native to the Santa Monica Mountains area.

4. Turf is acceptable in parkways where vehicle parking is permitted adjacent to the parkway curb or edge; however, the use of a water wise alternative is encouraged. Where parking is not permitted adjacent to the parkway curb or edge, the parkway shall be designed using one hundred (100) percent water wise plants.
5. Single-family residential, multifamily residential and institutional use projects shall be designed so that turf occupies not more than twenty-five (25) percent or one thousand five hundred (1,500) square feet, whichever is less, of the landscape area. Approved turf parkways shall not be counted toward the twenty-five (25) percent turf limitation. For single-family residences, plants that are not water wise plants shall be limited to not more than twenty-five (25) percent of the landscape area or limited to an area within fifty (50) feet of the primary residential structure on the parcel, whichever results in less landscape area installed with plants that are not water wise species. For landscape areas more than fifty (50) feet from the primary residential structure and outside the required irrigated fuel modification zone, new or altered plantings shall be limited to water wise species native to the Santa Monica Mountains.

6. Turf is not permitted in medians or parking lot landscape finger planters.

7. Turf shall not be used on slopes exceeding twenty (20) percent or five to one within the landscape area.

8. Notwithstanding subsections (3) and (4), additional turf areas may be approved by the director for areas designed and used for outdoor sporting and recreational activities, or for an approved functional use. Such approved turf areas may be watered at a rate of 1.0 of the reference evapotranspiration (ET0). However, water wise turf blends are encouraged as an alternative.

9. Soils Test. The applicant shall prepare a soils test that conforms to the guidelines, with recommendations for fertilizers, amendments and horticultural maintenance practices. Recommendations shall be based on soil samples taken from the site at the completion of finish grading. The soils testing requirement may be included as part of the specifications for installation.

10. Soil Amendments. Soil amendments shall be used when necessary to improve water retention in the soil, to improve the functional structure of the soil for greater water infiltration and percolation, to buffer pH and to optimize plan growth.

11. Mulch. Weed-free mulches of organic or inorganic material shall be used in all non-turf, irrigated areas to minimize evapotranspiration and runoff, and to moderate the temperature of the root zone. The landscape area, except those portions of the landscape area planted in turf, shall be covered with weed-free mulch material to a maximum depth of three inches throughout. In areas with groundcovers planted from flats, mulch shall be installed to an average thickness of one and one-half inches. Additional mulch material shall be added from time to time as necessary in order to maintain the required depth of mulch.

12. Non-Plant Material for Landscaping. The landscape area may
include natural features such as decomposing granite groundcover, rock and stone, non-vegetated natural areas, and structural features, including but not limited to, fountains, reflecting pools, art work, screens, walls, and fences, provided all of these features are integrated into the design of the landscape area and the primary purpose of the feature is decorative. These areas shall be included in the water budget calculations for the project and its various hydrozones as specified in the guidelines.

13. Nothing in this chapter shall be construed to permit the installation or removal of plants, trees or shrubs of a type or in a manner which is prohibited by another chapter of this code or the Malibu Local Coastal Program.

B. Irrigation System Requirements.

1. Irrigation systems shall be designed, constructed and managed to maximize overall irrigation efficiency, and to meet the MAWA.

2. Irrigation systems shall be designed to prevent runoff, overspray, low-head drainage, and other similar conditions where irrigation water flows or sprays on to areas not intended for irrigation and not part of the parcel’s landscape area, such as walkways, driveways, roadways, neighboring properties or the public right-of-way.

3. Irrigation systems (valve systems, piping and pressure regulators) shall be designed to deliver water to hydrozones based on the moisture requirements of the plant grouping.

4. An automatic irrigation system is required and shall include a weather-based irrigation controller, including a rain shut-off sensor.

5. Areas less than eight feet wide shall be irrigated with appropriately selected equipment that provides the proper amount of water coverage without causing overspray onto adjacent surfaces.

6. All sprinklers shall have matched precipitation rates within each valve and circuit. All irrigation systems shall be designed to include optimum distribution uniformity, head to head spacing, and setbacks from walkways and pavement. Overhead sprays shall be set back a minimum of twenty-four (24) inches from non pervious surfaces.

7. All irrigation systems shall provide check valves at the low end of irrigation lines to prevent unwanted draining of irrigation lines.

8. Pressure regulators may be required on the irrigation system as determined by the Los Angeles County Waterworks District 29.

9. Installation of a separate landscape water meter is encouraged where feasible to facilitate water management.
10. Nonpotable and Recycled Water. If nonpotable water service, including recycled water, is determined to be required for the project by a local agency or water agency, the irrigation system shall be designed, installed and operated in compliance with state and local laws, requirements and regulations applicable to the nonpotable water use. The local water agency shall provide the customer with applicable conditions for the use of nonpotable water within its jurisdiction.

C. Fire Protection Standards.

1. Planting Restrictions.
   a. Palm trees with the potential to grow over six feet in height are prohibited.
   b. Trees and shrubs are prohibited between zero and five feet from a structure.
   c. The following species are prohibited within 50 feet of structures: Eucalyptus (Eucalyptus gum tree), Pine (Pinus species), Cypress (Cupressus species), Cedar (Cedrus species), and Tree of Heaven (Ailanthus altissima).
   d. Non-continuous planting of trees and shrubs (except those in (a) and (b) above, is allowed between five feet and 50 feet from a structure.
   e. Eucalyptus trees are allowed between five feet and 50 feet of a structure if a qualified expert, as determined by the director, identifies the tree(s) as a monarch butterfly habitat.
   f. The distances for trees and shrubs subject to (b) through (e) shall be measured from the dripline of the tree or shrub at its projected maturity to the outermost projection of the structure including eaves and overhangs.
   g. Trees planted within or near existing utility easements where overhead power lines are present are limited as follows:
      i. Trees planted below or within 20 feet of a power line shall have a maximum growth height of 25 feet at maturity.
      ii. Trees planted within 20 feet and 50 feet of a power line shall have a maximum growth height of 40 feet at maturity.
      iii. The distances for trees and shrubs subject to this subsection (g) shall be measured from the center of the trunk.

2. Mulch material proposed between zero and five feet from a structure
must consist of nonflammable materials, such as gravel and decomposed granite. Flammable mulch material, including shredded bark, pine needles, and artificial turf, are prohibited between zero and five feet of a structure. Use of wood chips and shredded rubber is prohibited anywhere on the site. Non-continuous use of mulch (excluding wood chips and shredded rubber) is allowed between five feet and 30 feet from a structure. The distance shall be measured from the outermost projection of the structure including eaves and overhangs. The maximum application area of mulch located between five feet and 30 feet from a structure is 20 feet by 20 feet with a five-foot separation between application areas. Any mulch materials (excluding wood chips and shredded rubber), are allowed 30 feet or more from a structure with no limitation on application area.

D. Maintenance. Installed landscaping and irrigation systems shall be managed and maintained in conformance with these standards.

D. MMC Section 17.40.030(A) “General Development Standards” is hereby amended to read as follows:

A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:

MMC Section 17.40.030(A)(11) is hereby added to read as follows:

11. Hedges and flammable fences and walls are prohibited within five feet of a building. For fences and walls the distance shall be measured from the outermost projection of the building to the fence or wall, including eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the building to the canopy of the hedge at its projected maturity, including eaves, overhangs, and second floor balconies.

E. MMC Section 17.40.050 “Distance between buildings” is hereby amended to read as follows:

A. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.

1. Distance Between Main Buildings. A minimum distance of ten (10) feet shall be required between all main residential buildings established on the same lot or parcel of land.

2. Projections Permitted Between Buildings, including detached Shade Structures, on the Same Lot or Parcel of Land. The following projections are permitted within six (6) feet of the required ten (10) feet between buildings, including detached shade structures, provided they are developed subject to the same standards as and
not closer to a line midway between such buildings than is permitted in relation to a side lot line within a required interior side yard:

a. Eaves and cantilevered roofs;

b. Fireplace structures, buttresses and wing walls;

c. Rain conductors and spouts, water tables, sills, capitals, cornices, and belt courses;

d. Awnings and canopies;

e. Water heaters, water softeners, gas or electric meters, including service conductors and pipes;

f. Stairways and balconies above the level of the first floor.

B. Distance Between Accessory and Main Buildings. A minimum distance of six feet shall be required between any main residential building and an accessory building established on the same lot or parcel of land.

C. Uncovered porches, platforms, landings and decks, including access stairs thereto, which do not extend above the first floor are permitted within the required distance between buildings without distance restriction.

SECTION 5. Findings for Local Coastal Program Amendment No. 19-002.

A. The City Council hereby finds that LCPA No. 19-002 is consistent with and furthers the following Land Use Plan (LU) Policies:

LU Policy 4.2: All new development shall be sized, designed and sited to minimize risks to life and property from geologic, flood, and fire hazard.

LU Policy 4.45: New development shall minimize risks to life and property from fire hazard through:

a. Assessing site-specific characteristics such as topography, slope, vegetation type, wind patterns etc.;

b. Siting and designing development to avoid hazardous locations;

c. Incorporation of fuel modification and brush clearance techniques in accordance with applicable fire safety requirements and carried out in a manner which reduces impacts to environmentally sensitive habitat to the maximum feasible extent;

d. Use of appropriate building materials and design features to insure the minimum amount of required fuel modification;

e. Use of fire-retardant, native plant species in landscaping.

LU Policy 4.45: New development shall minimize risks to life and property from fire hazard through:
a. Assessing site-specific characteristics such as topography, slope, vegetation type, wind patterns etc.;
b. Siting and designing development to avoid hazardous locations;
c. Incorporation of fuel modification and brush clearance techniques in accordance with applicable fire safety requirements and carried out in a manner which reduces impacts to environmentally sensitive habitat to the maximum feasible extent;
d. Use of appropriate building materials and design features to insure the minimum amount of required fuel modification;
e. Use of fire-retardant, native plant species in landscaping.

LU Policy 4.52: Where applicable, property owners shall comply with applicable fire safety regulations for management of flammable materials (controlled burns) in fire hazardous areas.

B. The proposed ordinance does not authorize a use other than that already designated in the LCP. The proposed ordinance is consistent with the Coastal Act because it protects, maintains and enhances the overall quality of the coastal zone environment. The proposed ordinance will not alter the utilization or conservation of coastal zone resources, impede public access to and along the coastal zone, or interfere with the priorities established for coastal-dependent or coastal-related development.

SECTION 6. Local Coastal Program Amendments.

A. LIP Chapter 2.1 “Definitions” is hereby added to read as follows:

“Shade structure” means a structure with a temporary or permanent roof or covering made of or supporting plants or vines which is designed to provide shelter from the heat or glare of the sunlight.

B. LIP Chapter 3.5.3(A) “General Development Standards” is hereby amended as follows:

A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:

LIP Chapter 3.5.3(A)(11) is hereby added to read as follows:

11. Hedges and flammable fences and walls are prohibited within five feet of a building. For fences and walls, the distance shall be measured from the outermost projection of the building to the fence or wall, including eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the buildings to the canopy of the hedge at its projected maturity, including eaves, overhangs, and second floor balconies.

C. LIP Section 3.6(R)(1) “Distance between buildings” is hereby amended to read as follows:
1. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.

   a. Distance Between Main Buildings. A minimum distance of ten (10) feet shall be required between all main residential buildings established on the same lot or parcel of land.

   b. Projections Permitted Between Buildings, including detached Shade Structures, on the Same Lot or Parcel of Land. The following projections are permitted within six (6) feet of the required ten (10) feet between buildings, including detached shade structures, provided they are developed subject to the same standards as and not closer to a line midway between such buildings than is permitted in relation to a side lot line within a required interior side yard:

      i. Eaves and cantilevered roofs;

      ii. Fireplace structures, buttresses and wing walls;

      iii. Rain conductors and spouts, water tables, sills, capitals, cornices, and belt courses;

      iv. Awnings and canopies;

      v. Water heaters, water softeners, gas or electric meters, including service conductors and pipes;

      vi. Stairways and balconies above the level of the first floor.

   c. Distance Between Accessory and Main Buildings. A minimum distance of six feet shall be required between any main residential building and an accessory building established on the same lot or parcel of land.

SECTION 7. Additional Recommendations.

The City Council hereby makes the following additional recommendations:

1. Staff shall prepare a fire-hardening ordinance that addresses fire-resistant building materials and methods.

2. Staff shall prepare additional fire-resistant landscape ordinance provisions including an analysis of slope with regards to the spread of wildfires, but also accounting for necessary erosion control.

3. Staff shall develop an outreach program that encourages “firescaping” throughout the landscape and emphasizes proper maintenance of existing landscaping and vegetation. The program shall include an initiative to eradicate invasive fountain grass.

SECTION 8. Submittal to California Coastal Commission.
The City Council hereby directs staff to submit the Local Coastal Program amendments contained in Section 6 of this Ordinance to the California Coastal Commission per Title 14, California Code of Regulations Section 13554.5(a).


If any section, subsection, sentence, clause, portion, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of any competent jurisdiction, such decision shall not affect the validity of the remaining sections, subsections, sentences, clauses, portions, or phrases of this Ordinance. The City Council hereby declares that it would have passed this Ordinance and each and every section, subsection, sentence, clause, portion, or phrase without regard to whether any other section, subsection, sentence, clause, portion, or phrase of this Ordinance would be subsequently declared invalid or unconstitutional.

SECTION 10. Effectiveness.

The LCP amendment and ZTA approved in this Ordinance shall become effective only upon certification by the California Coastal Commission of this amendment to the LCP.

SECTION 11. The City Clerk shall certify the adoption of this ordinance.

PASSED, APPROVED AND ADOPTED this _____ day of _______ 2020.

KAREN FARRER, Mayor

ATTEST:

HEATHER GLASER, City Clerk
(seal)

Date: _______________________

APPROVED AS TO FORM:

THIS DOCUMENT HAS BEEN REVIEWED
BY THE CITY ATTORNEYS OFFICE
CHRISTI HOGIN, City Attorney
CITY OF MALIBU PLANNING COMMISSION
RESOLUTION NO. 19-74


The Planning Commission of the City of Malibu does hereby find, order and resolve as follows:

SECTION 1. Recitals.

A. On January 24, 2019, the City Council directed staff to prepare an item discussing potential restrictions on certain flammable plants, trees and materials in landscaping plans.

B. On October 14, 2019, the Zoning Ordinance Revisions and Code Enforcement Subcommittee (ZORACES) of the City Council provided recommendations on key elements to amend the Local Coastal Program (LCP) Local Implementation Plan (LIP) Chapter 3 (Zoning Designations and Permitted Uses) and Malibu Municipal Code (MMC) Title 17 (Zoning) and Chapter 9.22 (Landscape Water Conservation) to foster the creation of fire-resistant landscapes.

C. On October 24, 2019, a Notice of Planning Commission Public Hearing was published in a newspaper of general circulation within the City of Malibu and was mailed to all interested parties.

D. On October 28, 2019, the City Council adopted Resolution No. 19-47 and directed staff to prepare a zoning text amendment (ZTA) and local coastal program amendment (LCPA) to establish a citywide fire-resistant landscape ordinance. The purpose of the ordinance is to reduce fire hazard risk and spread by minimizing the fuels available to wildfires in the landscape. Amendments include restrictions on landscape species, spacing and placement, specifications for materials and siting for fences/walls and gates, and mulch/groundcover, and other similar measures aimed at reducing fuel loads, flammability and the potential for wildfire spread.

E. On November 18, 2019, the Planning Commission held a duly noticed public hearing on the draft ordinance, at which time the Planning Commission reviewed and considered the agenda report, reviewed and considered written reports, public testimony, and other information in the record.
SECTION 2. Environmental Review.

The Planning Commission has analyzed the project proposal described herein and has determined that the project is covered by the general rule that the California Environmental Quality Act (CEQA) applies only to projects which have the potential for causing a significant effect on the environment. Pursuant to CEQA Guidelines Section 15061(b)(3), where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. As the scope of the amendments are limited and the purpose is to reduce the spread of wildfires, there will be no significant effect on the environment. The Planning Commission has thus determined that there is no possibility the amendment will have a significant effect on the environment and that the project is exempt from CEQA pursuant to CEQA Guidelines Sections 15061(b)(3) – Common Sense Exemption, and 15308 – Actions by Regulatory Agencies for Protection of the Environment apply. Additionally, in accordance with the CEQA, Public Resources Code Section 21080.9, CEQA does not apply to activities and approvals by the City as necessary for the preparation and adoption of an LCP amendment. This application is for an LCP amendment which must be certified by the California Coastal Commission before it takes effect.

SECTION 3. Zoning Text Amendment Findings.

Pursuant to MMC Chapter 17.40, the Planning Commission makes the following findings and recommends to the City Council that the MMC be amended as set forth in Section 5 of this resolution.

A. The Planning Commission hereby finds that ZTA No. 19-004 is consistent with the General Plan and is designed to protect and promote public health, safety, welfare and quality of life. The ordinance further strives to protect property from damage caused by wildfires by restricting the fuels available for the spread of wildfires. The proposed amendment serves to enhance the Malibu General Plan Mission Statement, protect public safety and preserve Malibu's natural and cultural resources.

B. The Planning Commission hereby finds that ZTA No. 19-004 further advances the General Plan Land Use (LU) Objective 1.3 to develop “land uses consistent with flood, geologic and fire safety requirements” by implementing regulations, such as those used by fire protection districts that minimize the risk of loss of life and property as a result of fire. Land Use Policy 4.1.6 further states that the City shall promote extensive landscaping in new projects while emphasizing the use of native, fire-resistant and drought-tolerant plant materials. This LU Policy was implemented with the adoption of the landscape water conservation ordinance that encourages the use of native, drought-tolerant plant materials. The proposed fire-resistant landscape ordinance will further promote the LU Objective by emphasizing the use of fire-resistant plant and landscape materials.

C. The Planning Commission held a public hearing, reviewed the subject zoning text amendment application for compliance with the City of Malibu General Plan, Malibu Municipal Code and the Malibu Local Coastal Program, and finds that the zoning text amendment is consistent and recommends approval.
SECTION 4. Zoning Text Amendments.

A. MMC Chapter 9.22 (Landscape Water Conservation) is hereby repealed and existing provisions are added to MMC Chapter 17.53 (Landscape Water Conservation and Fire Protection).

B. MMC Section 16.24.020 (Subdivision Design Guidelines) is hereby amended to substitute the reference to MMC Chapter 9.22 with Chapter 17.53.

C. MMC Chapter 17.53 is hereby established to read as follows:

MMC Chapter 17.53 (LANDSCAPE WATER CONSERVATION AND FIRE PROTECTION):

17.53.010 Purpose.

It is the policy of the city of Malibu to promote water conservation. The landscape water conservation standards detailed in this chapter are intended to promote water conservation while allowing the maximum possible flexibility in designing healthy, attractive, and cost-effective water efficient landscapes.

17.53.020 Definitions.

“Application area” means the area, within the landscape, that is covered by mulch.

“Applied water” means the portion of water supplied by the irrigation system to the landscape.

“Director” means the community development director.

“Estimated total water use or ETWU” means the estimated total water use in gallons per year for a landscape area, calculated by summing the estimated water use for each landscape hydrozone as described in the water budget calculations of Section 17.53.060.

“ET adjustment factor” (ETAF) means a factor of 0.55 for residential areas and 0.45 for nonresidential areas that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. The ETAF for a new and existing (nonrehabilitated) special landscape area shall not exceed 1.0.

“ET or evapotranspiration” means the approximate summation of water losses through evaporation from soil and transpiration from the plants during a specified period of time.

“ETo or reference evapotranspiration” means a standard measurement of environmental parameters which affect the water use of plants. ETo is expressed in inches for purposes of this chapter and is an estimate of the evapotranspiration (or water loss) per year from a large field of four- to seven-inch tall cool season grass that is not water stressed. ETo is used as the basis for determining the maximum applied water allowance so that regional differences in climate can be accommodated. For Malibu, the ETo is 44.2 inches.

“Combustible material” means flammable material capable of igniting with extreme heat.
“Guidelines” refers to the Guidelines for Implementation of the Landscape Water Conservation Ordinance to be prepared by the city to describe procedures, calculations, forms and requirements for landscape projects subject to this chapter. The guidelines shall also provide information on increasing water use efficiency and avoiding water waste in existing landscapes.

“Hardscapes” means any durable material or feature (pervious and nonpervious) installed in or around a landscape area, such as pavements or walls.

“Hydrozone” means a portion of a landscape area having plants with similar water needs that are served by an irrigation valve or set of valves with the same schedule. A hydrozone may be irrigated or nonirrigated.

“Irrigation efficiency” means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum average irrigation efficiency for purposes of this chapter is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

“Landscape area” means all new or altered landscaping areas proposed as part of a development project. Landscape area shall include the planting areas, turf areas, water features, and design features as allowed in Section 17.53.090(A)(12). The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or nonpervious hardscapes, and other nonirrigated areas designated for nondevelopment (e.g., open spaces and existing native vegetation).

“Maximum applied water allowance or MAWA” means the maximum annual gallons per year of water allowed for a landscape area, calculated as described in the water budget calculations of Section 17.53.060.

“Mulch” means material (such as decaying leaves, bark, compost, gravel, or rocks) spread around or over a plant or within the landscape to enrich soil or suppress the growth of weeds.

“Non-continuous” means having one or more interruptions in a sequence or in a stretch.

“Noncombustible material” means material incapable of igniting and burning when subjected to fire or extreme heat.

“Plant factor” means a factor that when multiplied by the ETo, estimates the amount of water used by a given plant species. For purposes of this chapter, the plant factor range for low water use plants is 0 to 0.3; the plant factor range for moderate water use plants is 0.4 to 0.6; and the plant factor range for high water use plants is 0.7 to 1.0. Plant factors used in this chapter are derived from “Water Use Classification of Landscape Species” (WUCOLS).

“Power line” means a cable carrying electrical power, especially one supported by pylons or poles.

“Shade structure” means a structure with a temporary or permanent roof or covering made of or supporting plants or vines which is designed to provide shelter from the heat or glare of the sunlight.
“Special landscape area or SLA” means park and recreational areas, areas permanently and solely dedicated to edible plants, such as orchards and vegetable gardens, and areas irrigated with nonpotable water. A SLA is subject to the MAWA with an ET adjustment factor not to exceed 1.0.

“Turf” means a groundcover surface of mowed grass with an irrigation water need of greater than thirty (30) percent of the ETo, except for low water using alternative turf blend.

“Water budget calculations” mean the maximum applied water allowance and estimated total water use calculations.

“Water feature” means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools (where water is artificially supplied). The surface area of water features is included in the high water use hydrozone of the landscape area. Constructed wetlands used for on-site wastewater treatment, habitat protection or storm water best management practices that are not irrigated with potable water and are used solely for water treatment or storm water retention are not water features and, therefore, are not subject to the water budget calculation.

“Water Use Classifications of Landscape Species or WUCOLS” means the document prepared by the University of California Cooperative Extension and available from the State Department of Water Resources at: Department of Water Resources, Bulletins and Reports, P.O. Box 942836, Sacramento, California 94236-0001.

“Water wise plants” means those plants that are evaluated as needing “moderate” (forty (40) to sixty (60) percent of ETo), “low” (ten (10) to thirty (30) percent of ETo) and “very low” (less than ten (10) percent of ETo) amounts of water as defined and listed by WUCOLS. Other sources of water wise plant classifications may be used if approved by the director.

“Weather-based irrigation controller” means an irrigation controller that automatically adjusts the irrigation schedule based on changes in the weather.

17.53.030 Applicability.

A. This chapter applies to the following projects for which the city issues an administrative plan review or discretionary permit after the effective date of the ordinance codified in this chapter:

1. A project for an industrial, commercial, institutional, or multifamily use or a subdivision, any of which propose a new or altered landscape area, including public agency projects.

2. A project for a single-family residential use proposing a new or altered landscape area of five hundred (500) square feet or more; in the case of a project associated with an existing single-family residence, the new or altered landscape area is subject to this chapter when the landscape area is two thousand five hundred (2,500) square feet or more.
B. The following projects shall be exempt from the requirements of this chapter:

1. A single-family residence being rebuilt pursuant to a planning verification or administrative plan review following destruction or damage due to a natural disaster, except that such residences shall not be exempt from Section 17.53.090(C);

2. A registered local, state or federal historic site;

3. An ecological restoration project that does not require a permanent irrigation system;

4. A mined land reclamation project that does not require a permanent irrigation system;

5. A botanical garden or arboretum that is open to the public;

6. A cemetery, except that a new or altered cemetery shall meet the irrigation requirements of Section 17.53.090(B).

17.53.040 Administration, enforcement and landscape design guidelines.

A. The community development director (director) shall administer and enforce this chapter.

B. The director shall prepare landscape design guidelines that assist applicants with complying with the requirements of this chapter. The guidelines shall also provide information on increasing water use efficiency and avoiding water waste in existing landscapes.

17.53.050 Compliance requirements.

Applicants for projects covered by Section 17.53.030 (A) shall comply with this chapter as follows, unless an exception is granted pursuant to Section 17.53.070.

A. Prior to construction, the applicant shall obtain approval from the director of a landscape documentation package prepared in accordance with Section 17.53.080 which demonstrates compliance with this chapter.

B. Prior to certificate of occupancy or other final project sign off, the applicant shall obtain approval from the director of a certificate of completion prepared in accordance with Section 17.53.080.

17.53.060 Water budget calculations.

A. New or altered landscaping projects listed in Section 17.53.030 (A) shall comply with the following water budget calculations in the design, installation and maintenance of the landscape area, unless an exception is granted pursuant to Section 17.53.070. In the event that the State Department of Water Resources or other water agency develops a model ordinance with a different ET adjustment factor or enacts other provisions that affect water budget formulas, then that ET adjustment factor or any other water budget formula changes shall be automatically
incorporated into this chapter and the guidelines. Abbreviations are defined in subsection D.

B. Maximum Applied Water Allowance (MAWA). New or altered landscaping shall not exceed the MAWA. The MAWA shall be determined by the following calculations:

   **Residential Landscapes:**
   \[
   \text{MAWA} = (ETo)(0.62)[0.55 \times LA + 0.3 \times SLA].
   \]

   **Commercial Landscapes:**
   \[
   \text{MAWA} = (ETo)(0.62)[0.45 \times LA + 0.3 \times SLA].
   \]

C. Estimated Total Water Use.

1. The estimated total water use (ETWU) for the project shall be calculated as the sum of the estimated water use for each landscape area hydrozone, as described in subsections (C)(2) through (C)(4). The ETWU for a proposed project shall not exceed the MAWA.

2. Estimated water use for each hydrozone, except a special landscape area, shall be determined according to the following calculation:
   \[
   \text{Estimated Water Use} = (ETo)(0.62)(PF \times HA/JE).
   \]

3. Estimated water use for special landscape areas shall be determined according to the following calculation:
   \[
   \text{Estimated Water Use} = (ETo)(0.62)(SLA)
   \]

D. The abbreviations used in the equations shall have the following meanings:

   **ETo** = Reference evapotranspiration (44.2 inches per year for the city of Malibu).

   **0.55** = ET adjustment factor for residential landscapes (ETAF).

   **0.45** = ET adjustment factor for commercial landscapes (ETAF).

   **LA** = Landscape area (square feet, including SLA).

   **0.62** = Conversion factor (inches to gallons per square foot).

   **SLA** = Special landscape area (square feet).

   **0.3** = The additional ETAF for the SLA (1.0-0.7 = 0.3).

   **PF** = Average plant factor for each hydrozone based on whether the hydrozone is classified as high, medium or low water use. The hydrozone classification shall be based on the data included in the landscape and irrigation plans and WUCOLS.

   **HA** = Hydrozone area in square feet.

   **IE** = Irrigation efficiency of the irrigation method used in the hydrozone.
17.53.070 Exceptions.

Exceptions to the requirements of this chapter may be granted by the director upon a finding based on substantial evidence that the exceptions will promote equivalent or greater water conservation than that provided in this chapter. Requests for exceptions shall be in writing and shall be submitted to the director at the time the landscape documentation package is submitted to the city for review. Requests for exceptions shall be accompanied by documentary evidence supporting the finding of equivalent or greater water conservation.

17.53.080 Submittals.

A. Landscape Documentation Package.

1. A landscape documentation package shall be prepared in accordance with the provisions of the California Business and Professions Code relating to the practice of landscape architecture (Business and Professional Code Section 5641 et seq.).

2. The landscape documentation package shall include a statement of compliance in a form approved by the director certifying that the landscape design complies with the mandatory elements of this chapter. The statement of compliance shall be signed by the person who prepared the landscape plan.

3. The landscape documentation package shall be designed in accordance with the landscape water conservation standards and the guidelines, and shall include a landscape design and soils management plan, an irrigation plan and a water budget calculation worksheet.

   a. The landscape design and soils management plan shall, at a minimum:

      i. Delineate each hydrozone by number, letter or other method, and identify the water use level of each. Temporarily irrigated areas shall be included in the low water use hydrozone for the water budget calculations;

      ii. Delineate any existing plant material to be retained or removed by type;

      iii. Show the planting areas, plant spacing, plant location and size, natural features, recreational areas, areas dedicated permanently and solely to edible plants, areas irrigated with nonpotable water, surface areas and types of water features and all hardscape areas (pervious and nonpervious);

      iv. Have a legend listing the common and botanical plant names and total quantities by container size and species;

      v. Describe seed mixes with application rates and relevant germination specifications;

      vi. Identify soil amendments, type and quantity, based on soil test results and recommendations. Soils recommendations can be included as a generic specification if significant grading will occur on the site as part of the project prior to landscape installation. However, verification of a soils test, and compliance with soil amendment requirements must be completed after grading is complete and prior to the landscaping installation;
vii. Identify location and installation details of storm water best management practices, as applicable;

viii. Include as a separate sheet, a copy of the project grading plan, when applicable.

b. Irrigation Plan. The irrigation plan shall be a separate document from, but use the same format as, the landscape design and soils management plan. The irrigation plan shall, at a minimum:

i. Identify location and size of separate water meters for landscape;

ii. Identify location, size and type of all components of the irrigation system, including controllers, main and lateral lines, valves, irrigation heads, moisture sensing devices, rain switches, quick couplers, pressure regulators and backflow prevention devices, and power supply, as applicable;

iii. Identify static water pressure at the point of connection to the public water supply, as applicable;

iv. Provide the flow rate (gallons per minute), application rate (inches per hour) and design operating pressure (pressure per square inch) for each station;

v. Show nonpotable water irrigation systems as applicable.

c. Water Budget Calculation Worksheet. A water budget calculation worksheet shall include the following elements:

i. A hydrozone information table that summarizes the hydrozone and irrigation information of the landscape design and irrigation plans, including square footage and irrigation method for each hydrozone;

ii. Identification of the party(ies) responsible for long-term maintenance of the landscape and irrigation systems;

iii. Water budget calculations consistent with Section 17.53.060.

B. Certificate of Completion. Prior to final inspection or other final project sign off (as applicable), the applicant shall submit to the director for review and approval a certificate of completion. The certificate of completion shall be signed in accordance with the provisions of the California Business and Professions Code relating to the practice of landscape architecture (Business and Professional Code Section 5641 et seq.) and shall include the following:

1. A copy of a landscape management plan for the ongoing operation and maintenance of the landscape and irrigation system, including the water budget calculation worksheet with anticipated total annual water requirements, precipitation rates for the various hydrozones identified in the landscape plan, seasonal irrigation water schedules or procedures for programming of proposed weather-based controllers and certification that these have been provided to the property owner, along with a copy of the final landscape design and irrigation plans;
2. Certification that the landscaping and irrigation system have been installed in substantial conformance with the approved planting and irrigation plans and appropriate soil amendments have been made in accordance with soil tests. Where there have been significant changes to the landscape documentation package during the installation of landscaping or irrigation devices or irrigation system components, the applicant shall submit “as built” plans that show the changes, along with the statement of compliance required by Section 17.53.080;

3. Certification that the irrigation system and controller have been adjusted to maximize irrigation efficiency and eliminate overspray and runoff;

4. Certification that the water budget calculation worksheet has been provided to the appropriate water agency;

5. Acknowledgement that any changes to the irrigation system, plant materials or location or size of landscape areas that occur in the field due to site conditions or plant material availability must be submitted to the director prior to installation;

6. Installed landscaping found not to comply with the approved landscape plan is subject to correction. Under such circumstances, the director may require resubmittal of all or part of the landscape documentation package in accordance with Section 17.53.080.

17.53.090 Landscape water conservation design and fire protection standards.

All landscaping and irrigation systems associated with development regulated by this chapter shall be designed, installed and maintained in accordance with a landscape documentation package that meets the minimum standards of the guidelines and this section.

A. Planting Requirements.

1. Plants shall be selected to meet a MAWA determined by the water budget calculations and the guidelines.

2. Hydrozones. Plants shall be grouped into hydrozones with plant species having similar water demand and by their soil, sun and shade requirements.

3. The landscape area of projects proposing commercial or industrial uses shall be designed without the use of turf and with one hundred (100) percent water wise plants. Notwithstanding that requirement, projects may use turf where a specific turf type is proposed for any required bio-swale or bio-filter systems, or areas adjacent to pedestrian traffic where walking travel or crossings are expected. These walking areas would include corner lot locations or linear areas located along pedestrian routes. Any landscape trees and shrubs installed on commercial properties situated along public street frontage shall be limited to water wise species native to the Santa Monica Mountains area.

4. Turf is acceptable in parkways where vehicle parking is permitted adjacent to the parkway curb or edge; however, the use of a water wise alternative is encouraged. Where parking is not permitted adjacent to the parkway curb or edge, the parkway shall be designed using one hundred (100) percent water wise plants.
5. Single-family residential, multifamily residential and institutional use projects shall be designed so that turf occupies not more than twenty-five (25) percent or one thousand five hundred (1,500) square feet, whichever is less, of the landscape area. Approved turf parkways shall not be counted toward the twenty-five (25) percent turf limitation. For single-family residences, plants that are not water wise plants shall be limited to not more than twenty-five (25) percent of the landscape area or limited to an area within fifty (50) feet of the primary residential structure on the parcel, whichever results in less landscape area installed with plants that are not water wise species. For landscape areas more than fifty (50) feet from the primary residential structure and outside the required irrigated fuel modification zone, new or altered plantings shall be limited to water wise species native to the Santa Monica Mountains.

6. Turf is not permitted in medians or parking lot landscape finger planters.

7. Turf shall not be used on slopes exceeding twenty (20) percent or five to one within the landscape area.

8. Notwithstanding subsections (3) and (4), additional turf areas may be approved by the director for areas designed and used for outdoor sporting and recreational activities, or for an approved functional use. Such approved turf areas may be watered at a rate of 1.0 of the reference evapotranspiration (ETo). However, water wise turf blends are encouraged as an alternative.

9. Soils Test. The applicant shall prepare a soils test that conforms to the guidelines, with recommendations for fertilizers, amendments and horticultural maintenance practices. Recommendations shall be based on soil samples taken from the site at the completion of finish grading. The soils testing requirement may be included as part of the specifications for installation.

10. Soil Amendments. Soil amendments shall be used when necessary to improve water retention in the soil, to improve the functional structure of the soil for greater water infiltration and percolation, to buffer pH and to optimize plant growth.

11. Mulch. Weed-free mulches of organic or inorganic material shall be used in all non-turf, irrigated areas to minimize evapotranspiration and runoff, and to moderate the temperature of the root zone. The landscape area, except those portions of the landscape area planted in turf, shall be covered with weed-free mulch material to a maximum depth of two inches throughout. In areas with groundcovers planted from flats, mulch shall be installed to an average thickness of one and one-half inches. Additional mulch material shall be added from time to time as necessary in order to maintain the required depth of mulch.

12. Non-Plant Material for Landscaping. The landscape area may include natural features such as decomposing granite groundcover, rock and stone, non-vegetated natural areas, and structural features, including but not limited to, fountains, reflecting pools, art work, screens, walls, and fences, provided all of these features are integrated into the design of the landscape area and the primary purpose of the feature is decorative. These areas shall be included in the water budget calculations for the project and its various hydrozones as specified in the guidelines.

13. Nothing in this chapter shall be construed to permit the installation or removal of plants, trees or shrubs of a type or in a manner which is prohibited by another chapter of this code or the Malibu Local Coastal Program.
B. Irrigation System Requirements.

1. Irrigation systems shall be designed, constructed and managed to maximize overall irrigation efficiency, and to meet the MAWA.

2. Irrigation systems shall be designed to prevent runoff, overspray, low-head drainage, and other similar conditions where irrigation water flows or sprays on to areas not intended for irrigation and not part of the parcel’s landscape area, such as walkways, driveways, roadways, neighboring properties or the public right-of-way.

3. Irrigation systems (valve systems, piping and pressure regulators) shall be designed to deliver water to hydrozones based on the moisture requirements of the plant grouping.

4. An automatic irrigation system is required and shall include a weather-based irrigation controller, including a rain shut-off sensor.

5. Areas less than eight feet wide shall be irrigated with appropriately selected equipment that provides the proper amount of water coverage without causing overspray onto adjacent surfaces.

6. All sprinklers shall have matched precipitation rates within each valve and circuit. All irrigation systems shall be designed to include optimum distribution uniformity, head to head spacing, and setbacks from walkways and pavement. Overhead sprays shall be set back a minimum of twenty-four (24) inches from nonpervious surfaces.

7. All irrigation systems shall provide check valves at the low end of irrigation lines to prevent unwanted draining of irrigation lines.

8. Pressure regulators may be required on the irrigation system as determined by the Los Angeles County Waterworks District 29.

9. Installation of a separate landscape water meter is encouraged where feasible to facilitate water management.

10. Nonpotable and Recycled Water. If nonpotable water service, including recycled water, is determined to be required for the project by a local agency or water agency, the irrigation system shall be designed, installed and operated in compliance with state and local laws, requirements and regulations applicable to the nonpotable water use. The local water agency shall provide the customer with applicable conditions for the use of nonpotable water within its jurisdiction.

C. Fire Protection Standards.

1. Planting Restrictions.

   a. Palm trees are prohibited.

   b. Trees and shrubs are prohibited between zero to five feet from a structure.
c. The following species are prohibited within 50 feet of structures:

<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
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<tbody>
<tr>
<td>Acacia species</td>
<td>Acacia (trees and shrubs)</td>
</tr>
<tr>
<td>Adenostema fasciculatum</td>
<td>Chamise, greasewood</td>
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<tr>
<td>Ageratina adenophora</td>
<td>Eupatory</td>
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<tr>
<td>Ailanthus altissima</td>
<td>Tree of heaven</td>
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<td>Artemisia californica</td>
<td>California sagebrush</td>
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<td>Bougainvillea</td>
<td>Bougainvillea</td>
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<td>Cedar</td>
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<tr>
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<td>Pampas grass</td>
</tr>
<tr>
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<td>Cypress</td>
</tr>
<tr>
<td>Delairea odorata</td>
<td>Cape ivy, German ivy</td>
</tr>
<tr>
<td>Dimorphotheca sinuate</td>
<td>African daisy</td>
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<tr>
<td>Dodonea viscosa</td>
<td>Hopseed bush</td>
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<td>Eriogonum fasciculatum</td>
<td>Buckwheat</td>
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<tr>
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<td>Eucalyptus, gum tree</td>
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<tr>
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<td>Shamel ash</td>
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<tr>
<td>Gelsemiurn sempervirens</td>
<td>Carolina jessamine</td>
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<td>Hakea suaveolens</td>
<td>Hakea</td>
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<td>Ivy</td>
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<tr>
<td>Pinus species</td>
<td>Pine</td>
</tr>
<tr>
<td>Ricinus communis</td>
<td>Castor bean</td>
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<td>Schinus molle</td>
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<tr>
<td>Schinus terebinthifolius</td>
<td>Brazilian pepper tree</td>
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<tr>
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<td>Spanish broom</td>
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<td>Taxus species</td>
<td>Yew</td>
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<tr>
<td>Thuja species</td>
<td>Arborvitae</td>
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<tr>
<td>Tropaeolum majus</td>
<td>Nasturtium</td>
</tr>
<tr>
<td>Vinca major, Vinca minor</td>
<td>Periwinkle</td>
</tr>
</tbody>
</table>

d. Non-continuous planting of trees and shrubs (except those in (a) and (c) above, is allowed between five feet to 30 feet from a structure.

e. Eucalyptus trees are allowed between five and 30 feet of a structure if a qualified expert, as determined by the director, identifies the tree(s) as a monarch butterfly habitat.

f. The distances for trees and shrubs subject to (b) through (e) shall be measured from the dripline of the tree or shrub at its projected maturity.
g. Trees planted within or near existing utility easements where overhead power lines are present are limited as follows:

   i. Trees planted below or within 20 feet of a power line shall have a maximum growth height of 25 feet at maturity.

   ii. Trees planted within 20 feet to 50 feet of a power line shall have a maximum growth height of 40 feet at maturity.

   iii. The distances for trees and shrubs subject to this subsection (g) shall be measured from the center of the trunk.

2. Mulch material proposed between zero and five feet from a structure must consist of noncombustible materials, such as gravel and decomposed granite. Combustible mulch material, including shredded bark, wood chips, shredded rubber, pine needles, and artificial grass, are prohibited between zero and five feet of a structure. Non-continuous use of mulch (excluding wood chips and shredded tires) is allowed between five feet and 30 feet from a structure. The maximum application area of mulch located between five feet and 30 feet from a structure is 20 feet by 20 feet with a five-foot separation between application areas. Any mulch materials, excluding wood chips and shredded tires, are allowed 30 feet or more from a structure with no limitation on application area.

D. Maintenance. Installed landscaping and irrigation systems shall be managed and maintained in conformance with these standards.

D. MMC Section 17.40.030(A) “General Development Standards” is hereby amended to read as follows:

A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:

E. MMC Section 17.40.030(A)(11) is hereby added to read as follows:

   11. Hedges and combustible fences and walls are prohibited within five feet of a building. For fences and walls the distance shall be measured from the outermost projection of the building to the fence or wall, including eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the building to the canopy of the hedge, excluding eaves, overhangs, and second floor balconies.

F. MMC Section 17.40.050(A)(2) “Distance between buildings” is hereby amended to read as follows:

   A. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.
2. Distance between Main Buildings and Accessory Buildings, including detached Shade Structures, and between Accessory Buildings. A minimum distance of six feet shall be required between main buildings and accessory buildings, including detached shade structures, and between accessory buildings established on the same lot or parcel of land. The distance shall be measured from the outermost projection of the building, including eaves, overhangs and second floor balconies to the accessory building or detached shade structure.

SECTION 5. Local Coastal Program Amendment Findings.

Pursuant to Local Coastal Program (LCP) Chapter 3, the Planning Commission makes the following findings and recommends to the City Council that the LCP be amended as set forth in Section 7 of this resolution.

A. The Planning Commission hereby finds that LCPA No. 19-002 is consistent with and furthers the following Land Use Plan (LU) Policies:

LU Policy 4.2: All new development shall be sized, designed and sited to minimize risks to life and property from geologic, flood, and fire hazard.

LU Policy 4.45: New development shall minimize risks to life and property from fire hazard through:

a. Assessing site-specific characteristics such as topography, slope, vegetation type, wind patterns etc.;

b. Siting and designing development to avoid hazardous locations;

c. Incorporation of fuel modification and brush clearance techniques in accordance with applicable fire safety requirements and carried out in a manner which reduces impacts to environmentally sensitive habitat to the maximum feasible extent;

d. Use of appropriate building materials and design features to insure the minimum amount of required fuel modification;

e. Use of fire-retardant, native plant species in landscaping.

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c. Incorporation of fuel modification and brush clearance techniques in accordance with applicable fire safety requirements and carried out in a manner which reduces impacts to environmentally sensitive habitat to the maximum feasible extent;

d. Use of appropriate building materials and design features to insure the minimum amount of required fuel modification;

e. Use of fire-retardant, native plant species in landscaping.
LU Policy 4.52: Where applicable, property owners shall comply with applicable fire safety regulations for management of flammable materials (controlled burns) in fire hazardous areas.

B. The proposed ordinance does not authorize a use other than that already designated in the LCP. The proposed ordinance is consistent with the Coastal Act because it protects, maintains and enhances the overall quality of the coastal zone environment. The proposed ordinance will not alter the utilization or conservation of coastal zone resources, impede public access to and along the coastal zone, or interfere with the priorities established for coastal-dependent or coastal-related development.

SECTION 6. Local Coastal Program Amendments.

A. LIP Chapter 2.1 “Definitions” is hereby added to read as follows:

“Shade structure” means a structure with a temporary or permanent roof or covering made of or supporting plants or vines which is designed to provide shelter from the heat or glare of the sunlight.

B. LIP Chapter 3.5(A) “General Development Standards” is hereby amended as follows:

A. Hedges, Fences and Walls. Hedges, fences and walls may be erected and maintained in required yards subject to the requirements specified herein:

C. LIP Chapter 3.5(A)(5) is hereby added to read as follows:

5. Hedges and combustible fences and walls are prohibited within five feet of a building. For fences and walls, the distance shall be measured from the outermost projection of the building to the fence or wall, excluding eaves, overhangs, and second floor balconies. For hedges, the distance shall be measured from the outermost projection of the buildings to the canopy of the hedge, excluding eaves, overhangs, and second floor balconies.

D. LIP Section 3.6(R)(1)(b) “Distance between buildings” is hereby amended to read as follows:

1. Where more than one building is placed on a lot or parcel of land, the following minimum distances shall apply.

   b. Distance between Main Buildings and Accessory Buildings, including detached Shade Structures, and between Accessory Buildings. A minimum distance of six feet shall be required between main buildings and accessory buildings, including detached shade structures, and between accessory buildings established on the same lot or parcel of land. The distance shall be measured from the outermost projection of the building, including eaves, overhangs and second floor balconies to the accessory building or detached shade structure.
SECTION 7. Additional Recommendation.

The Planning Commission hereby makes the following additional recommendations for City Council consideration as part of their deliberations on the proposed amendments.

1. Direct staff to prepare a fire-hardening ordinance that addresses fire-resistant building materials and methods.
2. Direct staff to prepare additional fire-resistant landscape ordinance provisions including an analysis of slope with regards to the spread of wildfires, but also accounting for necessary erosion control.
3. Create a program to eradicate fountain grass which is related to climate action.
4. Direct staff to develop an outreach program that encourages “firescaping” throughout the landscape and emphasizes proper maintenance of existing landscaping and vegetation.

SECTION 8. The Planning Commission shall certify the adoption of this resolution.

PASSED, APPROVED AND ADOPTED this 18th day of November 2019.

JOHN MAZZA, Planning Commission Vice Chair

ATTEST:

KATHLEEN STECKO, Recording Secretary

I CERTIFY THAT THE FOREGOING RESOLUTION NO. 19-74 was passed and adopted by the Planning Commission of the City of Malibu at the regular meeting held on the 18th day of November 2019 by the following vote:

AYES: 3 Commissioners: Hills, Marx, Uhring
NOES: 1 Commissioner: Mazza
ABSTAIN: 1 Commissioner: Jennings
ABSENT: 1 Commissioner: Jennings

KATHLEEN STECKO, Recording Secretary
Fire-Resistant Landscape Ordinance References

- LA County Forestry;
- CA Native Plant Society (including Fremontia Journal);
- Theodore Payne Foundation for Wildflowers and Native Plants;
- Metropolitan Water District of SoCal;
- Ventura County Fire Department;
- Santa Monica Mountains Fire Safe Alliance;
- National Fire Protection Association;
- Escondido Fire Department;
- Study of Combustibility of Landscape Mulches by University of Nevada;
- Southern California Edison;
- “Firescaping” publication by Douglas Kent;
- Senior Ecologists and Biologists; and
- Jerry Vandermeulen, Fire Safety Liaison.
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**Low-Growing Ground-Cover Plants:**

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**Sources:**
- Santa Monica Mountains Fire Safe Alliance (SMM)
- California Native Plant Society Fire Safe Alliance (FSA)
- Armstrong Garden Center (GC)
- Metropolitan Water District of SoCal (WD)
RESOLUTION NO. 19-47

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MALIBU INITIATING AMENDMENTS TO THE LOCAL COASTAL PROGRAM AND TITLE 17 (ZONING) OF THE MALIBU MUNICIPAL CODE TO FOSTER CREATION OF MORE FIRE-RESISTANT LANDSCAPES

The City Council of the City of Malibu does hereby find, order and resolve as follows:

SECTION 1. Recitals.

A. The 2018 Woolsey fire has destroyed over 440 homes in the City and significant amounts of landscaping and other structures, including decks, hardscapes and fences.

B. While fires have historically been unpredictable, dependent upon factors such as wind speed, wind direction and fuel load, it is possible that standards could be established to decrease a property's likelihood of burning and spreading the fire to neighboring properties. Fuels for fires include but are not limited to dead plant material, buildings, decks, fences and other flammable materials such as mulch. In the interest of minimizing the risk of wildfires and reducing the potential for their spread, amendments to the City’s Local Coastal Program (LCP) and Malibu Municipal Code (MMC) zoning code are necessary.

SECTION 2. Initiation.

Pursuant to LCP Local Implementation Plan (LIP) Chapter 19 and MMC Chapter 17.74, the City Council hereby initiates amendments to the LCP and MMC Title 17 (Zoning) to foster creation of more fire-resistant landscapes and directs staff to issue a Notice of Availability consistent with LIP Section 19.3.1. Amendments include restrictions on landscape species, spacing and placement, specifications for materials and siting for fences/walls, decking, overhangs and mulch/groundcover, requirements for vegetation/tree maintenance, and other similar measures aimed at reducing fuel loads, flammability and the potential for wildfire spread.


The Planning Commission is hereby directed to conduct a duly noticed public hearing in accordance with the provisions of LIP Chapter 19 and MMC Chapter 17.74. Following the public hearing, the Planning Commission shall recommend to the City Council whether it should approve, modify or deny the proposed amendment. The Planning Commission’s recommendation shall be made by resolution carried by the affirmative vote of not less than the majority of the entire Planning Commission.

SECTION 4. The City Clerk shall certify to the passage and adoption of this resolution and enter it into the book of original resolutions.

PASSED, APPROVED and ADOPTED this 28th day of October 2019.
ATTEST:

HEATHER GLASE, City Clerk
(seal)

APPROVED AS TO FORM:

CHRISTI HOLIN, City Attorney

I CERTIFY THAT THE FOREGOING RESOLUTION NO. 19-47 was passed and adopted by the City Council of the City of Malibu at the adjourned regular meeting thereof held on the 28th day of October 2019 by the following vote:

AYES: 5  Councilmembers: Mullen, Peak, Wagner, Pierson, Farrer
NOES: 0
ABSTAIN: 0
ABSENT: 0

HEATHER GLASE, City Clerk
(seal)
Palm Trees as Fire Hazards

During the 2007 wildfires, it was determined that certain species of palm trees, due to their form or lack of maintenance, were especially hazardous. As a result, the Escondido Fire Department strongly recommends the following for new construction and landscaping:

Palm trees that have fibrous tissue or leaf stem bases along the trunk should be planted and maintained no closer than 30 feet from the tree’s drip line to any combustible structure.

Palm species that have fibrous tissue:
- *Chamaerops humilis* (Mediterranean Fan Palm)
- *Phoenix canariensis* (Canary Island Date Palm)
- *P. dactylifera* (Date Palm)
- *P. reclinata* (Senegal Date Palm)
- *P. roebelenii* (Pygmy Date Palm)
- *Trachycarpus fortunei* (Windmill Palm)

Palm tree that has leaf bases:
- *Washingtonia robusta* (Mexican Fan Palm)

All dead palm fronds; including older leaves that persist on the tree, forming a “skirt” of brown thatch, should be removed annually, especially if an existing palm is within 100 feet of any structure or within 30 feet of a driveway or roadway.

Palms that are “skinned” or cleaned of the fibrous tissue or leaf bases annually may be planted as close as 10 feet from the tree’s drip line to any portion of a combustible structure.

When an established palm tree already exists closer to a home or other structure than the recommendations above, removal is preferred but if that is not an option, the property owner should:
- Maintain the existing palm by removing dead material and skinning wherever possible
- Maintain combustible vegetation adjacent to or growing along any palm tree by reducing or removing.
- Watch for signs of disease or stress to ensure that the palm is healthy; remove if dead or dying.
  - Fronds should look green and full.
  - Brown fronds or branches at the top center where the new growth emerges indicate a problem that needs attention

Important: The Fire Department also cautions anyone intending to remove the dead skirt from a palm tree to be aware of the dangers of suffocation while doing so; specially trained professionals should be contracted for this type of work.
A palm tree that is not maintained can explode into a giant torch.

Flying embers can embed themselves into the fibrous tissue or leaf bases along the trunk of a palm tree. The rest of the tree can quickly become consumed by fire; anything combustible in the immediate area is at risk.

Once ignited, leaf bases and dried fronds can detach from the trunk and be carried on the wind for great distances.

*For video footage of a burning palm tree, go to [http://www.youtube.com/watch?v=705dEbBMAAk](http://www.youtube.com/watch?v=705dEbBMAAk)*
APPLICATION OF MULCH AND CHIPS in DEFENSIBLE SPACE
(Ref: Ventura County Fire Code, Section 2808 & Appendix W)

The information contained in this standard is provided solely for the convenience of the reader and was being enforced by the Ventura County Fire Protection District at the time of its publication. The District reserves the right to make changes and improvements to this standard as and when required by law, or otherwise, at any time. (The District's current standards will be posted and made available for downloading by the public at the following web site: http://fire.countyofventura.org.)

Please note that the District assumes no liability for any damages incurred directly or indirectly as a result of any errors, omissions, or discrepancies between this standard and any applicable law. It is the sole responsibility of the person or persons conducting any work pursuant to this standard to ensure their work complies with any and all applicable codes, ordinances, and regulations.

CHAPTER 1 ADMINISTRATION

1.1 Scope. This standard is the approved requirements of the fire code official under Ventura County Fire Code (VCFC), Section 2808 and Appendix W. This standard applies to the application of mulch and wood chips in defensible space areas. This standard shall also be used in conjunction with Ventura County Resource Management Agency (RMA) (Planning & Environmental Health Divisions), Ventura County Agricultural Commissioner, VCFC, Ventura County Ordinance Code (VCOC) and other applicable Laws, Regulations, Rules and Codes including incorporated Cities,(if applicable). Where any conflict occurs with the requirements of this standard and other Laws, Regulations, Rules and Codes, the most restrictive application shall apply, unless prohibited by Law.

1.2 Purpose. This standard was developed to address the concerns and issues associated with fires starting within or spreading from mulch and wood chips that have been spread within the defensible space area around structures. These fires pose hazards to emergency responders, the surrounding communities and the wildland area. This standard is intended to provide basic fire safety measures that should limit fire spread within the defensible area.

1.3 Responsibility. All parcel owners who apply (spread) mulch and wood chips in any required defensible space area are subject to the requirements of the VCFC and this standard.

1.4 Modifications. Increases in the limitations of this standard may be considered on a case-by-case basis. A written request and justification prepared by a qualified expert acceptable to the fire code official and based upon site-specific conditions shall be submitted and approved prior to land application. Such written requests shall be made by the property owner of record. Additional measures to prevent the ignition and spread of fire shall be provided as approved by the fire code official.
CHAPTER 2 DEFINITIONS

2.1 General. The following words and terms shall, for the purposes of this standard, have the meanings shown herein.

2.2 Compost and Compostable Material. “Compost” and “Compostable Material” shall mean any organic material that when accumulated is capable of rapid decomposition and generating temperatures of at least 122 degrees Fahrenheit.

2.3 Contaminants. “Contaminants” shall mean pieces of non-compostable solid waste that include, but are not limited to, plastics, metals, glass, clothing, wood which contains lead-based paint or wood preservatives, and other similar materials. Ref: VCOC Sec 4701

2.4 Disposal. As defined by VCOC, Section 4701.

2.5 Invasive Species. Current inventory provided by the California Invasive Plant Council

2.6 Organic Mulch. “Organic Mulch” shall mean compostable material limited to landscape waste and crop production byproducts consisting of leaves, yard trimmings, wood waste, branches and stumps, and whole plants/trees, that have been mechanically reduced in size and have been composted prior to application.

2.7 Wood Chips. “Wood Chips” shall be from trees only. No hazardous brush is allowed including, but not limited to: sage, coyote brush or chamise. Chips should average 2-4 inches in length. Fine ground or stringy types of material which can ignite faster and burn more readily shall not be used. These materials include, but are not limited to, Gorilla Hair (shredded redwood or western red cedar) and Coconut fiber. Wood chips are not required to be composted prior to applications.

2.8 For purposes of this standard, the terms Fire Hazard Severity Zones (FHSZ), Hazardous Fire Area (HFA), State Responsibility Area (SRA), and Wildland-Urban Interface (WUI) Area, shall be as defined in Chapter 2 the Ventura County Fire Code (VCFC).

VCFC Chapter 2
HAZARDOUS FIRE AREA (HFA) is land which is covered with grass, grain, brush, or forest, whether privately or publicly owned, which is so situated or is of such inaccessible location that a fire originating upon such land would present an abnormally difficult job of suppression or would result in great and unusual damage through fire or resulting erosion and includes any location within 500 feet of a forest or brush, grass, or grain covered land, exclusive of small individual lots or parcels of land located outside of a brush, forest grass, or grain covered area. Such areas are designated by the fire code official. The fire code official is authorized to utilize, as references, the definition of Wildland-Urban Interface Area, State SRA maps, Local Agency Fire Hazard Severity Zone Maps designated pursuant to California Government Code, Sections 51175 through 51189 and the International Wildland-Urban Interface Code.

CHAPTER 3 GENERAL REQUIREMENTS

3.1 Type of Material. Mulch and wood chips consisting of invasive species, hazardous trees, non-native vegetation, pine needles, leaves, grass and in-organic materials, such as shredded rubber, are not allowed within the required defensible space zone.
3.2 **Maximum Depth of Application.** The application and spread depth shall not exceed two (2) inches in height within the required defensible space zone.

3.3 **Composted Material.** Organic mulch shall be clean and already composted.

3.4 **Contaminants.** Organic mulch and wood chips shall be free of any contaminants.

3.5 **Delivery for Land Application.** Organic mulch and wood chips delivered to a parcel for land application shall be applied within Seven (7) days of delivery or placed into piles complying with VCFD Standard 14.9.1. At no time shall any pile exceed 6 feet in height.

3.6 **Limitations.** Land application within the required defensible space zone shall be in accordance with Table 3.6. Land application outside the required defensible space shall be in accordance with Ventura County Ordinance Code and VCFD Standard 14.9.1 as applicable.

### Table 3.6 Land Application Limitations within Defensible Space of a Structure

<table>
<thead>
<tr>
<th>Zone</th>
<th>Distance from Structure</th>
<th>Requirement of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 - 5 feet</td>
<td>Land application prohibited. Must use non-combustible materials such as gravel, decompose granite, etc.</td>
</tr>
<tr>
<td>B</td>
<td>&gt;5 - 30 feet</td>
<td>Limited non-continuous use of organic mulch is allowed. No wood chips. Use a mosaic (non-uniform) pattern with a maximum application area of 20-feet x 20-feet and a minimum 5-foot separation between application areas.</td>
</tr>
<tr>
<td>C</td>
<td>&gt;30 - 100 feet</td>
<td>Organic mulch and wood chips allowed. No limitation on application areas.</td>
</tr>
<tr>
<td>D</td>
<td>&gt;100 - 200 feet</td>
<td>Same as Zone C or as determined by the Fire Code Official if additional defensible space is required for the parcel beyond 100 feet.</td>
</tr>
</tbody>
</table>

**CHAPTER 4 ADDITIONAL INFORMATION**

For questions regarding this standard, please contact the Fire Hazard Reduction Program Unit (FHRP) at fhrp@ventura.org or 805-389-9759.

Additional information regarding defensible space requirements, fire hazard reduction and general fire safety, please visit [www.vcfhrp.org](http://www.vcfhrp.org) and [www.vcreadysetgo.org](http://www.vcreadysetgo.org)
Mulch plays an important role in Western residential landscapes. It can:

- reduce the water requirements of plants
- cool soil temperatures
- reduce the occurrence of weeds
- control soil erosion and dust
- prevent soil compaction
- visually enhance the landscape

Consequently, mulches are often promoted as being environmentally friendly and a desirable landscape practice. Unfortunately, despite the positive attributes, many mulches are combustible, a major drawback when used in home landscapes located in wildfire-prone areas (Figure 1). A combustible material is defined as one capable of igniting and burning (Berube 1991). In 2008, an evaluation of mulch combustibility was performed in Carson City, Nev., by the Carson City Fire Department, Nevada Tahoe Conservation District, University of California Cooperative Extension and University of Nevada Cooperative Extension. Using the results from this project, recommendations are offered concerning the use of mulches in wildfire hazard areas.

Mulch Types

Mulch is defined as any material used to cover the soil surface for a variety of purposes (Rogstad et al. 2007). Mulch materials are generally classified as organic or inorganic. Organic mulches usually come from plant materials. Examples include pine needles, wheat straw, pine bark nuggets of various sizes, shredded western red cedar and redwood bark, wood chips from recycled pallets or wildfire fuel reduction projects and cocoa shells. Ground and shredded rubber are also considered organic mulches. Inorganic mulches are usually derived from non-plant materials. They include rock, gravel and brick chips. Organic and inorganic mulches vary considerably in terms of size, shape, texture and parent material, all of which can influence their combustibility.
Table 1. Description of mulch treatments evaluated during the project.

<table>
<thead>
<tr>
<th>Mulch Treatment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composted Wood Chips, 2– to 3–inch depth</td>
<td>Fertile Mulch, produced by Full Circle Compost, Inc. of Minden, Nev., was used. Wood chips are composted for an eight–week period using a proprietary process.</td>
</tr>
<tr>
<td>Medium Pine Bark Nuggets, 2– to 3–inch depth</td>
<td>Garden Bark Western Decorative Bark medium–sized pine bark acquired from a home improvement store was used. Approximately 75% of the material tested consisted of pine bark pieces about 1 inch in diameter. The balance of the material was wood chips and other unrecognizable materials.</td>
</tr>
<tr>
<td>Pine Needles, 2– to 3–inch depth</td>
<td>Approximately 80–90% of this material consisted of four to eight inch long needles shed from native ponderosa and Jeffrey pine trees and 10-20% was comprised of twigs, leaves, wood chips and cone scales. This is a popular naturally occurring mulch in the Sierra Nevada region.</td>
</tr>
<tr>
<td>Shredded Rubber, 2– to 3–inch depth</td>
<td>DuPont Signature Premium Rubber Mulch acquired from a home improvement store was used. This product is made from 100% recycled rubber, dyed and processed to resemble redwood mulch products.</td>
</tr>
<tr>
<td>Shredded Western Red Cedar, 2– to 3–inch depth</td>
<td>Mountain Magic Gorilla Hair Mulch is made from western red cedar that is machine shredded to create a long stringy, fibrous material. Approximately 5% of the material tested consisted of wood chips.</td>
</tr>
<tr>
<td>Tahoe Chips, 2– to 3–inch depth</td>
<td>A by-product of Lake Tahoe Basin chipping operations, this product consisted of pine needles, wood chips, bark and other plant biomass. The size, shape and texture of the chips varied and was influenced by the material being chipped.</td>
</tr>
<tr>
<td>Tahoe Chips with fire retardant, 2– to 3–inch depth</td>
<td>Same material and application depth as above, but sprayed with an ammonium sulfate-based wood colorant/fire retardant solution manufactured by Fire Chief Coatings, Inc. The retardant was applied at a rate of 1.25 gallons/50 sq. ft. on July 7, 2008 by the manufacturer’s representative.</td>
</tr>
<tr>
<td>Tahoe Chips, single layer depth</td>
<td>Same material as above, but applied as a single layer of chips without fire retardant. The single layer of chips provided 80-100% ground cover.</td>
</tr>
</tbody>
</table>

Information herein is offered with no discrimination. Listing a commercial product does not imply an endorsement by the authors, University of Nevada Cooperative Extension, University of California Cooperative Extension or its personnel.

Evaluation of Mulch Combustibility

Evaluation measurements and plot design for this project were similar to mulch combustibility studies conducted by Zipperer et al. (2007). Eight landscape mulch treatments (Table 1) were evaluated in terms of three combustion characteristics: flame height, rate of fire spread and temperature measured at four inches and 16 inches above the mulch bed. Twenty-four, 8-foot diameter plots containing the mulch treatments were established at the Jacobsen Regional Training Facility in Carson City on May 28, 2008 (Figure 2). Each mulch treatment was replicated three times. The mulches were allowed to settle for 79 days and weather similar to mulches in the home landscape. The plots were ignited on a hot (about 100°F), dry (about 13 percent relative humidity) afternoon on Aug. 14, 2008, which is typically the height of fire season in northern Nevada. The National Fire Danger Rating System value for that day was extreme. To simulate the windy conditions common to Nevada fire seasons, fans were used to generate a mid-plot air flow of about 10 to 15 miles per hour. After the plots were ignited by a drip torch, the fans were turned on, and the plots were monitored for 20 minutes. The treatments were evaluated by comparing the three measured combustion characteristics. The results are expressed as relative values between the eight mulch treatments. For each combustion characteristic, the measured value for a mulch treatment is expressed as a percentage of the mulch treatment with the greatest value.
Key Findings

Figure 3 presents the evaluation results and the key findings are described below.

- All of the mulches evaluated were combustible under the test conditions of dry, hot and windy weather and more than 2½ months of outdoor exposure.

- The mulch treatments varied considerably in terms of flame height, speed at which fire spread and temperature measured above the mulch bed.

- With the exception of the composted wood chips, all of the mulch treatments demonstrated active flaming combustion. Composted wood chips produced only incidental flaming with smoldering as the primary form of combustion. It is not known if the performance of the composted wood chips is specific to the Fertile Mulch product produced by Full Circle Compost, Inc. and evaluated in this project or if composted wood chips from other sources would perform in a similar manner.

- Based on cumulative values for the three combustion characteristics, shredded rubber, pine needles and shredded western red cedar demonstrated the most hazardous fire behavior.

- Composted wood chips and Tahoe chips, single layer demonstrated the least hazardous fire behavior based on the factors measured in this evaluation.

- Shredded rubber mulch burned at the hottest average maximum temperature (in excess of 630°F measured at four inches above the mulch bed) and produced the greatest flame heights which averaged over 3 feet. It ignited easily and burned intensely for a prolonged period (Figure 4).

- Pine needles were second only to shredded rubber mulch in terms of the cumulative value of combustion characteristics.
The most rapid rate of fire spread came from shredded western red cedar (Figure 5), traveling at an average rate of 47.9 feet per minute. Moderate temperatures averaging 380° F were measured at four inches above the mulch bed and it produced a relatively low average flame height of 11.4 inches. This mulch treatment also produced embers which moved beyond the plot perimeter and ignited adjacent mulch plots.

Medium pine bark nuggets produced relatively moderate flame height and temperature values and also exhibited a low rate of flame spread.

Flame height and temperature values for Tahoe chips, 2– to 3–inch depth and Tahoe chips with fire retardant, 2– to 3–inch depth were similar. The fire spread values, however, for the chips treated with fire retardant were lower than those for the untreated chips. The retardant delayed fire spread for approximately five to 10 minutes, after which the rate of spread was similar to the untreated chips.

The lowest temperature values were produced by the Tahoe chips, single layer treatment. They also produced relatively low flame heights and rates of fire spread.

Composted wood chips demonstrated the slowest fire spread rate of the eight mulch treatments evaluated, less than 0.3 feet per minute (Figure 6). Since the progress of smoldering combustion was, at times, obscured by a non-burning surface layer of chips, fire rate of spread values are an approximation. They also produced the shortest average maximum flame height (note: flaming combustion was rare). The average temperature was the second lowest recorded and was comparable to the Tahoe chips, single layer treatment.

Figure 5. Shredded western red cedar bark, as shown in this photograph, ignited easily and produced the fastest rate of spread of the eight mulch treatments evaluated.

Figure 4. Rubber mulch produced the greatest flame height and temperature of the mulch treatments evaluated in this study.

Figure 6. The composted wood chip product, Fertile Mulch, primarily burned through smoldering combustion as indicated by the darker areas and smoke. It produced very little flame and had the slowest rate of fire spread of the mulch treatments evaluated.
Within five feet of the house and other structures

- Maintaining a noncombustible, ignition–resistant area immediately adjacent to the house and other structures is particularly important (Mercker 2010, Florida Department of Community Affairs and Florida Department of Agriculture and Consumer Services 2004, Deneke 2002 and Glendale Fire Prevention Bureau undated). During a wildfire, embers may accumulate in this area, providing an ample source of ignition for combustible materials. Since all of the mulch treatments tested are combustible, they are not recommended for use within five feet of the house and other structures.

- Within five feet of the home, use noncombustible rock, gravel, concrete and pavers. Ignition-resistant plant materials, such as irrigated, well-maintained lawn and flowers could also be used.

From five to 30 feet of the house

- Medium pine bark nuggets, Tahoe chips with and without fire retardant and composted wood chips possessed the least hazardous combustion characteristics and are better choices for use within five to 30 feet of the house. Since they are combustible materials and can transmit fire across this area, do not use them in a widespread or continuous manner. Separate areas mulched with these materials with noncombustible and ignition–resistant materials such as concrete, gravel, rock and lawn.

- Composted wood chips demonstrated the least hazardous fire behavior overall of the eight mulch treatments tested and would be the best choice for use in residential landscapes. However, they are still considered a combustible material and could ignite wood siding, plant debris and other combustible materials in contact with or immediately adjacent to the mulch bed. Also, the smoldering combustion produced by this mulch treatment may not be readily noticeable during a wildfire event and may go undetected by firefighters.
The spray-on fire retardant suppressed fire spread for five to 10 minutes in the Tahoe chips mulch. After that, fire behavior of the retardant-treated Tahoe chips was no different than that of the untreated Tahoe chips. Also, the fire retardant–treated Tahoe chips were not exposed to precipitation or irrigation during the evaluation period. Precipitation and irrigation could have reduced the fire retardant’s effectiveness by leaching water-soluble components from the formulation. While the fire retardant provided some utility, the treated Tahoe chips mulch was still combustible.

Irrigating wood and bark mulches, as in a flowerbed, may reduce the ease with which they ignite and burn. Since water supply and pressure may be limited or not available during a wildfire, wetting mulches should not be relied upon to lessen the fire hazard. Also, the dry, hot and windy weather typical during wildfires could dry out the mulch bed between irrigation cycles and make it susceptible to ignition. It should be noted that drip irrigation used in flowerbeds typically does not wet the entire area. Consequently, dry areas of wood and bark mulches could exist in flowerbeds under irrigation.

Shredded rubber, pine needle and shredded western red cedar mulches demonstrated the most hazardous combustion characteristics and are recommended for use in areas more than 30 feet from the house.
Mulches Used in Residential Landscapes

- Shredded Western Red Cedar
- Composted Wood Chips
- Shredded Rubber
- Pine Needles
- Medium Pine Bark Nuggets
- Tahoe Chips

**Literature Cited**


**Acknowledgements**

This project was made possible through a collaborative effort between the Carson City Fire Department, Nevada Tahoe Conservation District, University of California Cooperative Extension and University of Nevada Cooperative Extension.

Mulch products and plot materials were provided by Full Circle Compost, Inc. and Meeks Lumber.

Funds to purchase additional project supplies were provided by the Natural Resource Conservation Service, Lake Tahoe Basin Office and the Bureau of Land Management, Carson City Field Office.

A special “thank you” goes out to the project volunteers who endured difficult conditions to collect the evaluation data.

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For more information: www.LivingWithFire.info

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Want to fireproof your home? It takes a village

Steve Yusi and Diana Ungerleider installed a state-of-the-art fire-suppression system in their home in Pacific Palisades. Will it be enough to protect them from a wildfire? (Robert Gauthier / Los Angeles Times)

By JOSEPH SERNA
STAFF WRITER

OCT. 3, 2019
Steve Yusi lives in a high-risk fire zone, and he would seem to have all the defenses a homeowner could want to survive Southern California’s next inferno.

He has installed sensors under the eaves of his Palisades home, reportedly able to detect flames licking on the structure’s wooden exterior. The sprinklers on the roof and garden rotate 360 degrees to create a halo of water and retardant that lasts at least 20 minutes.

Yusi’s eyes widened as he showed off his fire-defense system. Then he met Jack Cohen, who had some bad news.

Cohen, a renowned wildfire expert, has seen what sprinklers do in extreme wind-driven fires — they miss their target. He’s also seen communities lose power, hydrants run out of water and firefighters become overwhelmed as showers of red-hot embers spark hundreds of spot fires in a neighborhood.

**ADVERTISEMENT**

In wind-driven scenarios, protecting a home hinges on the little things — such as using the right building materials and maintaining a lush, manageable garden — over pricey projects such as sprinklers, Cohen said. Embers should be viewed as a contagion that can spread like an airborne virus.

“If we don’t mitigate together, we will surely burn together,” Cohen said.
Wildfire expert Jack Cohen leads a three-day class on how to fortify neighborhoods from flames. (Dania Maxwell / Los Angeles Times)

As California’s wildfires have become more destructive, many homeowners are spending thousands of dollars on sprinklers and other elaborate systems to protect their homes.

But experts say such investments offer limited, if any, protection from the wind-driven firestorms that in recent years have destroyed tens of thousands of homes and killed scores of people. They say that effective landscaping should be prioritized.

Safeguarding homes individually is nowhere as effective as what communities can do together, Cohen said. Events in Santa Rosa and Paradise, Calif., show that perceived protections such as freeways or firebreaks are no match for wind-driven conflagrations.

The key to avoiding the next catastrophic fire, experts say, is a term used by public health officials: group immunity.

ADVERTISEMENT

The North Bay wine country fires in 2017 revealed how the weakest links in a neighborhood can cost everyone. Firebrands — burning wood — from the Tubbs fire blasted down the slopes separating Napa and Sonoma counties amid gale-force winds,
jumped U.S. 101 and ignited the community of Coffey Park where homes stood less than
10 feet apart.

Looking for a guide on how to begin to
fireproof your home and neighborhood?
Here’s where to start

“That’s where I’m an advocate for [fire] coding ... so you don’t get a high level of
contagion from house to house,” Cohen said of the community’s layout.

Launching a group effort can be more difficult than individually protecting homes, but
increasingly, communities are banding together to do just that.

“It’s going to take every individual person having that commitment,” said Beth Burnam,
62, who leads the North Topanga Canyon Fire Safe Council and has worked to educate her
neighbors for years. “Unless you try, you’re not going to get there.”

Which led her to join a class being taught by Cohen over the summer.
Considered by many to be the godfather of wildfire home ignition science, Cohen traveled this summer to Los Angeles from his home in Missoula, Mont., to conduct a three-day mitigation session for residents and firefighters. Afterward, he toured the Palisades — where expensive residences are situated on steep hillsides of bone-dry chaparral overlooking Pacific Coast Highway between Malibu and Santa Monica — to assess the risk and provide guidance.

It’s in areas like these across the West, where suburban life flirts with the edge of untamed wildland, that traditional, modern firefighting methods such as aircraft bombardment and clearing land for fuel breaks have failed to stop the worst wind-driven blazes.
Pacific Palisades is among the communities at risk of catastrophic wildfire. (Kyle Kim / Los Angeles Times)

Residents and officials, Cohen said, instead must focus on a defense strategy that starts from the home and moves outward, including some fixes that won’t necessarily break the bank.

His prescription was bitter medicine for Yusi, his wife and many in their neighborhood near Temescal Canyon Park.

The couple had paid for the $75,000 sprinkler system by putting off replacement of their 17-year-old Honda Civic and other domestic expenses. They assumed the system would protect them from the kind of firestorm that scorched their neighborhood once before, and threatened to do so again during last year’s Woolsey fire. Cohen doused those hopes.

“Really?” Yusi said when he heard the news, deflated. “I want herd immunity. That’s why I took that course.”
Cohen's grim diagnosis started just inside the front yard of the Yusi property, where he pointed out a 10-inch-wide gravel strip between the home and the garden. He crouched, pushed his hand between green plant leaves and grabbed a handful of dead and dying vegetation layered beneath — kindling that could feed a fire.

The embers could spark a small fire that could burn the garden's dead under-story, then spread to the wood fence that overlaps with the gravel and crawl to the home's siding like a slow-burning fuse.

Cohen then walked to a back corner of the property, where wood steps connected to the home jut out, providing a gorgeous view of the neighborhood. Unfortunately, the steps also are within arm's reach of a thicket of 6-foot-high plants entangled in the wood fence, providing another path for flames to spread to the structure with one inopportune wind shift.

Details matter in protecting homes from firebrands.

Fine wire mesh vent screens help keep out embers. Fire-resistant construction materials and well-maintained landscaping can prevent fires from spreading. If a home is ablaze and is close enough to a neighbor — as is the case in most foothill communities across California and the West — there's a chance a single infected house could turn into an epidemic.
Some homes in Coffey Park were undamaged in the 2017 Tubbs fire, while others were destroyed. (Marcus Yam / Los Angeles Times)

A former hotshot firefighter, Cohen sees climate change and human folly combining to create ever-more dangerous wildfire conditions.

A century of aggressive fire suppression has left forests thick with spindly trees and brush, dried out by drought and steadily increasing temperatures. At the same time, frequent fires in some suburban foothills have allowed invasive, fast-burning plant species to encroach on homes, which are proliferating across the West's mountain regions.

According to a 2017 study in the Proceedings of the National Academy of Sciences, home building in the wildland-urban interface increased 41% nationwide between 1990 and 2010 — to 41.3 million homes.

Whereas Native Americans used fires to replenish vegetation, that symbiosis disappeared as Europeans spread across North America.
“Ironically, we have this high-tech, European culture coming into the land of low-tech ... and suddenly we find ourselves today not being compatible with fire as Native Americans were in the Great Plains. To me there’s no greater irony than that,” Cohen said.

Thus far, California’s approach to managing risk has focused on controlling fire through fuel reduction and prescribed burn programs. The California Department of Forestry and Fire Protection slated 35 different projects for 2019, with their environmental reviews fast-tracked by the California Natural Resources Agency.

The problem, some say, is that even as Cal Fire officials boast they quickly put down more than 90% of blazes, a small number of wind-driven fires are causing more death and destruction than ever before.

Consider the Camp fire in Paradise last year.

Winds squeezed through a mountain pass and blasted firebrands over natural firebreaks and a branch of the Feather River. They blew directly into the town and smaller communities to the northeast, trapping first-responders and residents alike.
Embers fly as wind and flames from the Camp fire tear through Paradise, Calif., on Nov. 8. (Josh Edelson / AFP/Getty Images)

In Southern California, the potential financial losses from extreme wildfires are many times higher. The region has some of the nation’s highest concentrations of expensive homes surrounded by the most flammable ground cover in the Western Hemisphere. Though low-cost maintenance may be the most direct path toward protection, affluent homeowners frequently explore other avenues first.

In Malibu, one resident told Cohen during class that neighbors discussed building a phalanx of ground sprinklers ringing the neighborhood to ward off an incoming fire.

“Nonsense,” Cohen said.

There was also the famous music producer with a Venice studio who suggested the National Park Service dump 50,000 gallons of water on the Santa Monica Mountains once a week through summer to keep the landscape from becoming too dry. That idea is impractical for a host of reasons, experts say.

In the case of the Yusi residence, the homeowners had purchased a sprinkler system that’s never been used in an actual wildfire.

Their house is in a state-designated high-risk wildfire zone, where it’s edged by a slope covered in dry chaparral and coastal sage scrub. The couple is concerned that, should a fire reach those hillsides — as one did in 1978 when multiple homes below were lost — flames and firebrands would storm the community, overwhelm firefighters and take down homes like a row of burning dominoes.
That's what happened with the Woolsey fire in November in Malibu, when hot, dry winds carried burning embers over firefighters and into the neighborhoods they were assigned to protect. There are never enough firefighters to extinguish the thousands of tiny spot fires that can rapidly erupt in worst-case scenarios.

“This is one of the fundamental characteristics of wildland-urban fire — overwhelming our resources,” Cohen said.

Which is why slowing down its spread is essential, he told residents and firefighters.

Steve Yusi walks a dense trail of brush located a few hundred yards from his home. (Robert Gauthier / Los Angeles Times)

Home-hardening should be viewed on a gradient that starts with the “structure zone” and the 5 feet around it, then moves outward, Cohen said. The landscaping should be set up in a way that as a fire gets closer to the structure, it slows down and burns less intensely.
Trees and bushes should be isolated into islands located 5 to 30 feet and 30 to 100 feet away from the structure.

“What that does is it gives a chance for somebody, maybe a resident, most likely firefighters, to be able to get here, discover it and easily extinguish it. It buys time,” Cohen said. “When they spend less time here and over there and over there … the more houses that can be protected.”

The importance of the 5-foot “structure zone” was validated during a recent lab test in South Carolina, said officials with the Insurance Institute for Business and Home Safety, an industry organization that focuses on best building practices.

In March, researchers at the IBHS fire lab conducted an experiment in which they exposed a home with a fire-resistant roof to a wind-driven shower of embers. One half of the home was landscaped with drought-friendly bark mulch and plants leading up to wood siding, the other half had gravel landscaping and plants that edged up to fire-resistant siding.

Seconds after the ember shower started, the mulch began burning and ignited the plants. Those flames spread rapidly to the wood siding, and before long, the entire home was engulfed in fire. The other half of the building remained unburned.

That type of mitigation pays dividends across entire neighborhoods, and is the basis for an update to California’s fire codes that’s on the governor’s desk awaiting his signature.

A 55,000-acre wildfire near Durango, Colo., last summer is an example of the zoned approach’s effectiveness, Cohen said. That blaze threatened the community of Falls Creek Ranch, which is surrounded by conifers in the San Juan National Forest. For a decade, residents there have fully embraced a culture of self-reliance in preparing for inevitable wildfire, according to Cohen and local media.
For three days each year the community gets together, clears their parcels of flammable debris and then has a potluck. Last summer, the fire reached the edge of town, but not a single home was lost.

The success of a community-wide approach also bore fruit in 2007, during the Witch fire in San Diego County. During that October fire storm, five fire-hardened developments in Rancho Santa Fe remained standing while surrounding neighborhoods burned. One home suffered damage when embers ignited a scrap of particle board leaning against the garage. A sprinkler system doused that fire before it could engulf the home.

“If wildfires are inevitable and extreme wildfire conditions are inevitable, then firebrands are inevitable,” Cohen said. “And that means we don’t have a decision.”

Miriam Schulman, who lives across the street from Yusi in the Palisades, was instrumental in organizing her neighborhood to tackle its particular threat.

While on vacation in Oahu in 2017, Schulman was checking the news on her phone when her stomach knotted.

She saw flames from the Skirball fire running up the sides of the Sepulveda Pass and, she feared, toward her home.

“I was horrified,” said Schulman, 66. “I wasn’t where I could do anything about it, and I didn’t know what to do about it.”

While the blaze never reached her side of town, the experience left her shaken. As soon as she returned to the Palisades, she went on social media, dialed neighbors, sent emails and searched online for the latest wildfire home-hardening strategies recommended by experts.

That effort ultimately steered Schulman to pools of grant money and eventually, reaching out to Cohen to teach the class.
If enough residents modify their homes for wildfires — and have it validated by local fire officials — some of these Westside communities could be listed as “firewise” by the National Fire Protection Assn., which can lead to insurance discounts. Bel-Air is the only firewise community in Los Angeles County.

As for Yusi’s home, Cohen says, it is a lost cause “without some quick fixes.”

Those are already in the works, the homeowner said. He’s installed smaller vent screens, coated his wood siding in fire retardant and installed metal flashing along the ground, ensuring any embers that hit the walls won’t smolder and burn through.

Steve Yusi installed a state-of-the-art fire-suppression system on his home located next to a wilderness area. (Robert Gauthier / Los Angeles Times)

He also has assembled an emergency kit that includes an ample supply of water.
Yusi said that, after the Woolsey fire, “common sense, and paranoia” drove him to buy the fire-suppression system instead of a new car.

“And I must admit, real or not, that there is a sense of security I get from looking at the hedges that hide the [water] tanks, or the sprinklers on the roof, or the fire sensors located around the house,” he said. “I’m still not overly confident, and I just hope we’re never tested.”

Want to read more L.A. Times wildfire coverage? Subscribe here.

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Joseph Serna

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Joseph Serna is a Metro reporter who has been with the Los Angeles Times since 2012.

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How much of a fire hazard is posed by decorative features inside and outside buildings?

BY ASHLEY SMITH

ON JULY 25, 2015, A FIRE BROKE OUT on a 14th-floor pool deck at The Cosmopolitan of Las Vegas, a 61-story luxury resort and casino on the Strip. The fire spread quickly, shooting flames and giant black plumes of smoke into the air, sending at least one person to the hospital and causing $2 million in damage. The exact cause was never determined, though discarded cigarettes were suspected.

Firefighters knew exactly why the fire burned so intensely: artificial palm trees made of polyethylene, a highly combustible foam plastic. Clark County Fire Chief Greg Cassell told CNN he had never seen a fire quite like it in his 26 years on the job. The plastic trees acted like "solid gasoline," he said, causing the fire to "take off like a rocket." Other outdoor decorations made of synthetic materials, including artificial turf and cabanas, further exacerbated the fire’s intensity.

Related Content

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Combustible Decorative Features and the Las Vegas Strip

Watch the video:
Watch dramatic footage of a pool deck
contributed to the speed and intensity of the blaze.

There are no local or national building and life safety codes that specifically prohibit Las Vegas properties from using these types of combustible decorative features on the outside of buildings, a vulnerability highlighted by the fire at The Cosmopolitan. NFPA 101®, Life Safety Code®, along with several other NFPA codes and the International Building Code (IBC), do regulate interior decorative features—everything from artificial vegetation to massive statues and columns—but a pair of code experts say those regulations are not always enforced and that they may need to be updated and improved.

Marcelo Hirschler, a chemist who runs a fire safety testing and consulting firm, and Douglas Evans, a former fire protection engineer for the Clark County, Nevada, Building Department who is now a private safety consultant for the construction industry, are trying to raise awareness on the topic and explain what they believe should be done to reduce the dangers associated with combustible decorations. Hirschler and Evans will present an education session on the topic at the NFPA Conference & Expo in Las Vegas.

Hirschler and Evans favor a possible expansion of NFPA 101 to include regulations for external decorative features, particularly large items made of polystyrene or polyurethane plastic located close to buildings. They also advocate for a review of the minimum fire testing standards for interior decorative features, which they say were written to apply to small items, not the large-scale or even giant decorative features that exist throughout Las Vegas. Those include elements such as columns, statues, large signs and LED screens, hand-painted canvas murals that take up entire walls, buildings within buildings, and much more.

“There are also no limits on the size and number of interior decorations, and there should be,” Hirschler said. “Decorations are only properly regulated if they’re large enough to be considered an interior finish, which is more than 10 percent of a wall or ceiling. Most people are not aware this is a potential problem.”

Plastic problems

Las Vegas offers countless examples of the kind of faux features that concern Hirschler and Evans. In a city built on fantasy, it’s no surprise that trees, gold statues, marble columns, and thatched-roof tiki bars are actually made of plastic. After the Cosmopolitan fire, Clark County Department of Building and Fire Prevention Director Ron Lynn told the Associated Press that the plastic fronds burned 10 times faster and hotter than an actual tree, and the artificial trunk made of metal polyurethane foam and fiberglass resin burned five times more intensely. Test results indicated that the tree’s materials did not meet flame and smoke resistance standards for indoor use and would not be allowed inside a building or as an exterior component attached to a building.
Following the fire, Clark County considered changing its building code to regulate artificial vegetation around exterior areas of buildings. The decision was ultimately made that it didn't make sense from an enforcement perspective, according to Lynn. A letter did go out to hotels and resorts asking them to consider removing such features. "We have millions of square feet of conference space alone," Lynn said. "This becomes a logistical question of how much you can regulate." The Cosmopolitan said it planned to remove all the artificial foliage outside and replace it with live foliage. As of December 4, the hotel had removed about half of the artificial trees, according to the Associated Press. The rest were to be removed early this year.

Plastic palm trees were blamed for fueling a fast-moving fire on the pool deck of The Cosmopolitan hotel in Las Vegas last year. Photograph: AP/Wide World
Plastics are compared to gasoline because they burn much faster than materials such as wood and cotton. The flame spreads more rapidly; greater amounts of smoke are produced; and toxic or combustible gases are released more quickly. Polystyrene plastics tend to melt or drip and further contribute to the spread of a fire.

Even so, Hirschler points out that plastic, in and of itself, isn't necessarily the problem. No material is inherently bad in all situations if it is properly regulated, and no material should be banned outright, he said. “I'm concerned about the amount of decorative materials, not because they're plastic but because they are not regulated,” he said. “If an item passes a fire test, I don't give a hoot what it's made of.”

For internal decorative features, NFPA 101 requires different tests depending on the nature, geometry, and use of the material. NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, and NFPA 289, Standard Method of Fire Test for Individual Fuel Packages, are among the tests required for interior furnishings and contents. The NFPA 701 test is smaller in scale, what's known as a Bunsen burner test, Hirschler said, while NFPA 289 is a full-scale test that more closely simulates real-life conditions. According to Evans, Bunsen burner tests were meant for much smaller decorative items than those found in many Las Vegas casinos. “It refers to things like small plants and mannequins. What happens when that mannequin becomes a 40-foot-tall statue? How big is an umbrella before it becomes a ceiling?” he said. Lynn said Clark County conducts the full-scale test for foam plastics.

Tracy Vecchiarelli, a senior fire protection engineer at NFPA, sees the issue a bit differently. “I agree that we definitely have a gap in the codes where we have very precise regulation of these decorative features when used inside a building, yet we are silent when similar materials are used in the public, occupied areas on the outside,” she said. She points out that NFPA 1, Fire Code, and NFPA 101 include mandates for testing of contents that utilize foam plastics when used as other than interior finish; NFPA codes, for example, would not consider the NFPA 701 test to be suitable for a foam plastic decorative item. The NFPA 289 test and its companion, UL 1975, Fire Tests for Foamed Plastics Used for Decorative Purposes, offer the testing protocol for such items. Vecchiarelli disagrees that these features are only regulated when they qualify as interior finishes. “The NFPA codes are quite clear as to what test protocol applies to what material under what conditions,” she said.

Varied track record

The Cosmopolitan was not the only fire made worse by the presence of combustible plastics or decorative features, either outside or inside buildings. In 2008, the Monte Carlo Resort & Casino in Las Vegas caught fire when a welder ignited a decorative band on the building’s exterior that was made of foam plastic. In a follow-up investigation, according to Las Vegas Business Press, it was determined that the hard polyethylene material encapsulating the polyurethane foam plastic was not to code. Parts of the Monte Carlo’s roof, façade, and upper stories were engulfed in flames, and 13 people were injured. Other hotels, most prominently the Excalibur Hotel and Casino, also use the same exterior foam plastic material, according to Las Vegas Business Press.

Other fires involving decorative features have been deadly. On October 30, 2015, during a concert at the Colectiv nightclub in Bucharest, Romania, the pyrotechnics show on stage ignited a polystyrene acoustic foam pillar. The fire spread rapidly, killing 64 people and injuring 147. After the fire, some 20,000 Romanians took to the streets to protest what they called corruption,
including the use of fireworks in a basement, government incompetence, and the fact that the building was apparently not properly licensed or inspected. Under public pressure, the country’s Prime Minister resigned.

The deadliest nightclub fire in U.S. history is also related to combustible decorative features, although an exact cause of ignition is unknown. On November 28, 1942, fire destroyed the Cocoanut Grove club in Boston, killing 492 people. Witnesses said the fire started in an artificial palm tree, while others said it began in a cloth covering the ceiling. The smoke was toxic, and most of the deaths were caused by asphyxiation rather than burns.

While there were no deaths in the Cosmopolitan or Monte Carlo fires, Evans said safety officials shouldn’t wait for people to die before making important code changes. “Clark County has determined these incidents are rare enough that, at this time, they are not revising their regulations,” he said “But why does it take somebody to die? Why don’t we do something before this becomes a problem?”

Hirschler said the artificial trees at The Cosmopolitan should have been regulated before the fire, and they should be regulated now. If so, they would have been made of a material other than foam plastic, or they would have been protected with some sort of fire-retardant coating or treatment. “The trees at The Cosmopolitan are outdoors but they’re pretty close to the building,” he said. “Do I think [external] decorative features should be covered in the code? Maybe not, if they’re 20 feet from the building. But if they’re two feet away, I would say they should. We just need to use common sense.”

Vecchiarelli agrees that regulation of decorative material outside of the building is an area worth pursuing, especially in an assembly use area like a pool deck. “It is also important for the regulators, designers, and building owners to specify materials that have been subject to the proper test,” she said. “We have different tests for different needs, and those tests are not interchangeable.”

ASHLEY SMITH is staff writer for NFPA Journal. Top Illustration: Sarah Jones
J. Fire-Resistant Plants to Favor and Restricted Plant List/Plants to Avoid\textsuperscript{1,2,3,4}

“These California natives are good options for a fire-safe landscape. Drought-tolerant non-native species can also be good choices if they don’t self-sow or naturalize; but consult the “Plants to Avoid” list on the next page before selecting any non-natives. A good rule of thumb is to use plants with high fire resistance closer to your house and those with lower resistance farther away.

“Restricted plants, mostly non-native, are highly flammable and should not be planted near your house. If they are already growing on your property, you might want to consider phasing them out and replacing them with more fire-resistant species.”\textsuperscript{5}

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|l|l|l|l|}
\hline
\textbf{Scientific Name} & \textbf{Common Name} & \textbf{Fire Resistance} & \textbf{Height} & \textbf{Spread} & \textbf{Exposure} & \textbf{Flower Color} \\
\hline
\textbf{Succulents:} & & & & & & \\
Agave species & Agave & High & 1–6’ & 1–10’ & sun & yellow-green \\
Dudleya species & Bluff lettuce, Live Forever & High & <1.5’ & varies & sun/part shade & yellow-red \\
Sedum species & Stonecrop & High & <1’ & varies & sun/part shade & many \\
\hline
\textbf{Low-Growing Ground-Cover Plants:} & & & & & & \\
Arctostaphylos ‘Carmel Sur’ & Carmel Sur & Low & 1’ & 6’ & sun/part shade & white-pink \\
Baccharis pilularis & ‘Twin Peaks’ dwarf coyote brush & Medium & 1–2’ & 6’ & sun/part shade & white \\
Ceanothus ‘Centennial’ & ‘Centennial’ & Medium & 8–12” & 4–6’ & sun/part shade & blue \\
Ceanothus griseus var. horizontalis & Carmel creeper & Medium & 3–5’ & 5–15’ & sun/part shade & blue \\
Heuchera maxima & Island alum root & Medium & 1–2’ & 1–2’ & shade & white-pink \\
Mahonia repens & Creeping barberry & Medium & 1–3’ & 3’ & sun/part shade & yellow \\
\hline
\textbf{Shrubs and Trees:} & & & & & & \\
Calliandra eriophylla & Fairy duster & Low & 1–3’ & 3–4’ & sun & pink, white \\
\hline
\end{tabular}
\caption{Fire-Resistant Plants}
\end{table}

\begin{itemize}
\item \textsuperscript{1} Santa Monica Mountains Fire Safe Alliance (2010), \textit{A Road Map to Safety: How to Create Defensible Space in the Santa Monica Mountains}, pp. 29–30. \texttt{www.fire.lacounty.gov/Forestry/MaptoFireSafety.pdf}.
\item \textsuperscript{2} C. Bornstein, D. Fross, and B. O’Brien (2005), \textit{California Native Plants for the Garden} (Los Olivos, CA: CaChuma Press).
\item \textsuperscript{3} Recommended List of Native Plants for Landscaping in the Santa Monica Mountains. Revised August 2007. Los Angeles/Santa Monica Mountains Chapter, California Native Plant Society.
\item \textsuperscript{4} Betsey Landis of the California Native Plant Society contributed to this list.
\item \textsuperscript{5} Santa Monica Mountains Fire Safe Alliance (2010), \textit{A Road Map to Safety: How to Create Defensible Space in the Santa Monica Mountains}.
\end{itemize}
<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>FIRE RESISTANCE</th>
<th>HEIGHT</th>
<th>SPREAD</th>
<th>EXPOSURE</th>
<th>FLOWER COLOR</th>
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<tbody>
<tr>
<td>Cercis occidentalis</td>
<td>Western redbud</td>
<td>Low</td>
<td>10–20'</td>
<td>8–10'</td>
<td>sun/part shade</td>
<td>magenta</td>
</tr>
<tr>
<td>Heteromeles arbutifolia</td>
<td>Toyon</td>
<td>High</td>
<td>12–30'</td>
<td>12–30'</td>
<td>sun/part shade</td>
<td>white</td>
</tr>
<tr>
<td>Mimulus aurantiacus</td>
<td>Sticky monkey-flower</td>
<td>Low</td>
<td>3'</td>
<td>3'</td>
<td>sun</td>
<td>orange</td>
</tr>
<tr>
<td>Platanus racemosa</td>
<td>California sycamore</td>
<td>Medium</td>
<td>40–80'</td>
<td>40–50'</td>
<td>sun</td>
<td>—</td>
</tr>
<tr>
<td>Quercus agrifolia, Q. lobata, Q. wislizenii</td>
<td>Coast live oak, Valley</td>
<td>High</td>
<td>to 100'</td>
<td>to 100'</td>
<td>sun</td>
<td>—</td>
</tr>
<tr>
<td>Quercus berberidifolia</td>
<td>Scrub oak</td>
<td>Low</td>
<td>to 15'</td>
<td>to 15'</td>
<td>sun</td>
<td>—</td>
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<tr>
<td>Rhamnus californica</td>
<td>Coffeeberry</td>
<td>Low</td>
<td>3–15'</td>
<td>3–10'</td>
<td>sun/part shade</td>
<td>yellow-green</td>
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<tr>
<td>Rhus integrifolia (coastal)</td>
<td>Lemonadeberry</td>
<td>Low</td>
<td>4–5'</td>
<td>15'</td>
<td>sun/part shade</td>
<td>pink</td>
</tr>
<tr>
<td>Rhus ovata (inland)</td>
<td>Sugar bush</td>
<td>High</td>
<td>10–20'</td>
<td>15'</td>
<td>sun/part shade</td>
<td>white-pink</td>
</tr>
<tr>
<td>Romneya coulteri</td>
<td>Matilija poppy</td>
<td>High</td>
<td>6–10'</td>
<td>6–8'</td>
<td>part shade/shade</td>
<td>white and yellow</td>
</tr>
</tbody>
</table>

**Perennials and annuals:**

<p>| Achillea species                          | Yarrow                 | Medium         | 6”–3’   | may spread | sun/part shade | white, yellow, pink |
|Clarkia amoena, C. bottae, C. unguiculata  | Farewell-to-spring     | Low            | 4–5”    | &lt;1’       | sun/part shade | pink, lavender |
|Epilobium californica (syn. Zauschneria)   | California fuchsia     | Low            | 1–3’    | 1–3’      | sun            | red           |
|Eriophyllum confertiflorum                | Golden yarrow         | Low            | 1–2’    | 1–2’      | sun            | yellow       |
|Eschscholzia californica                  | California poppy       | Low            | 8–24”   | to 1’     | sun            | orange       |
|Iris douglasiana                          | Douglas iris          | Medium         | 1–2’    | clumping  | sun/part shade | varies       |
|Isomeris arborea                          | Bladder-pod            | High           | 2–6’    | 3–6’      | sun/part shade | yellow       |
|Layia platyglossa                         | Tidytips               | Low            | 5–16”   | to 1’     | sun            | yellow       |
|Lupinus species                           | Lupines (Annuals to   | Low to Medium  | 8–30’   | to 2’     | sun            | blue, yellow, violet |
|                                           | perennials)            |                |         |           |                |              |
|Nemophila menziesii                       | Baby blue eyes         | Low            | 4–6”    | to 1’     | sun/part shade | blue         |
|Penstemon species                         | Penstemons             | Low            | 1–3’    | 1–3’      | sun/part shade | purple, red |
|Salvia spathacea                          | Hummingbird sage       | Low            | 1–3’    | 1–3’      | sun/part shade | red          |
|Sisyrinchium bellum                       | Blue-eyed grass (iris) | Low            | 8–10”   | clumping  | sun            | blue-purple  |
|Sisyrinchium californicum                 | Yellow-eyed grass (iris)| Low      | 1’      | clumping  | sun/part shade | yellow       |</p>
<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
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<td>Acacia species</td>
<td>Acacia (trees and shrubs)</td>
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<td>Adenostema fasciculatum</td>
<td>Chamise, greasewood</td>
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<td>Ageratina adenophora</td>
<td>Eupatory</td>
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<tr>
<td>Ailanthus altissima</td>
<td>Tree of heaven</td>
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<tr>
<td>Artemisia californica</td>
<td>California sagebrush</td>
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<tr>
<td>Bougainvillea</td>
<td>Bougainvillea</td>
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<tr>
<td>Cedrus species</td>
<td>Cedar</td>
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<td>Cortaderia selloana, Cortaderia jubata</td>
<td>Pampas grass</td>
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<td>Cupressus species</td>
<td>Cypress</td>
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<td>Delairea odorata</td>
<td>Cape ivy, German ivy</td>
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<td>African daisy</td>
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<td>Buckwheat</td>
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<td>Fraxinus uhdei</td>
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<td>Gelsemium sempervirens</td>
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<td>Pennisetum species</td>
<td>Fountain grass</td>
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<td>Phoenix canariensis</td>
<td>Canary Island date palm</td>
</tr>
<tr>
<td>Picea species</td>
<td>Spruce</td>
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<tr>
<td>Pinus species</td>
<td>Pine</td>
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<tr>
<td>Ricinus communis</td>
<td>Castor bean</td>
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<tr>
<td>Schinus molle</td>
<td>Peruvian pepper tree (AKA “California” pepper tree)</td>
</tr>
<tr>
<td>Schinus terebinthifolius</td>
<td>Brazilian pepper tree</td>
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<tr>
<td>Spartium junceum</td>
<td>Spanish broom</td>
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<tr>
<td>Taxus species</td>
<td>Yew</td>
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<tr>
<td>Thuja species</td>
<td>Arborvitae</td>
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<tr>
<td>Tropaeolum majus</td>
<td>Nasturtium</td>
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<tr>
<td>Vinca major, Vinca minor</td>
<td>Periwinkle</td>
</tr>
<tr>
<td>Washingtonia species</td>
<td>California and Mexican</td>
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Dear ZORACES members Peak and Wagner,

Here are a few considerations regarding the proposed Fire Resistant Landscape Ordinance.

**PALM TREES** – The all-night, on-the-street TV coverage of the Saddleridge Fire was a dramatic, painful reminder of how palm trees are really the worst offender – veritable fountains spraying millions of embers per minute. While there may be difference between different species, their height is not a relevant criteria for deciding which ones are worse than others – even short palms can be torches of embers that will carry for a mile or more.

After further research on whether there are any benign species, I might go so far as to require *removal* of existing palms, with some possibility of exemption based on site-specific circumstances (e.g., certain locations on the beach might not be too bad, especially since Santa Ana’s tend to blow offshore).

Maybe their sale can be banned in Malibu too, to inhibit planting by existing homeowners who aren’t constrained to permitted landscape plan.

**EUCALYPTUS** – Requires a more nuanced analysis. I’m no expert, but living with an Australian botanist, I have half a clue. There are over 700 species of eucalypts (although far fewer in the U.S.), and they have widely varying characteristics with respect to fire. Misinformation and prejudice abound, even paranoia.

Most eucalypts are fire resistant. With proper management, they pose little risk. (The small grove of euc. globulus on my property have gone unscathed through three brushfires in the past ~70 years, and probably more before that). Yes, their crowns will burn, but often don’t because they’re far enough off the ground that they’re not exposed to direct flame; and their leaf structure (flat and droopy) will shed any flying embers before they have a chance to alight. Grass fires will typically bypass eucalyptus.

When eucalypts burn it’s because they haven’t been maintained. Many species generate bark litter that becomes kindling when it accumulates; those bits can become firebrands. But they’re easy to rake up.

Some species have stringy bark, which should be kept "clean" within a few meters of the ground, so as not catch flying embers. But that’s an even less onerous chore than keeping other tree species "lollipopped."
If other plants (such as Laurel Sumac) are allowed to grow large around the base of a eucalypt, that creates a fire ladder which can set the euc's crown on fire. But here, the rule is the same as with other tree species: keep groundcover beneath the tree to less than 1/3 height of the bottom of the crown above.

Some the knock on eucalypts appears to come from further North (e.g., re the Oakland Hills Fire), where eucs tend to grow in more dense clusters, due to higher rainfall totals.

Meanwhile, Eucalyptus provide significant benefits in our coastal scrub and canyon biomes. They help slow windstreams, knocking down flying embers. (They were first planted in Calif as windbreaks, in rows between fields, before someone realized they could be used for lumber, as was happening in Australia.)

In addition to being good habitat for butterflies, they provide excellent forage for honeybees.

Because they're grow in hillier, more exposed spots than will coast live oaks (which prefer canyons), they provide shade where other don't, which lowers ambient temperature – just enough to make a difference in flammability during heat wave events. They also collect condensation, facilitating transfer of atmospheric moisture to the soil below.

So, for eucalypts, any regulation should be about maintenance practices, not an outright ban.

Here are a few links re eucs that you might like to skim:

https://milliontrees.me/2010/06/14/more-fire-factors-fire-ladders-and-embers/
https://sutroforest.com/eucalyptus-myths/
https://baynature.org/article/burning-question-east-bay-hills-eucalyptus-flammable-compared/

**FOUNTAIN GRASS** – This invasive species is rapidly taking over Malibu, roughly from East to West. In a few years, it will become our greatest fire concern, as it propagates fire across the landscape faster than any native plants do. It creates its own monoculture, as it releases chemicals that inhibit other, native plants (I forget which chemicals offhand; I have it in my writings somewhere, but I'm trying to keep this simple!). And it creates a "fire-ready" landscape in just a few years, as compared to the 10-15 years that our native scrub takes to mature.

I don't know how we'd regulate it further; it's already a no-no as a non-native. But if the ordinance could specify some proactive approach that all residents were required to take, we might slow down its spread. In my experience, the only way to control it is to dig it out by the roots, with a shovel. When weed-whacked, it just grows back stronger within a few months. Ideally, we'd have the state providing CCC inmate crews to scour the hills, digging it out in the name of fire prevention.
FLAMMABLE MULCH – This stuff (bark or straw) takes a close second place in the nasty sweepstakes, behind only Palm Trees. Note a discontinuity in the proposed regulation. The staff report states,

"The Ventura County standard prohibits flammable mulch materials within five feet of a structure and limits the use of organic (compostable) mulch within five feet to 30 feet of a structure to areas no greater than 400 square feet with a minimum five-foot separation between mulched areas."

But that's the same area, closer to the house, where non-native ornamentals are allowed – the only plants that require mulch! Out beyond that distance, where only native plants are allowed – no native plants require mulch.

Because bark mulch can blow around, you might want more than 5-foot separation between mulched areas (in the ornamental zone). If it were increased to 10 or 15 feet, not only would it reduce the total amount of mulch used, it might also encourage landscape plans that don't depend on mulch at all.

If it's going to be allowed in limited circumstances near houses, we might also want to expressly prohibit it *beyond* 100 feet from houses, where there should be only native plants that don't require mulch. By limiting that radius, we would further reduce the total amount of mulch used.

RAILROAD TIES – These are fundamentally different. They don't shed embers nearly so much as palm trees or mulch; instead, their hazard is that they can smolder for hours or even a day or two. (In the '93 fire, we had railroad ties 5 feet from our house that smoldered away to nothingness, never shedding any material to endanger the house.)

These want a nuanced approach. We want to discourage or disallow them in uses that could be best achieved by other means; e.g., retaining walls should be concrete, stone, etc. But there are some uses that railroad ties best fulfill, particularly as steps to access brush on steep slopes. Pinned in place with rebar, they provide access like nothing else, in situations where concrete steps would be prohibitive in terms of engineering and/or permanent environmental impact.

So railroad ties should be regulated but not entirely prohibited. Ordinance language could dictate, for example, that they:
• be used only as steps on steep slopes for brush maintenance access;
• not be used for purely ornamental purposes;
• not be arrayed in stacks (such as in walls), but only as single-height steps;
• must be at least 50 feet away from any structure;
• must be at least 10 feet away from vegetation taller than 6" (other than discrete lollipopped trees).
There should probably be language providing staff discretion to assess whether their benefit outweighs their potential hazard in a given context, though I'm not quite sure how you'd frame that.

Thanks for considering these ideas.

Best,

Kraig
Mayor Karen Farrer. City Council Members. Susan Duenas. Jerry

During the last few weeks I have attended some presentations at City Hall, and read a number of articles in the weekly Malibu newspapers regarding fire.

In speaking with residents of Malibu regarding what they have read in the papers, or attending meetings, I have been concerned to hear that one speaker commented that he was aware that Eucalyptus survived a fire (because it was trimmed to be without leaves) One person commented that trees are okay. Why? Because they can catch embers! One other speaker commented that it was, in essence, acceptable to have mulch right next to a home. (think embers) Another person had observed that the City itself had had mulch around some of its landscaping.

A tremendous amount of money is being thrown at the "fire situation". I am observing this is being demanded by the residents of Malibu so they "feel" something is being done. I am also observing that many residents are not prepared to change their own lifestyle. Please consider. There have been some 20 fires or so in Malibu in the last 100 years. In the East Bay Hills Area of Northern California there have been 15 major fires between 1923 and 1992. After the 1993 fires in Malibu, for the first couple of years afterwards there were going to be so many changes including upgrading the water system? What happened??

What are the objectives of the City of Malibu? There will always be fires. That is a given due to the topography, Santa Ana Winds etc.

- Is the objective to reduce the fuel of the vegetation/Chaparral/brush/grass/trees? Fires jump highways. Fires jump Firebreaks.
- Is the objective to have extremely strict laws regarding eliminating "wood Piles" Unless stored in a fireproof container.
- Is the objective to have strict laws regarding building materials for new/remodeled homes.
- Is the objective to have strict laws regarding the Architectural design/layout/taking into account the way Santa Ana Winds blow.
- Is the objective to have strict laws regarding landscaping with specifications as to which trees/shrubs/plants are banned.
TO: Malibu Planning Commission.

ITEM: November 18 2019 Planning Commission Meeting. No 4 on The Agenda. Item 5b Code amendments to "Foster" Fire resistant Landscape City Wide.

ESTEEMED PLANNING COMMISSION MEMBERS.

Over the last 100 years there have been 20 plus fires in Malibu. Due to its topography, climate, various natural varieties of hillside chaparral and grasses, weather conditions (particularly due to Santa Ana winds,) together with effects of drought, high winds, high temperatures and very low humidity, all combine to create conditions for devastating fires. Climate change is likely to increase the possibility of wild fires which will get more extreme with more brush fires creating their own storm. An even bigger recipe for disaster. Malibu must wake up and be prepared.

In the 1970s Malibu homeowners were encouraged to plant pine tree saplings as they had deep roots. They were given out by the Fire department. Homeowners were encouraged to plant ice plant as a fire retardant plant. At that time there was very little knowledge as to the effects of either. Pine Trees are disaster for fire. Ice plant for invasive growth.

Today, many suggest that hillsides/gardens should be planted with California natives. What is a California Native?. Any plant that predates the European Settlers to North America. It is completely incorrect to think all California Natives are fire resistant. There are at least 7 California natives including Coyote brush and Coastal Sagebrush that should be avoided /or taken out.

In 2014 Malibu City conducted research as to the number of Eucalyptus Trees are on City property alone. Of the 876 identified, there were 350 Gum Trees - Most Eucalyptus Trees can grow to well over 200 feet, have an enormous girth and some have exploded during fires. There are thousands of Eucalyptus trees on private property. It is doubtful that all Eucalyptus could be eliminated even in decades. So the Monarch butterfly will still be able to pass through. The Eucalyptus has a tremendous leaf drop, just naturally. With some wind the leaves and branches fly through the air. (I know I do not have any Eucalyptus but have the pleasure of collecting the leave and branch drop up to 4 33 gallon trash bags at times) To think that ALL homeowners, or their help, are cleaning up leaves weekly, is a pipe dream.

A wonderful source of information is: www.firesafemarin.org who is obviously extremely focused, and adapts to change, offers comprehensive information and is a tremendous resource of information with Marin County have become extremely focused to ensure that there is a real, and targeted and aggressive business plan whereby residents are required.
to be as fire safe as possible. There is a list of 35 trees and shrubs that must be avoided or taken out. Most of their information requires the FIRST 30 FEET or 100 FROM a structure with regard to landscaping. Not 5 feet. There is also emphasis on the type of trees and distance between one tree and the next. Keep in mind some of the large Pine and Eucalyptus branch span can be at least 30 feet. One of the problems in my area is the number of trees and closeness to each other, creating a forest, ready to explode and create its own firestorm.

What has Malibu done in creating a comprehensive fire/landscaping plan since it became a City in 1991??????

When were laws passed regarding regarding Brush Clearance. And what is the definition brush clearance.? Is it clearance of grasses/ is it clearance of buckwheat, chaparral, or the trimming/pruning of certain trees?. A hundred foot Eucalyptus with its leaf drop, and a branch cut 5 or 10 feet at the trunk, but the branch above almost touches the ground???? What use is that? Look at the grasses that have been introduced to Malibu in the last twenty years or so by either birds/goats/homeowners? How does the fire department look at fuel reduction.? So often I hear that the fire departments hands are tied because of fire laws and fire codes. Perhaps when the laws were passed there were far fewer homes with more natural space between them? Perhaps time for some new tough laws.?

Everywhere there are Palm Trees with at least 6 of the species being the absolute worst for fire. Many areas of California require that they be planted at least 30 feet from a structure.

Just what has the City of Malibu done with regard to an aggressive comprehensive plan regarding landscaping of homes and commercial buildings. As recently as a couple of years ago a re modelled hotel in Malibu was allowed to plant the worst type of palm tree within a few feet of its property.

And now there is an item on the agenda of the 18th November Planing Commission to "Foster " a fire resistant landscape. The definition in Websters dictionary for "foster" means "TO HELP TO DEVELOP - PROMOTE" . Is this the best you can do? To suggest and promote that homeowners/business have a fire resistant landscape.

The City of Malibu seems to be hiring all sorts of "experts" to do what, I don't know. To have someone drive around Big Rock with an airhorn as a way to alert for fire, was extremely sad. One of the new ideas!!!!. Perhaps look into a Tornado warning type siren. There is so, so much information and reports on line regarding fire. It is very unfortunate, there seems to be no will to get anything comprehensive done except to do a little patch here and there.

Planning Commission. There is no way to prevent fires completely. Homeowners have a responsibility. However, a really aggressive and comprehensive approach to what is recommended and a plan for reduction of the fuel load may help mitigate the disaster that
could occur when the next fire comes through Malibu. But does Malibu have The Will?

Judie Graham-Bell.
November 14 2019
Relying on technology, with systems that can be over loaded or mobile phones that don't work on PCH or in Canyons I just don't understand. How are notifications done in Hurricane areas - a siren is used. In war prone areas a siren is used. The decibels of fire engines are loud. The trial of using little airhorns and trying to drive around Big Rock did not seem to work. And how would that be achieved by City personnel who may live elsewhere and fires may be raging all around, roads closed etc. It did not seem to make one ounce of sense considering logistics. The decibels of the leaf blowers were far higher than the airhorn.

A seminar was given in which the main speaker was from Australia. It was very unfortunate that the entire evening was not devoted to what Australia decided to do after some of their awful fires around 2009. They made a decision to make changes on a State and local basis. They are committed and dedicated to change as well as monitoring and making changes as necessary.

As a very concerned Malibu Citizen of many decades, I find it deeply concerning that there is such an emphasis to spend money without focus, and without any sense of mature direction. It does not take too long to take a look at the blue prints of what other cities and counties in the State have done after disastrous fires. Likewise in Europe and Australia. I have attached a document from Firesafe Marin, which commences with information on the trees and shrubs and ones that are verboten.

In looking at "safe" areas for evacuation, I recall a suggestion for Eastern Malibu was Dukes Restaurant which has approximately 120 parking spaces. And what size are the parking spaces?. Image, with two sets of non working traffic lights in the area, people in a panic texting and not paying attention to driving, the congestion in that area. In the last two major fires in Malibu one could only travel in one direction. The other two lanes were reserved for fire equipment.

I hope the City will have a number of plans for evacuation. As was shown in the last fire, the long time planned orderly evacuation for Topanga residents went out the window with the fire chief asking everyone to leave at the same time. In the last Fire where the announcement of a fire in Malibu was announced on KFI at approximately 0650, why Pepperdine Management did not issue a text to all students cancelling classes for the day, so students who lived off campus is beyond me.

I hope too, you will take a very serious look at the success or failure of how other Cities have coped in Fires, and take the best ideas that could be incorporated into this unique area, where both the City and the residents work together. And where, in particular, the residents REALLY take responsibility and do THEIR part.

Thank you for your attention.

Judie Graham-Bell.
From: Klaus Radtke  
Sent: Sunday, November 17, 2019 5:49 AM  
To: Kathleen Stecko  
Cc: John Ainsworth, California Coastal Commission  
Subject: City of Malibu - Local Coastal Program Amendment No. 19-002

Kathleen Stecko, Recording Secretary  
City of Malibu.

Aloha Kathleen:

Attached is my letter with supporting documents pertaining to the 11-18-2019 Planning Commission review of Local Coastal Program Amendment No. 19-002 and Zoning Text Amendment No. 19-004—Amendments to the Local Coastal Program and Malibu.

Please forward the documents to the Planning Commission for timely review.

Thank you,

Klaus Radtke
Fire History of the Santa Monica Mountains

Klaus W-H Radtke, Arthur M. Arndt, and Ronald H. Wakimoto

DESCRIPTION OF THE AREA

The Santa Monica Mountain range parallels the Pacific Coast of southern California in Ventura and Los Angeles Counties at 34°05’N latitude. It stretches for a distance of about 70 km from Ventura County into the heart of the City of Los Angeles to the east (Figure 1) and thus provides an ideal recreational setting for over 10 million people in this region. At its western extent it measures 15 km in width, narrowing to about 4 km at its eastern boundary. The southern boundary is the Pacific Ocean; the eastern boundary consists of the cities of Santa Monica and Beverly Hills and the West Hollywood section of the City of Los Angeles. The northern boundary is the Ventura Freeway (Highway 101). The mountains encompass approximately 97,000 ha or 240,000 acres (USDl, 1980).

The topography of the mountains is characterized by rugged terrain in its western and central sections. In the west, Sherwood Peak rises to 1175 m within 10 km of the coast and in its central section, Saddle Peak rises to 885 m within 4 km of the coast. Almost half the mountain range has slopes exceeding 35 percent. The coastal slopes are characterized by steep hillsides that descend suddenly into many narrow north-south running canyons.

The area has a Mediterranean climate characterized by warm, dry summers and cool winters with approximately 80 percent of the precipitation falling from October through March. The 90-year mean annual precipitation ranges from 380 mm to 400 mm at the coastline to approximately 625 mm at the crest, and back down to 400 mm at the inland boundary along the Ventura Freeway (Los Angeles County Flood Control, 1976). Climatic averages are of limited value as the rainfall is often concentrated into a few heavy winter storms with intervening periods of high temperatures. Thus the fire season may extend into January during drought years.

1Presented at the Symposium on Dynamics and Management of Mediterranean-type Ecosystems, June 22–26, 1981, San Diego, California.

2Wildland Resource Scientist, Head Deputy Forest, Los Angeles County Fire Department, Los Angeles, California; Assistant Professor of Wildland Fire Management, University of California, Berkeley.

The natural airflow for most of the year creates night and morning downward flows of air from the seaward side of the mountains over the Santa Monica Bay. In the afternoon this flow is carried inland by the seabreeze (USEPA, 1977). During the summer the Catalina eddy penetrates the mountain canyons to a considerable distance with cool, moist marine air. The summer fog line extends up to the coastal ridges and to a considerable distance into the canyons. Fluim1 late September through December and occasionally even into January and February the area is characterized by strong (north to northeasterly) foehn winds, locally known as Santa Ana winds. These winds are born as high pressure areas in high desert, great basins of Utah and surrounding areas. As they descend to lower elevations they become hot, dry (and gusty) and may create erratic wind patterns when meeting the local mountain winds.

Major vegetation types found in the Santa Monica Mountains include a) coastal sage scrub (which is found below 300 m along the drier coastal slopes and as a band surrounding the higher mountains; b) oak woodland on some northern slopes with deep soils and areas relatively protected from fire; c) riparian woodland along stream channels in areas where moisture is found at or near the surface throughout the year; d) grasslands of primarily introduced grasses on finer textured clay soils that may be saturated during the rainy season; and e) the woody, evergreen chaparral which is the most common vegetation type.

The early fire history of California as well as the Santa Monica Mountains is obscure. Sampson (1944), after surveying historic documents dating back to the 15th Century, concluded that in areas away from the coast, burning by Indians had little influence on chaparral distribution. Drucker (1937) stated that when the Spaniards arrived, they found a hunting and gathering society of Indians who probably used fire only sparingly to increase hunting success. Once a fire started it was not controlled but was allowed to run its course. Other authors maintain that Indians practiced primarily spring burning to maintain grasslands (Lewis, 1973). Such fires would be of limited extent. Brown (1978) cited Dana as reporting extensive fires in the coastal ranges of southern California in the 1830’s.

Burning by Indians and settlers often endangered settlements as well as livestock ranges. In 1793 Governor Jose de Arilleja issued California's...
first fire control law prohibiting any kind of burning that may be detrimental to someone else (Lee and Bonnicksen, 1978). With California statehood in 1850, fire control became the responsibility of the individual landowners. Deliberately set fires increased as they served as a cost-effective way of opening up chaparral for access, development, grazing, ranching and mining. However, it is unlikely that this period greatly affected the fire history of the Santa Monica Mountains until 1900.

The period 1900 to 1918 was characterized by many large fires that burned the area on an average of at least two times (Santa Monica Evening Outlook 1900-1918). In 1919, the Forestry Department was established as fire suppression agency for the unincorporated areas of Los Angeles County and began maintaining records of all fires. Figure 1 illustrates these records as frequency of fires over 40.5 ha (100 acres) for the fire exclusion period 1919-1980 and shows that the highest fire frequency was historically located in the coastal zone. The coastal zone from about Las Flores Canyon to beyond the Ventura County line was burned 3-5 times giving an average burn frequency of from 12.4 to 20.7 years. Smaller areas not identified on the map burned up to 7 times. Mountainous areas inland of the ridge line, for the most part, burned only once. The 3-fire frequency corridor shown in the Las Virgenes-Mulholland block was created by fires that got an upslope running start along the Ventura Freeway on north slope range land consisting of flash fuel annual grasses and coastal sage. These fires occurred during strong Santa Ana wind conditions in 1958, 1970 and 1980.

FIRE FACTORS

An evaluation of the factors that determine fire patterns in the Santa Monica Mountains is necessary to understand the recorded fire history, speculate back from it to natural fire history and predict future fire patterns. The four most important factors that influenced the fire history in the Santa Monica Mountains are land use, vegetation, fire topography and climate (fire winds). They will be reviewed in this order.

Land Use

Almost every fire in recorded history was accidentally or deliberately set by man. In the Santa Monica Mountains, lightning fires are an almost unknown ignition source since they start primarily in the wet season and are out of phase with the foehn winds. Before 1900 most fires were started by local ranchers and homesteaders during weather conditions that prevented the development of large-scale fires. However, after 1900 the increasing population base at the southeastern end of the mountain range and the hunting season, which coincided with the fire season, served as ignition sources of carelessly set fires. Some of these fires burned uncontrolled for several weeks and caused extensive damage to ranchers while creating a better hunting season through brush regrowth. The establishment of an organized fire fighting force in 1919 put an end to such fires. Since then most fire starts have occurred along access routes leading into or through the mountains.

Vegetation

Many of the coastal slopes are covered by coastal sage. This plant community is characterized by
drought deciduous, short-lived shrubs that readily carry a fire within 7-10 years after a previous burn. Chaparral is found in a belt above the coastal sage slopes and becomes highly flammable on south slopes within 15-20 years. This is due to the preconditioning of highly flammable chamise (*Adenostoma fasciculatum*), floristic components of coastal sage, and the low fuel moisture of these plants. The flammability of chaparral is high until the third to fifth season after a fire because the short-lived herbaceous postfire flora carries the fire (Rothermel and Philpot, 1973). Chaparral is quite fire-resistant from 5-15 or 20 years or until the dead to live fuel ratio increases such that hot fires can again be supported. North slope chaparral consists of a mixture of more mesic species. Except in periods of extreme drought or dry foehn winds, this community does not become highly flammable unless the shorter-lived perennial species, such as *Ceanothus*, die, increasing the proportion of dead fuel. This generally does not occur for at least 20-25 years. Thus coastal chaparral can be considered relatively fire-resistant for the first 5-15 years or more whereas coastal sage may be highly flammable after 7-10 years.

The flammability of individual sites depends on a variety of site specific factors. However, during intense fire conditions fuel moisture is lowered because of low relative humidity, drying of fuels by the wind and, once a fire has started, the preheating of vegetation ahead of the fire. Thus the more flammable coastal sage can reduce the greater fire resistance of south slope chamise chaparral by carrying flames upslope into the chaparral. Similarly south slope chaparral can reduce the fire resistance of north slope communities.

**Fire Topography**

The coastal mountains extend east to west with all major canyons running north and south. Weide (1968) stated that in the eastern part of the Santa Monica Mountains, the canyons run south to southwesterly or parallel with the fire winds so that fires will be channeled up the canyon, spread out as they meet the ridges, contract again as they are funneled downhill through the canyons and may fan out in either direction as they reach the beaches. Weide also stated that this close linearity of fire winds and canyons is not present in the western section. Here the fires are more controlled by the direction of the wind and are thus more irregular in shape. However, a closer analysis shows that these generalities need to be further refined. First, the central and western portions of the range have much steeper canyons than the eastern portion so that fires are difficult to control. Canyons all reach from the ocean inland whereas in the eastern portion, from Pacific Palisades and beyond, fire spread is blocked by the city. Furthermore, major canyons in the western section run primarily northeast to southwest and in the central section north to south. These directions parallel the fire winds.

**Wind Patterns (Climate)**

Wind and fuel moisture are the two most important elements affecting fire behavior. Wind primarily controls the direction and spread of fire. It also affects fire behavior by reducing fuel moisture, increasing the oxygen supply needs for combustion, preheating the fuels, and bending the flames closer to the unburned fuels ahead of the fire. In intense wildland fires, the upper airflow may have a different direction from the surface winds and may influence fire behavior by not only carrying fire brands ahead of the fire but also into new directions (Greenwood, 1962).

In the Santa Monica Mountains large-scale fire patterns may seem erratic but they are predictable. Airflow is guided by topography into the north-south facing canyons so that onshore winds are channeled up canyon as well as upslope and the foehn or Santa Ana winds down canyon. This is especially noticeable during strong northerly Santa Ana winds. The sharp ridge lines produce significant turbulence and wind eddies on the lee side. Eddies that are associated with the rims of steep canyons may rotate and result in moderate to strong upslope winds that are opposite to the direction of the winds blowing over the rim. In general, when strong winds blow through steep canyons, wind eddies can become localized in bends in the canyons or the mouth of tributary canyons. The compressed air in mountain passes also results in horizontal and vertical eddies that fan the fire out as it descends downslope on the lee side.

During the Santa Ana season the local daytime wind pattern is characterized by moderately strong onshore breezes along the coast and gentle to weak upslope and up canyon winds in the adjacent mountain areas. The nighttime cooling produces down-slope and offshore winds that are of lesser magnitude than the daytime winds (Schroeder and Buck, 1970). This air circulation is predominant at the coastal side of the mountains, especially at lower elevations. Strong Santa Ana winds eliminate the local wind patterns so that little difference in day and night patterns exist in the initial stages. As the Santa Ana wind weakens, it shows diurnal patterns. During the daytime a light onshore sea-breeze is often observable along the coast and light upslope winds along the coastal slopes. Such weak Santa Ana winds are held aloft along the coastal slopes so that the turbulence and strong ups and down drafts found on the lee side when strong winds blew perpendicular to mountain ranges are not found. Furthermore, the air in the sea-breeze may be returning Santa Ana wind which is not as moist as the marine air. After sunset, surface winds reverse and became offshore downslope winds. Increasing air stability may then allow the weaker lee turbulence aloft to produce the familiar mountain airwaves that hit the surface of leeward slopes and produce strong downslope winds. As the Santa Ana winds weaken further, normal seasonal and diurnal wind patterns return.

Strong Santa Ana surface winds that push the
fire in a southwestern direction up the inland mountain slopes often change their direction to south and east as the winds are funneled into the coastal canyons. Thus the fire is fanned east up the canyon walls at the same time it continues up and down canyon in a southwesterly direction across the canyons. This is especially noticeable in steep terrain and areas of heavy fuel loading.

ANALYSIS OF FIRE PATTERNS

When an organized fire department was established in 1919 for the unincorporated areas of Los Angeles County, fuel loading in the Santa Monica Mountains was at a low level. Large-scale fires had burned the mountain range several times between 1900 and 1919. Principally among the many fires were the 1903 Rindge Fire, the 1909 Malibu Fire, the 1910 Las Flores-Temescal Fires, the 1911 Santa Monica-Ventura Fires, and the 1913 Topanga-Escondido Fires. The 1911 fire was the largest. It burned the mountain range for several weeks and extended from Santa Monica into Ventura County.

The most complete fire records since 1919 are available for an area of 54,000 ha extending from Ventura County to San Diego Freeway to the east. Further discussions will pertain to this area. When fires over 40.5 ha are analyzed for the active fire suppression period 1919-1980 their cyclic periodicity is readily noticed. Figure 2 shows the total area burned per decade as well as the cumulative area burned, and illustrates that the overall burn cycle averages 20 years. As the fuel loading of the inland chaparral increased, more and more of its vegetation was incorporated into the burn cycle. This resulted in the steadily increasing peaks of hectares burned as listed in table 1.

Table 1 - Fire Size By Decade (in ha)

<table>
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<th>Time Period</th>
<th>Size of Fire</th>
<th>Area Burned</th>
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<td>1920-29</td>
<td>8</td>
<td>4,000</td>
</tr>
<tr>
<td>1930-39</td>
<td>3</td>
<td>20,000</td>
</tr>
<tr>
<td>1940-49</td>
<td>6</td>
<td>12,000</td>
</tr>
<tr>
<td>1950-59</td>
<td>8</td>
<td>23,500</td>
</tr>
<tr>
<td>1960-69</td>
<td>1</td>
<td>5,800</td>
</tr>
<tr>
<td>1970-79</td>
<td>4</td>
<td>26,500</td>
</tr>
<tr>
<td>1980</td>
<td>1</td>
<td>1,122</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>92,922</td>
</tr>
</tbody>
</table>

Table 1 shows that 8 of the 11 fires (73 percent) for the decade 1920-29 ranged in size from 40 to less than 200 ha. Figures for 1930-39, 1950-59 and 1970-79 are 60, 50 and 40 percent respectively. Thus, as fuel loading increased, the number of small fires decreased and large fires increased. With the present land use pattern and level of fire protection, it is predicted that the area burned per year for the period 1980-89 will average 800 to 1,200 ha; a yearly reduction of at least 1,400 ha burned per year over the previous decade.

Next, the fires were analyzed for the time of year of burning. Figure 3 shows that the total area burned prior to August was insignificant, that it was relatively low in August (2,500 ha), but that it increased sharply thereafter. It tripled in September and again more than doubled in October (29,000 ha) before finally declining for the rest of the year. Table 2 shows that of the 25 fires under 200 ha, 20 or 80 percent were encountered prior to October. Twenty-three fires or 88 percent of all fires over 400 ha were encountered after September. Fires prior to August started almost exclusively in annual grassland or degraded sage.

Figure 2--10 year periods and cumulative area burned by fires over 40 ha (1919-1980)

Figure 3--Monthly and cumulative area burned by fires over 40 ha (1919-1980)
Table 2 - Fire Size By Time of Year (in ha)\(^1\)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Size of Fire</th>
<th>Area Burned (in ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb-June</td>
<td>2 0 0</td>
<td>10</td>
</tr>
<tr>
<td>July</td>
<td>8 0 0</td>
<td>66</td>
</tr>
<tr>
<td>August</td>
<td>4 1 1</td>
<td>2,41</td>
</tr>
<tr>
<td>September</td>
<td>6 0 2</td>
<td>12,78</td>
</tr>
<tr>
<td>October</td>
<td>0 2 7</td>
<td>29,06</td>
</tr>
<tr>
<td>November</td>
<td>4 0 11</td>
<td>24,84</td>
</tr>
<tr>
<td>December</td>
<td>1 0 5</td>
<td>20,68</td>
</tr>
<tr>
<td></td>
<td>25 3 26</td>
<td>90,55</td>
</tr>
</tbody>
</table>

\(^1\)The month of year of some of the earlier fires is not known. These have been omitted.

Individual fires seemingly show great differences in burning pattern. Some are confined to the inland regions and never reach the coast. Others are confined to the central region and never reach the coast, sate burn along the coast, others burn across the whole mountain range. A history of fire behavior of selected fires follows in an effort to support the picture of the composite fire history discussed so far. The fires discussed are shown in figure 4.

Fires in Initially Strong Northwest Wind Conditions

The 1944 Woodland Hills Fire started near the Ventura Freeway and, fanned by northwest winds, spread in a southeastern direction for about 9 km. Mulholland Highway was an effective fire barrier on its southern flank and limited the size of the fire. Large-scale fires during northwestern wind conditions have historically been effectively controlled with aggressive backfiring, hose lines and tractor work. The present use of helicopters, though not as effective as aggressive backfiring against a frontal fire, nevertheless limits these fires in size with the slightest break in fire weather.

Fires in Santa Ana and Onshore Wind Patterns

During the 1935 Latigo (Malibu) Fire light northeasterly winds allowed the local updraft mountain winds to spread the flames upslope and toward the ridge line where they were picked up by the light Santa Ana breeze and pushed toward the west. Hot spots still burning in the canyons would lay down at night but would be whipped into flames early in the morning, making another run for the ocean. Onshore winds and local surface winds would push the fire again uphill and easterly upslope. Aggressive backfiring on a 27 km wide front finally contained the north and eastward spread of the fire. Thus Santa Ana winds coupled with local winds are responsible for spreading flames in both directions.

Santa Ana Fires from Coastal Ridges to the Coast

The 1956 Newton Fire started in the upper Newton Canyon watershed at the coastal ridge and raced to the beach while fanning out east and west. Changing wind patterns make the coastal mountain slopes vulnerable to east as well as westward fire spread, but quick aerial response and ground access make it now possible to limit the eastward spread of a coastal ridge fire.

Santa Ana Winds Fires Spreading from Highway 101 or Mulholland Highway to the Coast

Fires starting along the inland boundaries of the mountain range will normally become large if they are pushed by strong Santa Ana winds. Such fires were unknown from 1919-1935, were uncommon until 1957, but have since then occurred at least once every decade. Examples of such fires are the 1943 Woodland Hills Fire, the 1956 Sherwood Fire, the 1958 Liberty Fire, 1961 Topanga and Bel Air Fires, the 1970 Wright Fire, and finally the 1978 Kanan-Dune and Mandeville Fires. The 1978 twin fires burning through stands of chaparral in excess of 50 years old show the reliance on the north to northeasterly winds to set fire boundaries despite an army of men and a fleet of modern fire fighting equipment. Today, fire fighting personnel is geared to saving life and property during catastrophic fires. There is really no means of controlling such fires until the wind dies down or the fire runs out of fuel.

FIRE BOUNDARIES, FIRE FIGHTING TECHNIQUES

As the wind dies down, fire barriers such as firebreaks, roads and even previous burns as old as 20-30 years can become important fire boundaries. For example, the southwestern extent of the 1978 Kanan-Dune Fire was checked and prevented from crossing into Ventura County by the 1-year old Carlisle burn. Flames in the 1-year burn were supported by dead stands of aerially seeded annual ryegrass (Lolium multiflorum) and dead herbaceous annuals, but the law intensity flames were stopped on Decker Road despite winds gusting in excess of 60 km/hour. The westerly flank of the 1958 Liberty Fire was prevented from reaching the beach but not before it had crossed Latigo Canyon Road and burned several km into a 2-year burn. The southwestern extension of the 1970 Wright burn was also checked by a 3-year old burn. The 1978 Mandeville burn wedged between the 1961 Topanga and Bel Air Fires and made a run in chaparral stands in excess of 40 and 63 years. It was...
prevented from reaching the beach when it ran out of fuel in urban developments and the strongly gusting Santa Ana wind subsided.

The 1935 Latigo Fire is of interest in that the northern extent of the fire was slowed down when burning through a 10-year old burn. An indication that the chaparral was not highly flammable is shown by the large unburned stands along the northern boundaries of both the 1925 and 1935 burns.

The shapes of both the 1958 Warner Fire (Hourglass) and the 1943 Woodland Hills Fire indicate the successful use of aggressive backfiring and/or pinching off the flanks of fires by taking advantage of strategic fire barriers, such as firebreaks, roads and previous burns. The 1943 fire stretched like a worm from Woodland Hills to Point Dume, an aerial distance of approximately 23 km. It showed that westerly spreading fires, even when pushed only occasionally by Santa Ana winds, are hard to control. Prior to the use of helicopters, constant flareups when the winds picked up converted many seemingly controlled fires into uncontrolled fire disasters. The value of a helicopter thus lies in extinguishing fires through aerial water drops as soon as the wind dies down and extinguishing many spot fires before they can become major new fires.

CONCLUSION

This study showed that the coastal slopes of the Santa Monica Mountains had a higher fire frequency both in the prefire suppression period 1900–1918 as well as in the fire suppression period 1919–1980. During this latter period, the higher fire frequency was found predominantly in the coastal sage vegetation. Fire suppression was more successful in the inland chaparral regions. This resulted in a steady fuel buildup and a shift from small to large disastrous fires. The area investigated showed a cyclic periodicity in area burned of about 20 years. Coastal sage vegetation is able to carry large-scale fires within 10 years after a burn, south slope chaparral within 15 years, and north slope chaparral within 20 years.

Most large-scale fires occur during the Santa Ana fire wind conditions from mid-September through December. The probability of large-scale fires is also enhanced by the linearity of the fire winds and the canyons. When taking into account fuel type, topography and other site specific factors, it is therefore possible to predict the occurrence of large-scale fires and use fire management techniques inclusive of fire exclusion and prescribed burning more effectively to reduce high fire risks.

ACKNOWLEDGMENTS

We thank the Los Angeles County Forester and Fire Warden (Fire Department) for contributing data. This study was supported under the cooperative agreement with Chaparral Ecology and Related Ecosystems Studies between the County of Los Angeles and the U.S. Forest Service, PSW Forest and Range Exp. Stn., Berkeley.

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Santa Monica (Evening) Outlook. Fires in the Santa Monica Mountains; Dec. 5, 6, 7, 1903; Oct. 17-21, 1904; Sept. 15, 16, Oct. 25, Nov. 3, 1909; Sept. 10, 1910; Nov. 11-28, 1911; Aug. 13, 26, Sept. 13, Oct. 21, 1913.
November 18, 2019

To: Chair Jennings and Members of the Planning Commission
Re: Local Coastal Program Amendment No. 19-002 and Zoning Text Amendment No. 19-004—Amendments to the Local Coastal Program and Malibu.

On Page 1, Discussion, it states:
In November 2018, the Woolsey Fire damaged or destroyed over 440 homes in the City and significant amounts of landscaping and other structures, including decks, hardscapes and fences. Although fires have historically been unpredictable, dependent upon factors such as wind speed, wind direction and fuel load, it is possible that standards could be established to decrease a property’s likelihood of burning and spreading the fire to neighboring properties. Fuels for fires include, but are not limited to, dead plant material, buildings, decks, fences and other flammable materials such as mulch.

Please note that there are some inaccuracies in this long statement, as underlined, that must first be acknowledged as we have apparently not learned from past mistakes.

Funded under the Forest Service/Los Angeles County cooperative research contract and at the request of County Board of Supervisors, I wrote A Homeowners Guide to Fire and Watershed Management at the Chaparral/Urban Interface in 1982 (HOGFW Attachment 1). It was updated in 2004 to keep it in public domain, still downloadable from the web as of today (HOGFW Attachment 2). In 1981 the article Fire History of the Santa Monica Mountains (FHSMM Attachment 3) was also published. Such information was then spread throughout fireprone mountain communities. Subsequently, in 1984 the National Foundation for Environmental Safety (NFES), with Judge Baker as moderator, gave an evening seminar at the Malibu library to a packed audience consisting of fire personnel from throughout the area, public officials, homeowners and news services. The predictability of wildland fires affecting the Santa Monica Mountains and specifically Malibu was demonstrated on wall maps along with handouts. Such information was then further provided throughout the years to the community by NFES and local newspapers (Attachments 4,5,6,7,8).

Since the lessons learned were not yet implemented during the 1993 Old Topanga Fire, the County of Los Angeles Fire Department was then largely blamed for the “lack of community preparedness and lack of effective firefighting” with many stating that if Malibu would have been an independent city, it would not have happened. Then incoming County Fire Chief Freeman, eager to learn from mistakes, immediately organized along with the upcoming new City of Malibu a large Fire Safety Fair to educate homeowners for the inevitable. He also changed the Fire Department’s policy from forced evacuation to voluntary evacuation and closer communication with residents. However, apparently not learning from past mistakes and lessons learned being forgotten with new City employees and changing City management, the City did not follow through with such Fire Safety Fairs but instead took the easy way out – like most agencies – just publishing a safety brochure instead of boots-on-the-ground education along with the Fire Department and making sure that existing laws are already enforced.
This brings us now to the 2018 Woolsey Fire and the lessons that were already published in the 1980s and known to local elected and fire officials but soon forgotten. According to a *Los Angeles Times* article dated Jan. 6, 2019,¹ Los Angeles City fire officials already predicted the fire-driven path of the Woolsey Fire soon after it started, namely that it would end up in the City of Malibu pointing towards Point Dume and would stop at the beach. This was not based on rocket science but on common sense. I believe that, given the fire prediction information distributed since 1981, almost every high school student in the City of Malibu could have accurately predicted where the fire would end up, given the fire start.

The Woolsey Fire, contrary to what County Fire and City of Malibu officials want the public to believe, was therefore not an unpredictable fire but gave the City of Malibu almost 24 hours notice that it was coming, compared to other past wind-driven fires that started near the top of the mountain and raced to the beach within hours. Given this fact, many home losses could have been prevented and much of the evacuation panic avoided if the City of Malibu – independently, as I believe, was its duty – would have immediately issued a bulletin such as perhaps the following:

*A fire has broken out near xxx during extreme fire weather conditions. The fire, fanned by strong Santa Ana winds, can be expected to reach the City of Malibu within the next 24 hours. Assure that your home is prepared for the assault of the fire by removing away from any structures all flammable items that can be ignited by firebrands or flame impingement. Also make sure that all cars, travel trailers, etc., are garaged or are moved out of the area, as firebrands raining from the sky ahead of the fire can readily ignite them.*

*If you have not prepared your property for a wildland fire, be prepared to evacuate. Note that mobile homes are extremely vulnerable to wildland fires and therefore can virtually not be protected during an onrushing wildfire despite present fire clearance codes. So, if you are living in a mobile home, be prepared to evacuate.*

*Don’t depend on fire hydrants or your water hoses to provide fire protection as the fire overruns your community. Water systems are designed to provide fireflow for fighting individual structural fires and not for simultaneous fire needs during wildland fires.*

Now back to the prosed amendments before you today. What is the meaning of adopting a new amendment if you could not even enforce what is presently on the books? Writing and adopting laws is meaningless if the enforcement power and spirit is not behind them.

Some sections of the proposed “fire-resistant plant ordinance” (a misnomer in itself) are well-intended and meaningful as they address many of the reasons why largely unattended homes burned during the Woolsey Fire. However, the ordinance as a whole it politicized, as some sections of it will just lead to future predictable designs-for-disaster while largely keeping the status quo. The basic concepts of conduction, convection, and radiation heat sources were explained in *HOGFW* so that, I believe, even

high school students could readily comprehend them and therefore assist their parents in preparation of a wildfire. They should be fully understood, acknowledged and incorporated in any amendment and then implemented and enforced.

On Page 12, the proposed amendment states: An alternative to prohibiting the planting of highly flammable trees completely is to prohibit the planting within 30 feet of structures. The proposed amendment would prohibit the planting of the following trees and shrub species within 30 feet of structures:
1) Eucalyptus (Eucalyptus, gum tree)
2) Pine (Pinus species)
3) Cypress (Cupressus species)
4) Cedar (Cedrus species)
5) Tree of Heaven (Ailanthus altissima)

So, according to these statements, homeowners could plant a row (a line source of radiation) of what is acknowledged to be highly flammable landscape vegetation such as pines or Bluegum Eucalyptus trees 30 feet from their home (what kind of home and where is it located). Have we not created the recipe for a future urban firestorm?

As the trees mature, their crowns expand and their branches encroach within 15-20 feet of the house to provide it with the required privacy as still allowed by the amendment. If unattended, the houses have a high probability of igniting as the aerial fuels will be instrumental in supporting the firespread and the fire’s radiating heat will make it impossible to protect the homes throughout the burnout period of the trees and can readily blow out windows.

A nearby homeowner, perhaps also foolishly, plants only a single pine tree thirty feet away from his home and also makes sure that it is set back for such a distance from any accessory structures inclusive of nearby neighbors’ homes. His home has a chance of surviving a fire, even if unattended, if the tree burns but this all depends on the fire winds. So, what are the differences in heat sources expected if a row of trees, a hedge, a wooden fence (a line source of radiation) catch on fire compared to a single tree (a point source of radiation).

As restated on page 41 of the 2004 HOGFW, for a line source of radiation, such as a hedge or row of trees, the heat intensity only decreases with the distance instead of the square of the distance and a house receives this heat from all points along the line. Thus, the heat intensity received 20 feet from a burning hedge is still one-half (1/2) that at 10 feet and one-fourth (1/4) that at 5 feet.

For a point source of radiation such as a tree or bush, the heat intensity already decreases with the square of the distance from the source. Thus, a tree burning within 20 feet of a window transfers only one-fourth (1/4) the heat to the house compared with a tree burning within 10 feet, and only one-sixteenth (1/16) of the heat compared with a tree within 5 feet.

Given these facts, increasing the number of flammable landscape plants around a home and increasing the number of trees, or both, will make a home much more prone to fire, despite legal “brush clearance.”
We must remember that landscape fuels that burn adjacent to a house create enough conductive and radiant heat to ignite wood siding, wooden decks, trellises, and break windows. Unprotected windows are often the ‘Achilles heel’ for fire entry even on a ‘fire-safe’ designed home.

The following is also well to remember:
A.) Even a small two-story structure on level ground can create enough radiant heat during its burnout period to ignite wood siding, etc., on homes within an approximately 60-foot radius. Wind-driven firebrands will also shower the neighborhood during the burnout period.
B.) While the burnout period for chaparral fuels in a wind-driven fire is generally less than 15 minutes, the burnout period for structural fuels (houses) may last hours. During this time period your home may be subjected not only to invisible radiation heat from a neighboring burning house that raises surrounding vegetation and structural fuels to the ignition point, but also to visible firebrands that may invade your home unnoticed.
C.) A six-foot-tall mature, continuous chaparral fuel mass burning on steep slopes can create enough radiant and convective heat during its burnout period to ignite upslope homes more than 100 feet away. If the wind cooperates with an uphill running fire, flames of up to 100 feet long could even be expected that directly impinge on the house. Two feet-tall mature low fuel plants such as prostrate coyote brush (*Baccharis pilularis*) can already produce 30 feet long flames on steep slopes during extreme fire weather conditions with a fire burning uphill.

Given all the fire safety conundrums that are neither acknowledged nor addressed in the proposed amendments, I strongly suggest that they be withdrawn and rewritten if so desired so that sections of the City of Malibu do not become an even greater highly flammable urban forest in the years to come.

Sincerely yours,

*Klaus W.H. Radtke*

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cc. California Coastal Commission
john.Ainsworth@coastal.ca.gov
A Homeowner’s Guide to Fire and Watershed Management at the Chaparral/Urban Interface

Klaus W. H. Radtke
COVER PHOTO: Living in chaparral areas understandably appeals to many people. However, living safely in these areas requires an awareness of fire and erosion problems. In dealing with these problems, wildfire safety must be balanced with watershed safety.

Acknowledgments

I am grateful to personnel of the Pacific Southwest Forest and Range Experiment Station for their support. C. Eugene Conrad (Research Botanist) provided suggestions on the ecological aspects of chaparral management. Serena Hunter (Research Forester) helped to review and shape the booklet. May E. Huddleston (Technical Publications Editor) provided editorial suggestions and contributed to the layout design.

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Klaus W. H. Radtke, Ph.D.
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Clyde A. Bragdon, Jr.  Forester and Fire Warden

County of Los Angeles, California
June 1982

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Introduction

Several guides and booklets have been written to help the homeowner deal with particular aspects of living in the fire-prone wildlands of the Pacific Southwest. Until now, however, none has given the homeowner comprehensive advice on managing his property effectively so as to reduce the chance of wildfire and mudflow disasters and the hardships, both personal and financial, they bring. This booklet attempts to provide such advice in a practical, non-scientific, yet professional manner, through basic principles and guidelines.

This booklet is based on and contains excerpts from the PSW General Technical Report Living More Safely at the Chaparral-Urban Interface, a guide to hillside property management for fire and watershed protection. Both publications were written by the same author under cooperative contracts between the Pacific Southwest Forest and Range Experiment Station (Forest Service, U. S. Department of Agriculture) and the County of Los Angeles. They are based on research by the Forestry Bureau of the Los Angeles County Fire Department and the Forest Fire Laboratory of the Pacific Southwest Station in Riverside, California. They also incorporate state-of-the-art knowledge in various wildland disciplines, and the experience gained by the author in dealing with fire and floods in his work and as a homeowner at the chaparral boundary.

The booklet first provides a brief description of the chaparral plant community, followed by sections describing some basic considerations of watershed and fire management. Later sections deal with improving safety around the home through home design, landscaping, and maintenance; protecting oneself and one's property during a wildfire; and, finally, providing emergency treatment of hillsides after a fire.

After fire, chaparral recovers by means of seeds, sprouts, and bulbs.
The Chaparral Plant Community

California's chaparral plant communities consist of many different woody shrubs and herbaceous species that have adapted over millions of years to frequent fires and extended periods of drought. The mixture of plant species in the chaparral communities varies with such factors as aspect and steepness of slope, soils, elevation, fire frequency, and local climate. Although California's climate causes chaparral vegetation to be especially subject to large devastating wildfires, similar plant communities and associated fire and watershed problems occur in other western states and other countries.

Chaparral communities are characterized by a rich diversity of plant species. Although no single characteristic is present in all chaparral species, several adaptations to the hot, dry climate commonly occur. For example, some species have thick leathery leaves that are small or even needle-like. This design helps the plants to tolerate severe summer drought. Other drought tolerance characteristics include waxy and hairy leaf surfaces and leaves that have a high aromatic oil content. Some plants become dormant and shed some or all of their leaves during prolonged drought. A deep, extensive root system which increases drought tolerance and plant survival on steep slopes is another characteristic common to many chaparral species.

Chaparral plants survive periodic fire by sprouting and by germination of seeds stimulated by the fire. Soon after burning, new sprouts grow from the roots and root crowns of many plants. Then, fall and winter rains trigger prolific germination of herbaceous species, often resulting in a colorful array of wildflowers in spring. Seeds of woody plants also germinate prolifically.

Plant species differ in their susceptibility to fire. Their age and physiological state (whether flowering or dormant, for example) also influence how well they burn. For chaparral-type vegetation in general, the most important factors influencing flammability and fire behavior are fuel moisture (the moisture content of living and dead plant material), fuel loading (the amount of plant material per unit area), and the ratio of fine dead fuel to living fuel.

*Herbaceous native plants and aerially seeded ryegrass cover the mountains again at the end of the rainy season after a fall fire.*
Fuel moisture is high in winter and spring, but gradually decreases during the hot, dry summer months. The dead-to-live ratio, as well as the fuel loading, increase, causing increased fire danger as plants mature and become old.

Fire history records indicate that plant succession patterns influence fire frequency in chaparral communities. Chances of having a second fire within the first few years after an area burns are high because of the large amount of herbaceous fuels such as grasses and flowering annual plants that follow the first burn. These plants readily become dry and carry a low-intensity fire. As the woody plants begin to dominate an area again, germination of the shorter-lived herbaceous species is inhibited. This greatly reduces fire danger for about the next 10 years because of the high proportion of live, succulent plant parts and the low proportion of fine dead plant material on the shrubs.

Fire frequency tends to be greatest in a subunit of chaparral called coastal sage vegetation. This specialized chaparral type is dominated by plants that tend to grow more herbaceous material each year than do woody chaparral shrubs.

Plants and soil on south-facing slopes are drier than on north-facing slopes because they are exposed to more direct heat from the sun. Species on these sites burn more readily than vegetation on cooler, wetter sites.

**Summary**

- Chaparral communities have adapted to summer drought, frequent fires, and steep unstable slopes.
- Chaparral plants are able to recover after fire by sprouting and by fire-stimulated germination of seeds.
- The flammability of chaparral vegetation depends on its moisture content, the ratio of dead-to-living fuel, and the amount of vegetation per unit area.
- The stage of plant succession and the severity of a site affect the likelihood and intensity of a fire.

Five years later young woody plants have replaced the herbaceous species; at this stage they do not carry fire readily.
Watershed Management Considerations

A watershed can be defined as all the land and water within the confines of a drainage area. Its depth extends from the top of the vegetation through the soil to the underlying geologic strata that restrict water movement. Chaparral soils and their underlying soil mantle can store great quantities of water. Rainfall intensities rarely exceed the soil infiltration rate of well-vegetated chaparral watersheds. Watershed problems occur when protective vegetation is removed as by wildfire or land development.

The main objective in watershed management of chaparral lands is to maintain vigorous, multi-aged stands of vegetation which can respond favorably to periodic disturbance (by fire). The main objective in homeowner watershed management is to maintain a dense cover of deep-rooted, healthy vegetation that will stabilize the watershed and control the flow of water from it. Soils engineering techniques, which are discussed in detail in *Living More Safely at the Chaparral-Urban Interface*, may also be necessary to control runoff and drainage.

In order to meet the various objectives, a watershed has to be managed as a unit and the erosional processes must be well understood. The first requirement means cooperation among property owners, the second is outlined below.

Erosional Processes

Chaparral vegetation is commonly found on steep hillsides, even on slopes that exceed the angle of maximum slope. This angle, often called the angle of repose, is the steepest angle that bare soil will maintain. For most natural slopes and most soils, the angle of repose is about 34° (67%). Beyond this angle, soil and rocks are totally under the influence of gravity and may slide downhill unless anchored by plants. Vegetative cover, root depth, and root strength affect the extent to which landslides occur. Slope failures are much less common with deep-rooted vegetation than with grasses, and with dry soils than with soils that have been saturated by winter storms or overwatering.

Slopes of varying steepness are illustrated in Figure 1. The relationship between slope ratio, degree of slope, and percent slope is also presented.

![Figure 1. Slope ratio, percent slope, and degree of slope are shown for some hillsides of varying steepness.](image-url)
Landslides often result when the toe (base) of a slope is undercut so that hillside stability is weakened.

A large landslide on slopes covered with chaparral.

A large landslide on slopes covered with coastal sage.

A landslide in a residential area.

Slope failures after annual grasses have replaced the deep-rooted native vegetation.
Soil failures are most common on slopes ranging from 25° to 45° (49% to 100%) making proper management of such steep hillsides extremely critical. Beyond 45°, rock slides are the most common erosional process.

Dry creep, the downhill movement of dry soil and debris, is common on steep slopes with little vegetative cover. It often exceeds wet erosion during low rainfall years and is especially important after fire. The dry creep settles at the base of slopes where it waits to be flushed downstream and perhaps into homes by occasional storms of high intensity.

Soil slips and landslides account for almost 50% of the total erosion on a watershed. Unlike dry creep, these soil movements normally occur when the soil is saturated. They are readily visible and directly translate into financial losses to downstream as well as upstream homeowners. When heavy rains fall on hillsides left bare by fire or improper brush clearance, the water cannot infiltrate rapidly enough into the soil, running instead over the soil surface and causing excessive erosion and swollen streams. The soil from the bare hillsides and the dry creep that has collected in the canyons then combine to create mudflow disasters.

**Water-repellent Soil**

Damaging fires not only burn the vegetative cover, but can also cause the soil to become hydrophobic (water repellant). Normally, slight water repellency of soils is caused by the breakdown of organic material and certain chemicals in plant litter. Hot fires accentuate this by concentrating these water-repellent chemicals. Some of the chemicals are volatilized by heat from the fire, resulting in gases that penetrate deeper into the soil. There the gases cool and condense, coating the soil particles with the water-repellent substances. Since rains cannot readily penetrate this layer of coated soil particles, water quickly saturates the shallow wettable surface layer. Sheet or rill erosion occurs after the surface layer is saturated. More information on hydrophobic soils is presented in the watershed management chapter of *Living More Safely at the Chaparral-Urban Interface*.

**Summary**

- Watershed management aims at maintaining a deep-rooted, dense cover of healthy plants.
- Such a plant cover controls surface erosion and reduces slippage by anchoring the soil.
- Deep-rooted plants pump water out of the soil, leaving it free to absorb winter rains.
- Most postfire mudflow originates from debris accumulated in canyons by previous surface erosion, soil slips, and landslides.
- Fire can accentuate the water repellency of soil.
Fire Management Considerations

Wildland fire management attempts to predict and control fire behavior by managing vegetative fuels to control flame length, rate of spread, and heat intensity.

Fire Factors

Wind is an important element affecting fire behavior. Wind not only controls the direction and spread of fire, but also greatly affects the flammability of plants by reducing fuel moisture, preheating the plants, and bending the flames ahead of the fire.

Most major wildfires occur during extreme fire weather brought on by the warm Santa Ana or foehn winds. With the onset of these winds, which blow from the north or east, temperatures increase rapidly, even into the night, and relative humidity declines drastically. Under such conditions, fires in mature chaparral cannot be controlled unless the fuels are exhausted.

Topography is also a critical factor in fire safety. It affects windspeed and direction, and is responsible for differences in heat radiation and fire spread. The most important topographic effect to remember is that fire spreads much faster uphill than downhill.

Ignition

A fire is the flame, heat, and light caused by burning (oxidation) after an object has reached ignition temperatures and has been ignited. Ignition temperatures are influenced by the rate of airflow (supply of oxygen), rate of heating, and size and shape of the object. Once ignition has occurred, sustained combustion requires a continuous supply of oxygen and fuel.

Wildland fuels, such as grasses, coastal sage scrub, chaparral, and trees, have various ignition requirements which depend largely on their moisture content and size. For example, dry grass has the lowest heat requirement for ignition, and grassy areas therefore have the highest fire frequency. Woody chaparral shrubs in coastal areas normally do not become dangerously dry until late summer or fall.

Heat Sources

Heat transfer is by conduction, convection, and radiation. The flame is the visible burning gas and vapor produced by the fire and provides (along with airborne sparks) a direct ignition source for fuels that have reached ignition temperatures.

Convection heat is the transfer of heat by atmospheric currents and is most critical under windy conditions and in steep terrain. With light wind and on level terrain, the convection heat column is almost vertical. Radiation heat is transfer of heat by electromagnetic waves and can, therefore, travel against the wind. For example, it can preheat the opposite side of a burning slope in a steep canyon or a neighboring home to the ignition point. Conduction is the direct transfer of heat by objects touching each other. An example would be
the transfer of heat from a stack of burning firewood to the side of the garage against which it is stacked.

The interaction of the three types of heat transfer with topography can be illustrated by visualizing a burning match as shown in Figure 2. When the match is held head up, heat transfer is by conduction only, and the match burns slowly. The situation is comparable to a wildfire burning downhill. If the match is held horizontally, heat transfer is by conduction and radiation, and the match burns a little faster. When the match is held head down, it is consumed rapidly because conduction, convection, and radiation heating are occurring together. The situation is comparable to a wildfire burning uphill.

Reducing the duration of heat and length of flames produced by nearby vegetation can be critical to protecting your home from fire. Flame length in chaparral fuels can be reduced by maintaining low-growing, widely-spaced plants. For example, on steep slopes, 30-foot flames occur in 6-foot-tall mature chaparral at winds of less than 10 miles per hour. Reducing the vegetation to 2 feet in height would reduce the flames to 10 feet. When wind-speed increases to 50 mph, as it often does during extreme Santa Ana weather conditions, the flame length for 2-foot-tall continuous fuels increases to 35 feet and for 6-foot-tall fuels to more than 100 feet.

The duration of heat can also be a critical factor. For example, the time period for heavy chaparral fuels to be consumed may be more than 10 minutes, but if the continuity and height of such fuels can be reduced, the duration of the flame and its associated heat can often be shortened to seconds. Thus, a yard tree which may take several minutes to burn may represent a greater hazard to a home than nearby discontinuous chaparral.

Summary

- Wildland fire management includes modification of the size, arrangement, and kind of vegetative fuels.
- Vegetation modifications reduce the ignition potential, flame length, and heat output of a fire.
- Heat transfer methods (conduction, convection, and radiation) vary in their contributions to a fire depending on wind and topography.

Figure 2: These matches show the interaction of the three types of heat transfer.
Even in light fuels, convection currents in steep terrain can create long flames that can ignite a house.

This burning mountain shows that houses situated on ridges and sideslope are extremely vulnerable to fire.

Fine dead fuels in the interior crown make many broad-leaved trees flammable.

Conifers generally are also highly flammable and produce long flames.
Owning a Fire-safe Home

The fire safety of a home depends on the continuity and loading of the fuels around it, the location of the home with respect to topography, and the design of the structure itself.

Legal Brush Clearance Requirements

California Resource Code 4219 requires clearance of flammable vegetation for a minimum distance of 30 to 100 feet around any structure located in a fire hazardous area. The clearance distance is subject to local enforcement, and in extremely hazardous areas, local fire authorities may require clearance beyond 100 feet. However, the intent of the code is readily defeated if basic fire safety principles are not carried into home design and homesite selection.

Information adapted from a brush clearance leaflet which has been handed out for many years by fire agencies in Los Angeles County is given on the inside back cover.

Fire Topography

The relationship between topography and fire behavior is a factor over which the homeowner has little control. He should, however, be aware of the relationship as it relates specifically to his property. Figure 3 points out that homes located in natural chimneys, such as narrow canyons and saddles, are especially fire-prone because winds are funneled into these canyons and eddies are created. Studies on homes burned along ridges have shown that homes located where a canyon meets a ridge are more likely to burn than.

![Figure 3. Winds tend to channel through natural chimneys, making narrow canyons and saddles particularly fire-prone.](image)
other ridge-top homes. In very steep and narrow canyons, radiating heat may also be a major factor in fire spread and home losses.

Figure 4 illustrates how homes without adequate setbacks on narrow ridges are often lost because flames and convection heat hit the home directly. Homes located on the slope, especially stilt and cantilevered homes, are particularly vulnerable in this respect.

**Building Design**

Building density and design are important safety considerations because a burning home can ignite adjacent homes.

The roof is the most vulnerable part of a home because it is exposed to airborne sparks. The wood shingle roof has been the single most important element in home losses during wildland fires. It is also a major source of airborne firebrands capable of igniting nearby structures. Studies of structural losses during wildfire in southern California have shown that with 100 feet of brush clearance, a home with a wooden roof has a 21 times greater chance of burning than a home with a nonwood roof. Although most fire insurance rates are approximately 25% higher for wood roofs than for nonwood roofs, this rate does not compensate for the true difference in risk.

Exterior materials used on wildland homes should have a fire-resistance rating of 1 to 2 hours, meaning that they should consist of materials such as stucco, metal siding, brick, concrete block, and rock. This is especially critical for parts of a home exposed to winds from the north or east, or that are positioned at the top of a slope. Figures 5 and 6 graphically summarize the principles of topography, vegetation, and architectural design that can improve

*Figure 4. On narrow ridges, homes without adequate setbacks, such as those on the left, are particularly vulnerable to fire.*
THE FIRE-SAFE HOME DESIGN ALLOWS FOR GREATER FLEXIBILITY IN FUEL MODIFICATION, THEREBY RETAINING GREATER SLOPE STABILITY. BENCH DRAINS AND DOWN DRAINS WERE INSTALLED DURING FUEL CONVERSIONS. WITHOUT THESE SAFE-GUARDS FUEL CONVERSION IS NOT RECOMMENDED ON STEEP SLOPES SUCH AS THESE.

Figure 5. Here are some ways to reduce fire risk by preplanning:

1. Fire-resistant roof; preferably Class A, such as tile
2. Stucco or other nonflammable siding of at least 1 hour fire-resistant rating
3. Reduced overhang (preferably closed eaves)
4. Roof slanted to accommodate convection heat
5. Safety zone (slope setback) of at least 30 feet for single story home
6. Pool used to create safety zone
7. Shrubs and trees not directly adjacent to home nor overhanging the roof
8. A deck with exterior materials of at least 1 hour fire-resistant rating.

Fire safety is further increased by fuel reduction to twice (200 ft.) the legal minimum (100 ft.). Slope stability is maintained by retaining native plant specimen within the 18-foot legal distance for fuel separation. The flame length is still continuous but the amount and duration of the heat output is greatly reduced compared to a 100-foot or less clearance.

the fire safety of a planned or an existing home. Many positive features of home design are shown in Figure 5. Note that reduced overhangs or boxed eaves protect the house from ignition and heat or flame entrapment. Under-eave vents should be located near the roofline rather than near the wall. Exterior attic and underfloor vents should not face possible fire corridors and should be covered with wire screen (not to exceed 1/4 inch mesh). Picture windows and sliding glass doors should be made only of thick, tempered safety glass and protected with nonflammable shutters. Stone walls can act as heat shields and deflect the flames. Swimming pools, decks, and patios can be used to create a setback safety zone as well as to provide safety accessories.
Figure 6. Here are some ways to modify an existing property to reduce fire risks:

**Negative Features**

1. Wood shingle roof
2. Wood siding
3. Large overhang (open eaves)
4. High gable roof
5. No safety zone (no slope setback)
6. Large picture windows
7. Tree crown overhanging the roof

**Modifications**

- Fire-resistant roof
- Nonflammable siding
- Reduced overhang (closed eaves)
- Vent covers for fire emergency
- Redesigning is too expensive
- Create setback with a deck where exterior material has a fire-resistant rating of 1 hour or more
- Install nonflammable shutters
- Prune tree

Sprinklers placed on a wooden roof provide added safety, but don’t depend on them.

**Your Pool as a Water Source**

Pools can provide a convenient water source for use before or during a fire. Fire engines should be able to get within 10 feet horizontally of the pool. If this is not possible, the pool should be equipped with a bottom drain and pipe system that terminates horizontally or below pool level in a 2½-inch valved standpipe equipped with a fire hydrant with national standard thread. A floating pool pump or portable gasoline pump with a suction hose that can reach the bottom of the pool can assure a usable water source even when water pressure and electricity fail. You will also need a fire hose and nozzle.

Fabric fire hoses are fine for use with pool pumps that are designed for firefighting, but should not be used on home faucets because they readily kink as water pressure drops. All outdoor faucets should be equipped with strong 5/8-inch rubber hoses that will not burst when the nozzle is turned off. A ladder should be available to reach the roof.
For more information on how to enhance the fire safety of a home, see Living More Safely at the Chaparral-Urban Interface.

Summary

- California Resource Code 4219 requires clearance of flammable vegetation for a minimum distance of 30 to 100 feet from any structure in a fire hazardous area. Local ordinances determine the clearance distance and may be more restrictive.
- Location of a home with respect to topography affects its likelihood of burning.
- The design of a home should reflect fire safety considerations. The wood shingle roof is the largest single cause of structural fire losses.
- With some planning, the water in your pool can be an important water source for fighting a fire.

Wood shingle roofs require an inappropriate amount of manpower and water during a wildfire because they are easily ignited by flying sparks.

Wood sidings are almost as fire-prone as wood roofs.
The following safety features may save your home during a wildfire:

Boxed eaves that prevent heat entrapment even if the wood siding catches on fire.

Vents located near the roofline rather than the wall.

Gasoline pool pumps and accessories.

Shutters, even emergency plywood shutters, that protect windows.
Landscaping for Fire and Watershed Safety

The key to landscaping in fire-prone watershed areas is to selectively replace highly flammable native plants with lower-growing, less flammable plants of equal root depth and root strength.

In reality, optimum rooting depth and fuel volume generally work at odds with one another. That is, low-growing plants usually have relatively shallow root systems and tall plants have relatively deep and broad lateral root systems. Landscaping requires a compromise between minimizing fuel volume and maximizing root depth.

Rooting Depth and Fuel Volume

As a rule, nonwoody ground covers have an effective root depth of less than 3 feet and can be labeled "shallow rooted" for use in steep terrain. Grasses also belong in this category. Shallow-rooted plants should not be used as permanent cover on steep slopes unless they are interplanted at 10-foot centers with taller shrubs and 20-foot centers with trees. Interplanting is also required in stabilization of fill slopes.

Woody ground cover shrubs generally are moderately deep rooted, with roots ranging from 3 to 6 feet in depth, and can be effectively used on slopes in conjunction with taller shrubs and trees. Most plant species found in the coastal sage community fall into this root depth category.

Plants with roots ranging from 6 to 15 feet or more in depth include most woody shrubs in the chaparral community as well as small, drought-tolerant landscape trees. Very few commercially available woody ground covers, with the exception perhaps of prostrate (twin peak) coyote brush and prostrate acacia, have an effective root depth greater than 6 feet. Plants with roots much in excess of 15 feet include some native shrubs such as scrub oak and laurel sumac, and trees of larger stature.

Drought Tolerance and Sprouting Ability

Drought tolerance and sprouting ability are also important considerations when selecting plants. Water will be an increasingly sparse and expensive resource in the future. The plant's ability to survive on little

Deep-rooted coyote brush is a good drought-tolerant ground cover for moderately steep slopes.
water as well as to resprout after a fire or when neglected (neglect could be a result of water shortage) can mean savings over the years on water bills, maintenance costs, replanting costs, and hillside repairs.

Herbaceous or semiwoody ground covers like vinca or ivy, woody ground covers like coyote brush, hedges such as oleander and myoporum, and even some coniferous trees like Canary Island pine and Chir pine do not need to be replanted because they resprout readily.

Most native plants also resprout, and some native shrubs such as sugarbush, scrub oak, ceanothus species, and chokecherries can be nurtured into short-stemmed trees. At spacings of about 25 feet, these plants can be kept relatively fire retardant through occasional pruning. Resprouting broad-leaved trees, such as oaks, California pepper, Brazilian pepper, sycamore, black locust, and California laurel, to name just a few, can be effectively blended into the landscape setting. For fire safety, trees must be pruned and should be limited to the number necessary to provide shade and slope stability.

The use of herbicides and pre-emergent chemicals must be closely monitored in hillside landscaping. Overuse can kill landscape plants and sterilize soils. Fortunately, the deepest rooted chaparral shrubs are also the hardest to kill with herbicides. Since these shrubs serve the dual function of anchoring the soil to the bedrock and pumping water out of the ground, soil slippage is almost never observed where they are present. Mortality of such plants often results in slippage 5 to 10 years later after the roots have rotted away. The original cause of such delayed slippage is seldom recognized.

**Hillside Landscaping**

Some ground covers and low-fuel shrubs commonly used for hillside landscaping in southern California are listed in Table 1 along with their characteristics and some suggestions about where they should be used. The plant species listed, except where indicated, are able to form a solid ground cover for the

Test plantings such as these indicate that Acacia ongerup (arrow) is a highly drought-tolerant and fast growing woody ground cover.
slopes recommended. However, there is no guarantee that the species prevent slippage when the soil becomes saturated. Interplanting ground covers with shrubs and trees, as discussed earlier, will maximize slope stability. Plants that require high maintenance or that are readily browsed, such as most ceanothus species, are not included in Table 1.

The columns in Table 1 headed “aspect,” “soil depth,” and “irrigation” must be read as a unit. Soil depth figures apply to medium-textured, loamy soils. The irrigation figures apply to coastal regions of southern California and attempt to show relative watering needs of the plants listed. The figures assume that soil moisture is recharged to 12-inch depth during watering. In reality, this goal is rarely achieved through overhead watering because of sprinkler design and time period necessary for irrigation. The effective rooting depths indicated in Table 1 are based on moisture withdrawal by roots after soil moisture has been depleted in the upper soil layers.

The term “fire retardance” as used in Table 1 reflects differences in fuel volume, inherent flammability characteristics of the plant, and ease of fire spread. For example, under extreme autumn fire conditions, on steep slopes with nongusting winds of 30 mph, a 2-foot-tall solid ground cover with “high” fire retardance is expected to produce a flame less than 10 feet long and to reduce the rate of fire spread. Under similar conditions, a plant with “low” fire retardance may ignite readily, will carry the fire, and can produce flames approaching 25 feet in length. For comparison, mature chaparral under these conditions can produce flames exceeding 80 feet in length.

The following example will illustrate the use of Table 1. Capeweed is listed in row 1 of the table. Column 1 shows that the species is most effective for planting on slopes not exceeding 25°, but may be used on a limited scale on slightly steeper slopes. The shallow root system of capeweed may trigger soil slippage. The next three columns are to be read as a unit and show the relationship between aspect, soil depth, and irrigation requirements. For example, the first line shows that on a north-to-east aspect with less than 1 foot of soil depth, established plants require summer irrigation once to twice a month. The remaining columns are self-explanatory.
Ice plants have a shallow root system that was not able to prevent this slippage.

This sloping lawn sheds water onto the adjoining bank, causing slippage.

Capeweed on the bank is excellent to prevent surface erosion but its shallow root system is unable to prevent soil slippage.
Ice plants, listed in row 5, have been used extensively for hillside planting because they are low growing, drought tolerant, fire retardant, and aesthetically pleasing; they are easily established on harsh sites, and require minimal maintenance and watering. However, during high intensity storms, by far the greatest slope failures are found on hillsides planted with ice plants. A wise homeowner will acquire the written opinion of a geologist regarding slope stability before planting ice plants extensively on slopes in excess of 15°. Most species of ice plants are best suited for rock garden situations or for harsher sites with relatively stable geology and thin soils.

**Slope Engineering**

Slope engineering techniques such as concrete bench and down drains, designed to slow and direct excess water flow, are necessary on most steep slopes around homes. Their use becomes critical when modification of native vegetation is attempted in geologically unstable areas or areas with past soil-slip problems. The homeowner is responsible for the maintenance of any drainage devices on his land and the devices should be listed in the deed for the property. Any modification of vegetation on the hillside where the layering (dip) of the bedrock parallels the slope, as shown in Figure 7, should be undertaken with extreme caution because of the natural instability of the slope. Increasing the infiltration rate of water into the soil and reducing the root strength and root depth per unit area can result in almost immediate soil failures during winter rains.

More information on various aspects of hillside landscaping including slope engineering techniques, proper watering methods, plant selection, and selective brush conversion is available in *Living More Safely at the Chaparral-Urban Interface*. No book, however, should be a substitute for onsite expert advice from specialists familiar with hillside landscaping and hillside problems.

Landscape plants such as Italian cypress (arrow), junipers, and most pines are highly flammable. Even mature ivy will burn (arrow).

Figure 7. Rock strata may determine hillside problems.
Summary

- Slope stabilization may be achieved by the use of deep-rooted plants in conjunction with slope engineering.
- Fire management requires low-fuel or low-growing plants to reduce flame length and heat output.
- As a compromise between watershed and fire safety, a combination of taller, deeper rooted plants should be interplanted with ground covers.

Citrus orchards make good greenbelts and reduce firespread.

Bench drains (arrow) enhance slope stability; they break up the length of the slope and allow a greater choice of species for landscaping.
Table 1. Evaluation of some popular low-growing plants used in wildland-urban landscaping.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>EFFECTIVE...</th>
<th>On slopes (degrees)</th>
<th>On aspects N to E</th>
<th>At soil depths (feet) 1' 1'-3' 3'+</th>
<th>If irrigated summer to fall</th>
<th>At elevations (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Arctotheca calendula (Capeweed)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>1-2M</td>
<td>Up to 2,000</td>
</tr>
<tr>
<td>2. Acacia angustifolia</td>
<td>X</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>1M</td>
<td>Up to 2,000</td>
</tr>
<tr>
<td>3. Baccharis pilularis cultivar &quot;twin peak&quot; coyote bush (brush)</td>
<td>X</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>None</td>
<td>Up to 4,000</td>
</tr>
<tr>
<td>4. Cistus crispus Descanso rockrose</td>
<td>X</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>'None'</td>
<td>Up to 4,000</td>
</tr>
<tr>
<td>5. Carpobrotus, Delosperma, etc. Iceplants</td>
<td>X</td>
<td>See text</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>'None'</td>
</tr>
<tr>
<td>6. Hedera canariensis Algerian ivy (Freeway ivy)</td>
<td>X</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>X</td>
<td>'None'</td>
</tr>
<tr>
<td>7. Osteospermum fruticosum African daisy</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>X</td>
<td>1M</td>
<td>Up to 2,000</td>
</tr>
<tr>
<td>8. Vinca major Periwinkle</td>
<td>X</td>
<td>X</td>
<td>'X'</td>
<td>X</td>
<td>X</td>
<td>'None'</td>
</tr>
</tbody>
</table>

Abbreviations: X = Suitable for this category, 'X' = Plant not totally suitable for this category, W = Week, M = Month, S = Summer, > = greater than, < = less than. A blank under 'Irrigation' denotes an intermediate watering schedule.
### CHARACTERIZED BY...

<table>
<thead>
<tr>
<th>Growth habit</th>
<th>Fire retardance</th>
<th>Resprouting ability</th>
<th>Rooting depth (effective)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreading ground cover 6 to 8 inches tall</td>
<td>High</td>
<td>If watered</td>
<td>1 to 3 feet</td>
<td>Very low maintenance. Takes occasional foot traffic. Showy yellow flowers. Weedy in manicured setting. Frost sensitive. Draws bees. Spreads by runners. Full sun to partial shade.</td>
</tr>
<tr>
<td>Spreading shrub 12 to 30 inches tall</td>
<td>Low; decreases with increase in fuel</td>
<td>Poor</td>
<td>Greater than 6 feet</td>
<td>Low maintenance. No foot traffic. Showy yellow flowers. Draws bees. Most drought-tolerant and quickest-spreading woody plant tested. Full sun.</td>
</tr>
<tr>
<td>Spreading shrub 12 to 24 inches tall</td>
<td>Low</td>
<td>Vigorous</td>
<td>Approximately 6 feet</td>
<td>Prune back every 5 years or less often. No foot traffic. Inconspicuous flowers. Hard to establish from flats in midsummer. Healthy green color. Full sun.</td>
</tr>
<tr>
<td>Semi-upright shrub 12 to 24 inches tall</td>
<td>Low to medium</td>
<td>Poor</td>
<td>3 to 4 feet</td>
<td>Medium to low maintenance. No foot traffic. Showy pink flowers; draws bees. Ground cover for easily accessible drysite areas. Attractive if watered; unattractive if not maintained. Full sun.</td>
</tr>
<tr>
<td>Trailing ground cover 4 to 18 inches tall</td>
<td>Generally high</td>
<td>Depends on severity of fire</td>
<td>Mostly 1 to 2 feet</td>
<td>Low maintenance. No foot traffic. Showy multi-colored flowers. High foliage moisture and weak root system causes slippage on steeper slopes, especially fills. Full sun to partial shade.</td>
</tr>
<tr>
<td>Trailing ground cover 8 to 12 inches tall</td>
<td>Medium</td>
<td>If watered</td>
<td>3 to 4 feet</td>
<td>Low maintenance. Tolerates foot traffic. Excellent for minimizing erosion on long, steep cuts. Leaves will burn if watering is neglected. Excellent understory to a variety of trees. No flowers. Full sun to shade.</td>
</tr>
<tr>
<td>Trailing ground cover less than 12 ins. tall</td>
<td>Medium to high</td>
<td>If watered</td>
<td>3 feet</td>
<td>Moderate to high maintenance. Tolerates some foot traffic. Showy white flowers and other hybrid colors. Freezes at 25°F. Fertilize and water regularly. Full sun to partial shade.</td>
</tr>
<tr>
<td>Trailing ground cover less than 18 inches tall</td>
<td>Medium</td>
<td>If watered</td>
<td>3 feet</td>
<td>Low maintenance. Occasional foot traffic. Showy blue flowers. Does well under partial overstory where somewhat neglected. Sun to shade.</td>
</tr>
</tbody>
</table>

*For further plant recommendations, see Living More Safely at the Chaparral-Urban Interface.*
Maintenance for Fire and Watershed Safety

Landscape maintenance is necessary to keep man-made structures separated from surrounding vegetative fuels; to keep the amount of vegetative fuels at a safe level; to create a safety zone for residents, firefighters, and fire equipment; and to assure that water flow from the property is channeled properly. Giving correct priorities to maintenance needs and carrying out maintenance and safety inspections on a regular basis is the key to minimizing the effects of natural disasters.

For fire and watershed maintenance, the area around the home should be divided into three perimeters of defense:
1. 0 to 30 feet: year-round maintenance
2. 30 to 100 feet: seasonal maintenance
3. 100 feet or more: yearly inspections, periodic maintenance

Maintenance Adjacent to the Home

The area within 30 feet of the home is most critical for fire and watershed safety. Maintenance of nonflammable landscaping such as lawns, border plantings, flower gardens and vegetable beds, and structures such as pools, concrete decks, and recreation areas helps to reduce fire hazard close to the home. This area, for the most part, is level and all water from it should drain toward the street. Rain gutters, pipes, and drainage devices should be cleaned out on a regular basis. Additionally, all leaves should be removed from the roof before the fire season begins.

Foundation shrubs and trees are a necessary part of the landscaping. However, these plants often grow into an "urban forest" fuel problem, so that landscape plants rather than surrounding native plants become the primary cause of fire loss. Year-round maintenance should consist of pruning and regular watering of individual plants. Together, these measures decrease plant volume, increase plant moisture content, and reduce or eliminate dead fuels. (Caution: Unnecessary watering of drought-tolerant landscape plants may cause root rot of a native plant nearby.)

This home, designed to be fire-safe, also has a 30-foot safety zone.
Native plants can be thinned out to form an effective greenbelt zone that is easily maintained. Concrete bench drains should be cleaned as required.

Trees must receive the same regular maintenance as foundation shrubs. Oak trees, such as coast live oak, usually contain a high amount of dead twigs and branchlets. The crowns of such oaks are exposed to higher winds speeds than exist at ground level. These conditions can produce large flames that are readily bent onto the roofs of nearby structures. Eucalyptus trees are also notorious for their tendency to spread fire.

30- to 100-foot Greenbelt Area

Seasonal fire maintenance in the 30- to 100-foot greenbelt zone around the home should consist of removing dead woody plants, occasional pruning of trees and shrubs, and eradication of weedy species. To maintain healthy plants and strong root systems, pruning of most native plants should be done
during the summer. Ground cover shrubs may also need to be thinned periodically. In thinning and pruning, care must be taken not to expose the soil surface to a greater degree than can be safely covered by surrounding plants before the rainy season. Well-pruned, healthy shrubs require several years to build up an excess of flammable live and dead fuel. Therefore, a complete maintenance job can last a long time.

Watershed problems in this greenbelt zone are often critical. Yearly, before the winter rainy season, all drainage devices must be inspected to assure that they are functional and not clogged with debris. After major storms, all rain gutters, pipes, concrete bench and down drains, and other such devices, must be reinspected. Bench drains are easily blocked by minor soil slips. This forces uncontrolled water flow over the slope and results in supersaturated soils and mud flow.

Greenbelt Extension Past 100 Feet

The intensity of fire maintenance beyond 100 feet from the home is dictated by topography and design of the structure. Minimum maintenance for a home designed with fire safety in mind should consist of reducing the amount and continuity of the vegetation as well as thinning out the most flammable species. Selective maintenance can be done in areas where topography is favorable and geology stable (gentle slopes, rock outcroppings, etc.) every 10 years or less without causing any accelerated soil erosion. Such "feathering out" of older vegetation on portions of a watershed while favoring younger plants reduces the possibility and effect of major wildfires.

Rodents such as gophers and ground squirrels can be a major cause for soil slips because they weaken root systems and build underground tunnels where water can concentrate. For further discussion of animals detrimental to hillside stability, see the Watershed Management chapter in Living More Safely at the Chaparral-Urban Interface.

Summary

- Maintenance of landscaping and structural additions around the home is essential to fire safety and watershed protection.
- Maintenance needs are most critical within 30 feet of the home, but periodic fuel reduction and maintenance of drainage devices are required at greater distances from the home.
What To Do When Caught in a Wildfire

If your home is threatened by wildfire, you may be contacted by a fire or law enforcement official and advised to evacuate. If you are not contacted in time to evacuate, or if you decide to stay with your home, the following suggestions will increase your chances of safely and successfully defending your property.

Before the fire approaches your house:

1. If you plan to stay, evacuate your pets and all family members who are not essential to protecting the home.
2. Be properly dressed to survive the fire. Cotton fabrics are preferable to synthetics. Wear long pants and boots and carry with you for protection a long-sleeved shirt or jacket, gloves, a handkerchief to shield the face, water to wet it, and goggles.
3. Remove combustible items from around the house. This includes lawn and poolside furniture, umbrellas, and tarp coverings. If they catch fire, the added heat could ignite your house.
4. Close outside attic, eave, and basement vents. This will eliminate the possibility of sparks blowing into hidden areas within the house. Close window shutters.
5. Place large plastic trash cans or buckets around the outside of the house and fill them with water. Soak burlap sacks, small rugs, large rags. They can be helpful in beating out burning embers or small fires. Inside the house, fill bathtubs, sinks and other containers with water. Toilet tanks and water heaters are an important water reservoir.
6. Locate garden hoses so they will reach any place on the house. Use the spray-gun type nozzle, adjusted to a spray.
7. If you have portable gasoline-powered pumps to take water from a swimming pool or tank, make sure they are operating and in place.
8. Place a ladder against the roof of the house opposite the side of the approaching fire. If you have a combustible roof, wet it down or turn on any roof sprinklers. Turn on any special fire sprinklers installed to add protection. Do not waste water. Waste can drain the entire water system quickly.
9. Back your car in the garage and roll up the car windows. Disconnect the automatic garage door opener (in case of power failure you could not remove the car). Close all garage doors.
10. Place valuable papers and mementos inside the car in the garage for quick departure, if necessary. Any pets still with you should also be put in the car.
11. Close windows and doors to the house to prevent sparks from blowing inside. Close all doors inside the house to prevent draft. Open the damper on your fireplace to help stabilize outside-inside pressure, but close the fireplace screen so sparks will not ignite the room. Turn on a light in each room to make the house more visible in heavy smoke.
12. Turn off pilot lights.
13. If you have time, take down your drapes and curtains. Close all venetian blinds or noncombustible window coverings to reduce the amount of heat radiating into your home. This gives added safety in case the windows give way because of heat or wind.

When the fire approaches:

As the firefront approaches, go inside the house. Stay calm, you are in control of the situation.

After the fire passes:

After the fire passes, check the roof immediately. Extinguish any sparks or embers. Then, check inside the attic for hidden burning sparks. If you have a fire, get your neighbors to help fight it. The water in your pool and the water in your garbage cans, sinks, toilet tanks, etc., will come in handy now. For several hours after the fire, recheck for smoke and sparks throughout the house.

Remember:

In a major conflagration, fire protection agencies will probably not have enough equipment and manpower to be at every home. You cannot depend totally on their help. One of the firefighters’ principal responsibilities is to stop the spread of fire from house to house. Therefore, if one home is on fire, firefighters might have to pass it by to save another in the path of the fire.

Your careful planning and action during a fire can save your home. Be prepared. Talk with your neighbors to see what resources you have. Ask your fire or forestry personnel for professional advice and assistance.

When caught in the open:

When you are caught in the open, the best temporary shelter will be found where fuel is sparse. These places could include road cuts and banks, large boulders, rock outcroppings, large logs, and depressions in the ground. Here are comments on some good and bad places to go:

Automobile

Move the car to bare ground or sparse fuel areas, close all windows and doors, lie on the floor and cover yourself with a jacket or blanket. The fuel tank of the car will normally not explode until the car is well on fire or may not explode at all. So, keep calm and let the fire pass.

Road Cut

If caught without shelter along a road, lie face down along the road cut or the ditch on the uphill side (less fuel and less convection heat). Cover yourself with anything that will shield you from the heat of the fire.

Chimneys

Never be caught by fire in natural chimneys. These are narrow, steep canyons that concentrate heat and updraft. Temperatures may exceed several thousand degrees Fahrenheit during a fire.
Saddles

While hiking out of an area where fire is in progress, avoid topographic saddles if possible. Saddles are wide natural paths for fire winds, and vegetation here will normally ignite first.

In the Open

Look for areas with sparse fuel (for example, soft chaparral such as black sage or grassland rather than chamise chaparral), if possible, within a depression. Clear as much fuel as you can while the fire is approaching and then lie face down in the depression and cover yourself with anything that will shield you from the heat. Smoke may create as great a survival problem as the flames do. If you are caught on a steep mountaintop or sharp ridge, the backside (or fire leeward side) will provide more safety. Be aware, however, that fire eddies often curl over ridges.

Before hiking in fire-prone areas, seek additional advice from wildland firefighting agencies. They may supply pamphlets and can give you specific tips for wildland fire survival.

Summary

• Stay calm—you are in control of the situation.
• If you decide to stay with your home during a wildfire, evacuate all family members who are not essential to protecting the home.
• Dress properly to shield yourself from the heat and flames.
• Take steps to prepare your home for the approaching fire.
• As the fire approaches, move inside and stay until it has passed.
• Move outside, survey the situation, take action, and help neighbors.
• If caught in the open, seek shelter where fuel is sparse.
Postfire Emergency Measures

The steps to take in emergency rehabilitation of an area after a fire depend on the location, the time of year, the intensity of the fire, the erosion potential, and the kinds of plants present. Figure 8 illustrates some postfire emergency rehabilitation measures.

If the fire occurs in midsummer and the burned watershed cover consists primarily of landscape plants with a large proportion of resprouting ground covers and shrubs, all that may be necessary for rehabilitation is to periodically irrigate and fertilize. Adequate moisture, heat, and nutrients will encourage rapid resprouting so that a good foundation plant cover can be established before the heavy winter rains return.

Postfire management of native plants is similar to the procedure outlined above. Plants should be allowed to resprout and establish themselves from seed. Thinning of seedlings, as well as removal of dead stems and branches, can begin the following spring after the rainy season is over. The first year's thinning of native plants should be very light, followed by heavier thinnings the second and third year after clear species patterns and densities have emerged.

Timing becomes critical when a hot fire occurs in late fall. In neighborhoods where steep, long slopes overlook canyons and endanger the lives and property of canyon residents, neighbors should work together to quickly establish an emergency vegetation cover before heavy winter rains begin.

Vegetative Measures

Aerial emergency seeding efforts by public agencies primarily employ ryegrass and are a "band-aid" measure meant to duplicate or complement nature's

![Figure 8. Immediately after a fire, emergency measures should be taken to rehabilitate the watershed.](image-url)
own "band-aid" of postfire herbaceous plants. However, ryegrass seeds exposed at the soil surface will not germinate and root unless encouraged by 4 to 5 days of moist, overcast weather. Seeds of annual grasses present before the fire will germinate quickly with any moisture because most seeds are incorporated into the soil layer.

The least time- and labor-consuming emergency measure for homeowners is to broadcast annual ryegrass or other quickly germinating species at the rate of 15 to 30 lb./acre, rake the seeds about 1/2 inch deep into the soil where feasible and then water lightly and regularly. Watering may be necessary two or more times a day during hot weather.

Grasses have fibrous root systems that are very effective in competing for soil moisture. When replanting of shrubs or ground covers is planned for the spring or begins immediately after the fire, annual grasses must be separated from such plants and should be seeded in contour rows. Such rows should parallel the slope and are easily established with a hoe. They should be spaced about 3 feet apart but could be closer in steeper terrain and on fine textured soils with low infiltration rates. The ground covers are planted between the contour rows.

Contours are very effective in reducing erosion because the ridges and trenches form a series of miniterraces allowing water to infiltrate into the soil. This increases plant growth, reduces runoff, conserves soil moisture, and prevents soil losses. Do not use contour rows in active landslide areas. Cover these with plastic using the guidelines discussed in the next section.

Barley is an effective species for contour row planting. Seeds should be soaked overnight in gunny sacks (cloth bags) in leaky trash cans. Excess water, which may contain germination-inhibiting substances leached from the seed coat, should be channeled into the street. The recommended seeding rate is 150 lb./acre with about an equal amount of ammonium phosphate fertilizer. Seeds should be buried about 1/2- to 1-inch deep and the soil tamped. Barley is readily available from feed stores, but buy only recleaned barley; rolled barley (used for feed) will not germinate. Annual grasses, such as ryegrass and barley, die with the return of hot weather and then present a fire hazard.

**Mechanical Measures**

Flood control offices in most major cities provide excellent advice and pamphlets on mechanical measures.

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*Figure 9. Sandbags divert flowing mud.*
for use in emergency situations. The most effective methods for homeowner use are wooden deflector barriers (usually plywood) and sandbags that re-channel mudflow safely around structures. Figure 9 shows that the placement of such structures is critical in achieving the desired results. Sandbags should be filled half-full with sand or soil and the flaps tied under and pointed in the direction of the water source. Bags should be tamped and tightly fitted and each layer staggered, as when building a brick wall. Rows should not be more than three layers high unless they are pyramidal or supported by a building.

Some other effective measures are check dams to reduce gully erosion, chain link fences to control rock fall, and guniting of steep slopes and spreading of plastic to eliminate water infiltration. Plastic sheets should be 6 mil (0.006-inch-thick) because they are sturdier than 4 mil. The slope should be covered completely and the plastic should be anchored by partially filled sandbags. On steep slopes, the sandbags should be connected using ropes. Plastic sheets that cover only a small section of a slope (as when some sheets have blown away) concentrate the rainwater and are responsible for localized saturated soils and slippage.

Summary

- Survey fire damage in relation to topography (the whole watershed) and structures.
- Obtain expert advice immediately and coordinate quick action with other residents.
- Use vegetative as well as mechanical emergency measures effectively, taking care to avoid possible damage to other properties.
Brush Clearance Information

You are only required to clear your own property. Clearance on other property is the responsibility of the owner. Contact your local forestry or fire personnel if such clearance is needed.

Brush Clearance Law*

- A fire fighter who must protect your home from a brush fire would like every advantage he can get. He would like to see every bit of hazardous vegetation cleared away, right down to mineral soil.
- The homeowner, on the other hand, appreciates the beauty of the brush and the seclusion it offers. He also realizes that during a major fire conflagration, fire fighting personnel are ‘spread thin’ and the homeowner may become the key to saving his own home. Can you save your home or can it save itself?
- Both foresters and homeowners realize the danger from soil erosion that will result from a barren hillside; nevertheless, the native brush must be cleared by law to a point where a home will stand a good chance of being saved in the event of a fire.

In the Native Brush Around Your Home

- Remove native brush and other hazardous vegetation for a distance of 100 feet around all structures and 10 feet from the sides of roads and driveways that are used by more than one residence.
- Within 30 feet of the structure, relandscape with low-growing plants, such as lawns, ivy, succulents, etc. that do not transmit fire readily.

Exception: You may retain “specimen native shrubs” if they are trimmed 2 feet above the ground, do not exceed approximately 7 feet in diameter, are maintained free of all dead wood, duff, dry leaves, etc., and are not closer together than 18 feet air space. Notice that landscape trees are not involved in this regulation unless they present an unusual fire hazard (which they normally do) or are within 10 feet of the outlet of a chimney.

In and Around Your Home and Garage

- Allow no trees, shrubs or other vegetation to grow within 10 feet of the outlet of any chimney. Screen the chimney to prevent sparks from igniting the roof or brush. Use half-inch wire mesh.
- Keep all trees, shrubs, or other vegetation adjacent to or overhanging any structure free of dead limbs, branches, and other combustible matter.
- Keep the roof and rain gutters free of dead leaves, twigs and other combustible matter.
- Keep all combustible rubbish in non-combustible rubbish containers with tight-fitting lids.
- Stack woodpiles neatly and compactly in a location remote from the house and garage.

*Adapted with changes from homeowner guidelines by the Los Angeles (City) Fire Department.
Several guides and booklets have been written to help the homeowner deal with particular aspects of living in the fire-prone wildlands of the Pacific Southwest. Until the 1982 publication *A Homeowner’s Guide to Fire and Watershed Management at the Chaparral/Urban Interface*, none had given homeowners comprehensive advice on managing their properties effectively so as to reduce the chances of wildfire and mudflow disasters and the hardships, both personal and financial, they bring. The 1982 publication was subsequently identified by the Wildfire Safety Panel investigating the disastrous November 2, 1993 Malibu/Topanga Fire as the basis for developing definite guidelines for vegetation management plans in Los Angeles County. This panel and other post-fire disaster panels such as the San Diego Fire Recovery Network have also time and again acknowledged that continuous education programs are necessary to mitigate hazardous situations.

This revised and updated book attempts to further such an ongoing education process by providing advice in a practical, nonscientific, yet professional manner, through basic principles and guidelines. It is also based on and contains excerpts from the 1983 PSW General Technical Report *Living More Safely in the Chaparral-Urban Interface*, a guide to hillside property management for fire and watershed protection. Both publications were written by the same author under cooperative contracts between the Pacific Southwest Forest and Range Experiment Station (Forest Service, U.S. Department of Agriculture) and the County of Los Angeles, with funding provided by the Forest Service. They also incorporated state-of-the-art knowledge in various wildland disciplines, and the experience gained by the author in dealing with fire and floods in his work and as a homeowner at the chaparral boundary.

This book first provides a brief description of the chaparral plant community, followed by sections describing some basic considerations of watershed and fire management. Later sections deal with improving safety around the home through home design, landscaping, and maintenance; evacuation and road closure, protecting oneself and one’s property during a wildfire; providing emergency treatment of hillsides after a fire; and, finally, applying the lessons learned.

For more comprehensive and area-specific fuel modification and public safety code requirements applicable to your community, please also consult planning departments, and fire protection and flood control agencies having jurisdiction there.
California’s chaparral plant communities consist of many different woody shrubs and herbaceous species that have adapted over millions of years to frequent fires and extended periods of drought. The mixture of plant species in the chaparral communities varies with such factors as aspect and steepness of slope, soils, elevation, fire frequency, and local climate. Although California’s climate causes chaparral vegetation to be especially subject to large devastating wildfires, similar plant communities and associated fire and watershed problems occur in other western states and other countries.

Chaparral communities are characterized by a rich diversity of plant species. Although no single characteristic is present in all chaparral species, several adaptations to the hot, dry climate commonly occur. For example, some species have thick leathery leaves that are small or even needle-like. This design helps the plants to tolerate severe summer drought. Other drought tolerance characteristics include waxy and hairy leaf surfaces and leaves that have a high aromatic oil content. Some plants become dormant and shed some or all of their leaves during prolonged drought.

A deep, extensive root system, which increases drought tolerance and plant survival on steep slopes, is another characteristic common to many chaparral species.

Chaparral plants survive periodic fire by sprouting and by germination of seeds stimulated by the fire. Soon after burning, new sprouts grow from the roots and root crowns of many plants. Then, fall and winter rains trigger prolific germination of herbaceous species, often resulting in a colorful array of wildflowers in spring. Seeds of woody plants also germinate prolifically.

The Chaparral Plant Community

Plant species differ in their susceptibility to fire. Their age and physiological state (whether flowering or dormant, for example) also influence how well they burn. For chaparral-type vegetation in general, the most important factors influencing flammability and fire behavior are fuel moisture (the moisture content of living and dead plant material), fuel loading (the amount of plant material per unit area), and the ratio of fine dead fuel to living fuel.

Fuel moisture is high in winter and spring, but gradually decreases during the hot, dry summer months. The dead-to-live ratio, as well as the fuel loading increase, causing greater fire danger as plants mature and become old.
Fire history records indicate that plant succession patterns influence fire frequency in chaparral communities. Chances of having a second fire within the first few years after an area burns are high because of the large amount of herbaceous fuels such as grasses and flowering annual plants that follow the first burn. These plants readily become dry and carry a low-intensity fire. As the woody plants begin to dominate an area again, germination of the shorter-lived herbaceous species is inhibited. This greatly reduces fire danger for about the next 10 years because of the high proportion of live, succulent plant parts and the low proportion of fine dead plant material on the shrubs.

Fire frequency tends to be greatest in a subunit of chaparral called coastal sage vegetation. This specialized chaparral type is dominated by plants that tend to grow more herbaceous material each year than do woody chaparral shrubs. Plants and soil on south-facing slopes are drier than on north-facing slopes because they are exposed to more direct heat from the sun. Species on these sites burn more readily than vegetation on cooler, wetter sites.

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Summary
- Chaparral communities have adapted to summer drought, frequent fires, and steep unstable slopes.
- Chaparral plants are able to recover after fire by sprouting and by fire-stimulated germination of seeds.
- The flammability of chaparral vegetation depends on its moisture content, the ratio of dead-to-living fuel, and the amount of vegetation per unit area.
- The stage of plant succession, as may be reflected by fuel loading and the severity of a site, affects the likelihood and intensity of a fire.

A watershed can be defined as all the land and water within the confines of a drainage area. Its depth extends from the top of the vegetation through the soil to the underlying geologic strata that restrict water movement. Chaparral soils and their underlying soil mantle can store great quantities of water. Rainfall intensities rarely exceed the soil infiltration rate of well-vegetated chaparral watersheds. Watershed problems occur when protective vegetation is removed, as by wildfire or land development.

The main objective in watershed management of chaparral lands is to maintain vigorous, multi-aged stands of vegetation, which can respond favorably to periodic disturbance (by fire). The main objective in homeowner watershed management is to maintain a dense cover of deep-rooted, healthy vegetation that will stabilize the watershed and control the flow of water from it. Soils engineering techniques, which are discussed in detail in Living More Safely at the Chaparral-Urban Interface, may also be necessary to control runoff and drainage.

In order to meet the various objectives, a watershed has to be managed as a unit and the erosional processes must be well understood. The first requirement means cooperation among property owners, the second is outlined below.

Erosional Processes
Chaparral vegetation is commonly found on steep hillsides, even on slopes that exceed the angle of maximum slope. This angle, often called the angle of repose, is the steepest angle that bare soil will maintain. For most natural slopes and most soils, the angle of repose is about 34° (67%). Beyond this angle, soil and rocks are totally under the influence of gravity and may slide downhill unless anchored by plants. Vegetative cover, root depth, and root strength affect the extent to which landslides occur. Slope failures are much less common with deep-rooted vegetation than with grasses, and with dry soils than with soils that have been saturated by winter storms or overwatering.
Slopes of varying steepness are illustrated in Figure 1. The relationship between slope ratio, degree of slope, and percent slope is also presented.

Soil failures are most common on slopes ranging from 25° to 45° (49% to 100% or approximately 2:1 to 1:1), making proper management of such steep hillsides extremely critical. Beyond 45°, rockslides are the most common erosional processes. Dry creep, the downhill movement of dry soil and debris, is common on steep slopes with little vegetative cover. It often exceeds wet erosion during low rainfall years and is especially important after fire. The dry creep settles at the base of slopes where it waits to be flushed downstream and perhaps into homes by occasional storms of high intensity.

Soil slips and landslides account for almost 50% of the total erosion on a watershed. Unlike dry creep, these soil movements normally occur when the soil is saturated. They are readily visible and directly translate into financial losses to downstream as well as upstream homeowners. When heavy rains fall on hillsides left bare by fire or improper fuel management, the water cannot infiltrate rapidly into the soil, running instead over the soil surface and causing excessive erosion and swollen streams. The soil from the bare hillsides and the dry creep that has collected in the canyons then combine to create mudflow disasters.

Water-repellent Soil

Damaging fires not only burn the vegetative cover, but can also cause the soil to become hydrophobic (water repellent). Normally, slight water repellency of soils is caused by the breakdown of organic material and certain chemicals in plant litter. Hot fires accentuate this by concentrating these water-repellent chemicals. Some of the chemicals are volatilized by heat from the fire, resulting in gases that penetrate deeper into the soil. There the gases cool and condense, coating the soil particles with the water-repellent substances. Since rains cannot readily penetrate this layer of coated soil particles, the water quickly saturates the shallow wettable surface layer. Sheet or rill erosion occurs after the surface layer is saturated. More information on hydrophobic soils is presented in the watershed management chapter of Living More Safely at the Chaparral-Urban Interface.

Summary

1. Watershed management aims at maintaining a deep-rooted, dense cover of healthy plants.
2. Such a plant cover controls surface erosion and reduces slippage by anchoring the soil.
3. Deep-rooted plants pump water out of the soil, leaving it free to absorb winter rains.
4. Most post-fire mudflow originates from debris accumulated in canyons by previous surface erosion, soil slips, and landslides.
5. Fire can accentuate the water repellency of soil.

A steep backyard fill slope has failed, creating great financial hardship for the affected homeowner.
Wildland fire management attempts to predict and control fire behavior by managing vegetative fuels to control flame length, rate of spread, heat intensity, and the potential for spot fires.

**Fire Factors**

Wind is an important element affecting fire behavior. Wind not only controls the direction, spread, and size of a fire, but also greatly affects the flammability of plants by reducing fuel moisture, preheating the plants, and bending the flames ahead of the fire. Wind is also responsible for spreading firebrands (burning embers) even thousands of feet ahead of a fire front and starting new fires whenever these firebrands land on receptive vegetative or structural fuels. Dry grasses and wood shingle roofs are often the most likely fuel sources to almost immediately start new spot fires.

Most major wildfires occur during extreme fire weather brought on by the warm Santa Ana or foehn winds. With the onset of these winds, which blow from the north or east, temperatures increase rapidly, even into the night, and relative humidity declines drastically. Under such conditions, fires in mature chaparral cannot be controlled unless the fuels are exhausted.

Topography is also a critical factor in fire safety. It affects windspeed and direction, and is responsible for differences in heat radiation and fire spread. The most important topographic effect to remember is that fire spreads much faster uphill than downhill.

**Ignition**

A fire is the flame, heat, and light caused by burning (oxidation) after an object has reached ignition temperatures and has been ignited. Ignition temperatures are influenced by the rate of airflow (supply...
of oxygen), rate of heating, and size and shape of the object. Once ignition has occurred, sustained combustion requires a continuous supply of oxygen and fuel.

Wildland fuels, such as grasses, coastal sage scrub, chaparral, and trees, have various ignition requirements, which depend largely on their moisture content and size. For example, dry grass has the lowest heat requirement for ignition, and grassy areas therefore have the highest fire frequency. For example, dry grass has the lowest heat requirement for ignition, and grassy areas therefore have the highest fire frequency. Woody chaparral shrubs in coastal areas normally do not become dangerously dry until late summer or fall except under severe drought conditions.

**Heat Sources**

Heat transfer is by conduction, convection, and radiation. The flame is the visible burning gas and vapor produced by the fire and provides (along with airborne sparks) a direct ignition source for fuels that have reached ignition temperatures.

Conduction is the direct transfer of heat by objects touching each other. An example would be the transfer of heat from a stack of burning firewood to the side of the garage against which it is stacked.

Convection heat is the transfer of heat by atmospheric currents and is most critical under windy conditions and in steep terrain. With light wind and on level terrain, the convection heat column is almost vertical. Reducing the duration of heat and length of flames produced by nearby vegetation can be critical to protecting your home from fire.

Flame length in chaparral fuels can be reduced by maintaining low growing, widely spaced plants. For example, on steep slopes, 30-foot-long convection heat flames can occur in 6-foot-tall mature chaparral at wind speeds of less than 10 miles per hour. Reducing the vegetation to 2 feet in height would reduce the flames to 10 feet. When wind speed increases to 50 mph, as it often does during extreme Santa Ana weather conditions, the flame length for 2-foot-tall non-maintained continuous woody fuels with a high dead-to-live fuel ratio increases to 35 feet and for 6-foot-tall fuels to more than 100 feet.

Radiation heat is the transfer of heat by electromagnetic waves and can, therefore, travel against the wind. For example, it can preheat the opposite side of a burning slope in a steep canyon or a neighboring home to the ignition point. Again, it can be predictably managed if you are in control of your situation as the following landscape examples illustrate. For a point source of radiation, the heat intensity decreases with the square of the distance. This means that a burning tree 40 feet from a roof or picture window transfers only one-fourth of the heat to the house compared with a tree burning within 20 feet, and one-sixteenth the heat compared with a tree burning within 10 feet. A line source of radiation such as a burning hedge of junipers or cypresses is even more critical than a single point source because the house receives a broad expanse of heat from all points along the line. In this case, heat intensity varies with the distance instead of the square of the distance, so that the heat intensity at a home located within 40 feet of the burning hedge is still one-half that at 20 feet. This is a powerful incentive not to plant potentially flammable hedges or hedge-like “groundcovers” near structures, as well as keeping flammable shrubs and trees as far away from your house as possible.

This burning mountain shows that houses situated on ridges and sideslopes are extremely vulnerable to fire.

Fire dead fuels in the interior crown make many broad-leaved trees flammable.

Conifers generally are also highly flammable and produce long flames.
The interaction of the three types of heat transfer with topography can be illustrated by visualizing a burning match as shown in Figure 2. When the match is held head down, heat transfer is by conduction only, and the match burns slowly. The situation is comparable to a wildfire burning downhill. If the match is held horizontally, heat transfer is by conduction and radiation, and the match burns a little faster. When the match is held head up, it is consumed rapidly because conduction, convection, and radiation heating are occurring together. The situation is comparable to a wildfire burning uphill.

The duration of heat transfer can also be a critical factor. For example, the time period for heavy chaparral fuels to be consumed may be more than 10 minutes, but if the continuity and height of such fuels are reduced and the fine dead fuels removed, the duration of the flame and its associated heat can be shortened to seconds. This represents a greater hazard to a home than merely discovery by fire personnel or knowledgeable homeowners.

Legal Fuel Modification Requirements

California Resource Code 4219 requires maintaining an effective firebreak around structures in fire hazardous areas for a minimum distance of 30 feet, and fuel modification of flammable vegetation for another 70 feet, for a total minimum fuel modification distance of 100 feet. These, however, are minimum code requirements and do not necessarily insure a fire-safe environment. Therefore, fuel modification distances enforced by local fire authorities may extend beyond 200 feet, so be sure to check with local fire authorities about minimum applicable fire hazard requirements in your community.

Realize, however, that during a large wildfire, burning embers (firebrands) may be deposited onto your house even thousands of feet ahead of the fire front, ready to ignite it if they find receptive fuels irrespective of fuel modification carried out around the home. Fire loss statistics have clearly indicated—and it is common knowledge among fire personnel—that homes that are attended (either by fire personnel or knowledgeable homeowners) have a much higher chance of surviving a fire than unattended homes.

Also realize that there is no true fire safety for protecting your home in a high-slope wildfire fire or even several smaller fires burning simultaneously. Even under the best of conditions, fire brands may hit anywhere on your property or nearby your home to help protect it. To have a truly fire-safe home environment, you must therefore ask yourself, could (and under what conditions) my house make it on its own also, such as by fire personnel— that home, that is attended by us.

Owning a Fire-safe Home

Wildland fire management includes modification of the fuels, arrangements, and kinds of vegetation fuels. Vegetative modifications include thinning, prescribed burning, and the removal of flammable vegetation. These management activities are designed to reduce the magnitude of a wildfire, depending on wind and topography, as a way to ensure a safer environment for homes in fire hazardous areas.
Building densely, designing, and building materials are also important for protecting your home. The fire codes are already in place and have been in effect for many years. They are designed to help reduce the risk of fire and protect people's lives. However, there are still ways that homeowners can take steps to improve the safety of their homes. For example, installing smoke detectors and fire extinguishers can help prevent fires from spreading. And using fire-resistant building materials can help reduce the risk of fire damage to your home. But the best way to protect your home is to prevent fires from occurring in the first place. This means being vigilant about fuel modification requirements. For instance, clearing brush and debris from around your home can help prevent fires from spreading. And keeping flammable materials like wood and paper away from your home can also help. It's important to remember that while the fire codes are an important part of protecting your home, they are not enough on their own. You need to take active steps to ensure the safety of your property. And that starts with being proactive about preventing fires from occurring in the first place.
Figure 5. Reducing Fire Risk Through Preplanning.

Class A fire-resistant roof such as tile with seams and joints between tiles sealed.

No exposed wood surfaces but stucco or other nonflammable siding of 1 to 2 hours fire-resistant rating.

Reduced overhang preferably with closed eaves.

Roof slanted to accommodate convection heat.

Safety zone and slope setback of approximately 30 feet for a single story home and vegetation properly thinned within the next 70 feet.

Pool or other low fuel hardscapes used to create buffer zone between house and slope or potential flame sources.

Shrubs and trees not directly adjacent to home nor overhanging the roof.

Decks enclosed (skirted) and constructed of materials of 1 to 2 hours fire-resistant rating.

Adequate screening of vents to prevent entrance of embers. Preferably no vents on north to east side of house (side facing fire winds) or downslope side of house and no flammable vegetation planted near vents or flammable materials stored nearby.

Double-pane and tempered safety glass used as appropriate.

Protection of windows with fire-proof shutters.

Figure 6. Some ways to modify an existing property to reduce fire risks.

Negative Features
1. Wood shingle roof
2. Wood siding
3. Large overhang (open eaves)
4. High gable roof
5. No safety zone (no slope setback)
6. Large picture window
7. Tree crown overhanging the roof
8. Steep slope

Positive Features
1. Fire-resistant roof (non-wood)
2. Non-flammable siding
3. Reduced overhang (closed eaves)
4. Redesigning may be too expensive. Review design with your architect.
5. Create slope setbacks with retaining walls (stone walls) to provide level yard extensions and raise stone wall above ground to create heat shields in critical areas; or build totally fire-safe, enclosed deck of 1 to 2 hours fire-resistance (such as stucco siding and stone decking).
6. Install non-flammable shutters
7. Prune or remove tree
8. Increase length of fuel modification zone. Maintain continuously. Also see #5 above.

On steep slopes in high fire danger areas, fire safety can be further increased by the removal of the most flammable plant materials to twice (200 ft.) the legal minimum clearance distance. However, retaining thinned, deep-rooted native, woody plants as well as native bunchgrasses and herbaceous subshrubs is critical for maintaining slope stability and existing in controlling the invasion of flash-fuel weedy annuals. Maintenance of thinned shrubbery is important because died, woody vegetation can quickly accumulate in non-watered zones.

Seek geological and engineering advice as well as help from erosion control specialists before attempting intensive fuel modification on steep slopes. Drastic fuel reduction leads to slope instability.
Your Pool as a Water Source

Pools can provide a convenient as well as home-saving water source for use before or during a fire. Fire engines should be able to get within 10 feet horizontally of the pool. If this is not possible, the pool should be equipped with a bottom drain and pipe system that terminates horizontally or below pool level in a 2 1/2-inch valved standpipe equipped with a fire hydrant with national standard thread. A floating pool pump or portable gasoline pump with a hose that can reach the bottom of the pool can assure a usable water source even when water pressure and electricity fail. You will also need a fire hose and nozzle. Fabric fire hoses are suitable for use with pool pumps that are designed for firefighting, but should not be used on home faucets because they readily kink as water pressure drops. All outdoor faucets should be equipped with strong 5/8-inch rubber hoses. A ladder should be available to reach the pool.

The following safety features may save your home during a wildfire:

1. Boxed eaves that prevent heat entrapment even if the wood siding catches on fire.
2. Shutters, even emergency plywood shutters, that protect windows.
3. Gasoline pool pumps and accessories.
4. Vents located near the roofline rather than the wall.

For more information on how to enhance the fire safety of a home, see Living More Safely at the Chaparral-Urban Interface.

Summary

The fire safety of a home depends on the continuity and loading of the fuels around it, the location of the home with respect to topography, and also home design and building materials.

California Resource Code 4219 requires clearance of flammable vegetation and fuel modification for a minimum distance of 10 feet from any structure in a fire hazardous area. Local ordinances may require greater clearance distances and be more restrictive.

Location of a home with respect to topography affects its likelihood of burning.

The design of a home should reflect fire safety considerations. The wood shingle roof is the largest single cause of structural fire losses.

Burning embers (firebrands) may be a serious threat to the safety of a home irrespective of fuel modification carried out around it, especially if the home is unattended.

With some planning, the water in your pool can be an important water source for fighting a fire.
Planting the right plant in the right place is as important on manufactured slopes (foreground) as on natural slopes (right background).

Landscaping for Fire and Watershed Safety

The key to landscaping in fire-prone watershed areas is to selectively replace highly flammable plants with lower growing, less flammable plants of equal root depth and root strength. In reality, optimum rooting depth and fuel volume generally work at odds with one another. That is, low-growing plants usually have relatively shallow root systems and tall plants have relatively deep and broad lateral root systems. Landscaping requires a compromise between minimizing fuel volume and maximizing root depth.

The key to effective low maintenance landscaping is to use the right plant in the right place. Native plants should generally be planted only on the slope aspects they occupy naturally or areas that are not subject to over-watering. More water-demanding ornamental plants should generally be planted only in more shaded locations, not on harsher southern exposures with thin soils.

Rooting Depth and Fuel Volume

As a rule, nonwoody ground covers have an effective root depth of less than 3 feet and can be labeled “shallow rooted” for use in steep terrain. Grasses also belong in this category. Shallow-rooted plants should not be used as permanent cover on steep slopes unless they are interplanted at approximately 10-foot centers with spreading shrubs and approximately 20-foot centers with hillside-anchoring, taller shrubs, or small trees. Interplanting is also required in stabilization of fill slopes.

Woody ground cover shrubs generally are moderately deep-rooted, with roots ranging from 3 to 6 feet in depth, and can be effectively used on slopes in conjunction with taller shrubs and trees. Most plant species found in the coastal sage community fall into this root depth category. Plants with roots ranging from 6 to 15 feet or more in depth include most woody shrubs in the chaparral community as well as small, drought-tolerant landscape trees. Very few commercially available woody ground covers, with the exception perhaps of prostate coyote brush and prostrate acacia, have an
This native plant (center) is dying because of root rot caused by over-watering of the young coyote brush around it.

This home, designed to be fire-safe, also has a 30-foot setback safety zone. Landscaping with native plants protects this slope. Native Dicentra is blooming the second season after a fire.

Effective root depth greater than 6 feet. Plants with roots much in excess of 15 feet include some native shrubs such as scrub oak and laurel sumac, and trees of larger stature. Laurel sumac and laurel oak are two of the most water-efficient species within the chaparral plant community, and their root systems can mimic removal of steep slopes. Additionally, Laurel sumac has one of the highest fuel moisture contents of any tall-growing woody chaparral plant tested; it does not contain or readily accumulate fine, dead fuels when compared to sages and ceanothus species; and can be easily maintained. It takes much heat energy to drive the moisture out of Laurel sumac leaves and dry them to the ignition point, thereby making the plants quite fire-retardant if they are occasionally pruned and flammable fuels regularly removed around them.

Drought Tolerance and Sprouting Ability

Drought tolerance and sprouting ability are also important considerations when selecting plants. Water will be an increasingly scarce and expensive resource in the future. The plant's ability to survive on little water, as well as to regrow after a fire may determine the degree to which it can be recommended for specific uses, particularly in the dry years of the future. Native plants can mean spending fewer years maintaining them, improving both landscape and hillside repairs.

Herbaceous or semiwoody ground cover also offered advantages over deep-rooted trees in the landscape setting. However, California pepper and black locust, for example, are one of the few native trees that are easily pruned into short-stemmed trees. Coniferous trees, such as Oregon white oak, can be pruned by removing branches to provide shade and slope stability.

Most native plants also respond to fire. The named ornamental trees can be planted close to structures, providing shade and slope stability.

Most native plants also respond to fire, and some native shrubs such as sugarbush, scrub oak, ceanothus species, and chokecherries can be nurtured into short-stemmed trees. At spacings of about 25 feet, these plants can be kept relatively fire-resistant through occasional pruning. Responding native broadleaved trees such as oaks, Catalina ironwood, and California black walnut can be easily pruned into short-stemmed trees, providing shade and slope stability.
The use of herbicides and pre-emergent chemicals must be closely monitored in hillside landscaping. Overuse can kill landscape plants and sterilize soils. Fortunately, the columns in Table 1 headed “aspect,” “soil depth,” and “irrigation” must be read as a unit. Soil depth figures apply to coastal regions of southern California and attempt to show relative watering needs of the plants listed, except where indicated. The plant species listed, except when indicated, are able to form a solid ground cover for the slopes recommended. However, there is no guarantee that the species prevent slippage when the ground cover is not maintained properly. The homeowner is responsible for the maintenance of any drainage devices on his land and past soil slip problems.

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Slope Engineering

Hillside Landscaping

Some ground covers and low-fuel shrubs commonly used for hillside landscaping in southern California are listed in Table 1 along with their characteristics and some suggested uses. The list is not exhaustive, and the plants are not necessarily the most effective for planting on slopes. The columns in Table 1 are to be read as a unit and show the relationship between aspect, soil depth, and irrigation requirements. For example, the first line shows that on a north-to-east aspect with less than 1 foot of soil depth, established plants require summer irrigation once to twice every month. The remaining columns are self-explanatory.

Figure 7. Rock strata may determine hillside problems. As a compromise between watershed and fire safety, a combination of taller, deeper-rooted plants in conjunction with slope engineering techniques, proper water conservation methods, and “fire retardant” plants is available in Living More Safely in the Chaparral-Urban Interface. No book, however, should be a substitute for on-site expert advice from specialists familiar with hillside landscaping and hillside problems.

Summary

The term “fire retardance” as used in Table 1 reflects the inherent flammability characteristics of the plant, and the differences in fuel volume, inherent flammability, and size of the fire that a particular plant will produce. A plant with “low” fire retardance may carry the fire, and can produce flames approaching 25 feet in length. A plant with “medium” fire retardance may reduce the rate of fire spread. Under similar conditions, a 2-foot-tall solid ground cover with “high” fire retardance is expected to produce a flame less than 10 feet long and reduce the rate of fire spread. Any drainage devices on the hillside where the layering (dip) of the bedrock parallels the slope, as shown in Figure 7, should be undertaken with extreme caution because of potential soil slippage. The next three columns are to be read as a unit and show the relationship between aspect, soil depth, and irrigation requirements. For example, the first line shows that on a north-to-east aspect with less than 1 foot of soil depth, established plants require summer irrigation once to twice every month. The remaining columns are self-explanatory.

The following example will illustrate the use of Table 1. For example, under extreme autumn fire conditions, a plant with “low” fire retardance may ignite readily, will carry the fire, and can produce flames approaching 25 feet in length. A plant with “medium” fire retardance may reduce the rate of fire spread. Under similar conditions, a 2-foot-tall solid ground cover with “high” fire retardance is expected to produce a flame less than 10 feet long and reduce the rate of fire spread. Any drainage devices on the hillside where the layering (dip) of the bedrock parallels the slope, as shown in Figure 7, should be undertaken with extreme caution because of potential soil slippage. The next three columns are to be read as a unit and show the relationship between aspect, soil depth, and irrigation requirements. For example, the first line shows that on a north-to-east aspect with less than 1 foot of soil depth, established plants require summer irrigation once to twice every month. The remaining columns are self-explanatory.

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### Table 1. Evaluation of some popular low-growing plants used in hillside landscaping (check with your local nursery for plants adapted to your site conditions and climate).

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>EFFECTIVE...</th>
<th>LENgTH</th>
<th>Width</th>
<th>On slopes (degrees)</th>
<th>On aspects</th>
<th>At soil depths (feet)</th>
<th>At elevations (feet)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacias</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>1 to S</td>
<td>&lt;1M</td>
<td>Up to 2,000</td>
<td></td>
</tr>
<tr>
<td>Arctotheca calandra (Capeweed)</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>1 to S</td>
<td>&lt;1M</td>
<td>Up to 2,000</td>
<td></td>
</tr>
<tr>
<td>Baccharis pilularis</td>
<td>Dwarf varieties</td>
<td>Coyote brush</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>1 to S</td>
<td>&lt;1M</td>
</tr>
<tr>
<td>Ceanothus giaeus, horizontalis</td>
<td>Carmel creeper</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>&lt;1M</td>
<td>Up to 3,000</td>
<td></td>
</tr>
<tr>
<td>Citrus</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>1 to S</td>
<td>&lt;1M</td>
<td>Up to 4,000</td>
<td></td>
</tr>
<tr>
<td>Delosperma, Dracontium (Tea tree)</td>
<td>Spreading</td>
<td>4 to 6 inches tall</td>
<td>Low to medium</td>
<td>3 to 6 inches tall</td>
<td>Medium to low maintenance. No foot traffic. Showy pink flowers. Ground cover for easily accessible dry areas. Excellent for cut edges. Full sun to partial shade. Short-lived.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedera canariensis</td>
<td>Algerian ivy (Firesky Ivy)</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>1 to 2S</td>
<td>&lt;1M</td>
<td>Up to 2,000</td>
<td></td>
</tr>
<tr>
<td>Osteosperum fruticosum</td>
<td>African daisy</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>&gt;1M</td>
<td>&gt;1M</td>
<td>Up to 2,000</td>
<td></td>
</tr>
<tr>
<td>Vinca major</td>
<td>Parakeet</td>
<td>1 to 2M</td>
<td>2M</td>
<td>2M</td>
<td>&gt;1M</td>
<td>&gt;1M</td>
<td>Up to 2,000</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:**
- **W** = Week
- **M** = Month
- **S** = Summer
- **=** Suitable for this category
- **=** Plant not totally suitable for this category

**COMMENTS:**
- Prune back every five years or less often. No foot traffic. Inconspicuous flowers. Hard to establish from flats in midsummer. Healthy green color. Full sun.
- Low maintenance. No foot traffic. Showy light blue flowers. Dwarf beards. Ground cover for easily accessible dry areas in soils with good drainage. Little or no water in the summer. Deep watering only when needed. Full sun to partial shade. Short-lived.
- Low maintenance. Full sun. High foliage moisture and weak root system causes slippage on steeper slopes, especially fills. Full sun to partial shade. May become invasive. Do not plant within a native plant environment.
- Low maintenance. Full sun. Moderate to high maintenance. Tolerates foot traffic excellent for minimizing erosion on long steep cuts. Leaves will burn if water is neglected. Excellent understory to a variety of trees if maintained and cut back so that it does not climb. No flowers. Full sun to shade. May become invasive.
Native plants can be thinned out to form an effective greenbelt zone that is easily maintained. Concrete bench drains should be cleaned as required.

Landscape maintenance is necessary to keep man-made structures separated from surrounding vegetative fuels; to keep the amount of vegetative fuels at a safe level; to create a safety zone for residents, firefighters, and fire equipment; and to assure that water flow from the property is channeled properly. Giving correct priorities to maintenance needs and carrying out maintenance and safety inspections on a regular basis is the key to minimizing the effects of "natural" disasters.

For fire and watershed maintenance, the area around the home should be divided into three perimeters of defense:

1. 0-to-30-foot setback zone: year-round maintenance (regular watering)
2. 30-to-100-foot greenbelt zone: seasonal maintenance (watering as needed)
3. 100-to-200-foot thinning zone: yearly inspections, periodic maintenance (dry zone).

0-to-30-Foot Setback Zone—Maintenance Adjacent to the Home

The area within approximately 30 feet of the home is most critical for fire and watershed safety. Maintenance of non-flammable landscaping such as lawns, border plantings, flower gardens and vegetable beds, and structures such as pools, concrete decks, and recreation areas help to reduce fire hazards close to the home. This area, for the most part, is level and all water from it should drain toward the street. Rain gutters, pipes, and drainage devices should be cleaned out on a regular basis. Additionally, all debris such as leaves, pine needles, twigs, and overhanging branches should be removed from the roof before the fire season begins.

Foundation shrubs and trees are a necessary part of the landscaping. However, these plants often grow into "urban forest" fuel problems, so that landscape plants, rather than surrounding native plants, become the primary cause of fire losses. Year-round maintenance should consist
The intensity of fire maintenance beyond 100 feet from the home is dictated by the topography, design, and exterior builds of the structure. Minimum maintenance should be directed on an annual basis toward reducing the amount of combustible vegetation as well as the age and continuity of the vegetative cover. The level of intensity will depend on the natural vegetation growing on the property, the height to which it is maintained, and the fire behavior of the vegetation. The most critical factor affecting this maintenance is the potential for the vegetation to spread fire and reduce the likelihood of a fire originating on the property.

The intensity of fire maintenance can range from very light to extremely heavy. The amount of maintenance required for the fire-prone zones is determined by the potential for the vegetation to spread fire and reduce the likelihood of a fire originating on the property. The level of intensity will depend on the natural vegetation growing on the property, the height to which it is maintained, and the fire behavior of the vegetation. The most critical factor affecting this maintenance is the potential for the vegetation to spread fire and reduce the likelihood of a fire originating on the property.

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When caught in a wildfire:

1. If you plan to stay, evacuate your pets and all combustible items from around the house. This includes lawn and poolside furniture, umbrellas, jackets, gloves, a handkerchief to shield the face, water and carry with you for protection a long-sleeved shirt or jacket, gloves, a handkerchief to shield the face, water and carry with you for protection a long-sleeved shirt or

2. Be properly dressed to survive the fire. Cotton fabrics are preferable to synthetics. Wear long pants and boots. A heavy woolen, cotton, or cloth jacket, and gloves

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4. Close or cover outside attic, eave, and basement vents. This will eliminate the possibility of sparks blowing into hidden areas within the house. Close window shutters.

5. Place a ladder against the roof of the house. If you have portable gasoline-powered pumps to take water from a swimming pool or tank, etc., will come in handy now. For several hours after the fire, get your neighbors to help fight it. The water in your pool and the water in your garbage cans, sinks, toilets, and water reservoirs.

6. Locate garden hoses so they will reach any place to help stabilize outside-inside pressure, but close all doors inside the house to prevent draft. Open the damper on your fireplace screen so sparks will not ignite the room. The fireplace screen so sparks will not ignite the room. The

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9. Back your car into the garage and roll up the car windows.

10. Turn off pilot lights.

11. Close windows and doors to the house to prevent draft. Open the damper on your fireplace screen so sparks will not ignite the room. The

12. Turn off pilot lights.

13. If you have time, take down your drapes and curtains. Close all venetian blinds or noncombustible window coverings to reduce the amount of heat building up inside the windows. Open the damper on your fireplace screen so sparks will not ignite the room. The fireplace screen so sparks will not ignite the room. The

14. Ask your fire or forestry personnel for professional advice. One of the firefighters’ principal responsibilities is to protect your property. If your home is threatened by wildfire, you may be contacted by fire or law enforcement officials and advised to evacuate. If you are not contacted in time to evacuate, or if you decide to stay with your home, the following suggestions will increase your chances of safely and successfully defending your property.

Before the fire approaches your house:

1. If you plan to stay, evacuate your pets and all combustible items from around the house. This includes lawn and poolside furniture, umbrellas, jackets, gloves, a handkerchief to shield the face, water and carry with you for protection a long-sleeved shirt or jacket, gloves, a handkerchief to shield the face, water and carry with you for protection a long-sleeved shirt or

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When the fire approaches:

As the firefront approaches, go inside the house. Stay calm; you are in control of the situation. As the firefront approaches, go inside the house. Stay calm; you are in control of the situation.

When the fire passes:

Stay calm; you are in control of the situation. As the firefront approaches, go inside the house. Stay calm; you are in control of the situation.

After the fire passes:

Remember:

Topographic Chimneys

These are narrow, steep, dead-end canyons that concentrate heat, explosive gases, and updrafts. These places could include road cuts, rock walls, rock outcroppings, rock piles, large boulders, etc., for fire to build up. These places could include road cuts, rock walls, rock outcroppings, rock piles, large boulders, etc., for fire to build up.

Topographic Saddles

These are narrow, steep, dead-end canyons that concentrate heat, explosive gases, and updrafts. These places could include road cuts, rock walls, rock outcroppings, rock piles, large boulders, etc., for fire to build up.

When caught in the open:

When you are caught in the open, the best temporary shelter will be found where fuel is sparse and flames and heat exposure is hopefully reduced. These places could include road cuts, rock walls, rock outcroppings, rock piles, large boulders, etc., for fire to build up.
In the Open

Look for areas with sparse fuel (for example, soft chaparral such as black sage or grassland rather than chamise chaparral), if possible, within a depression. Clear as much fuel as you can while the fire is approaching and then lie face-down in the depression and cover yourself with anything that will shield you from the heat. Smoke may create as great a survival problem as the flames. If you are caught on a steep mountaintop or sharp ridge, the backside (or fire leeward side) will provide more safety. Be aware, however, that fire eddies often curl over ridges. Before hiking in fire-prone areas, seek additional advice from wildland firefighting and park service personnel. They may supply pamphlets and can give you specific tips for wildland fire survival.

Remember, even a seemingly non-threatening grass fire is a potential threat to your life if you are caught in the open and exposed to its quick heat release. Breathing very hot air can scar your lungs and kill you.

Stay calm—you are in control of the situation.

If you decide to stay with your home during a wildfire, evacuate all family members who are not essential to protecting the home.

Dress properly to shield yourself from the heat and flames.

Take steps to prepare your home for the approaching fire.

As the fire approaches, move inside and stay until it has passed.

Move outside, survey the situation, take action, and help neighbors.

If caught in the open, seek shelter where fuel is sparse.

Remember that wildfires are erratic, unpredictable, and often underestimated. Life safety should be the most important consideration.

Evacuation and Road Closure

Fire suppression agencies are responsible for determining when the need for evacuation exists and the jurisdictional law enforcement agency is responsible for carrying out an ordered evacuation. The purpose is to protect people from life-threatening situations. Under Section 409.5 of the California Penal Code, the jurisdictional law enforcement agency is responsible for carrying out an ordered evacuation and closing and restricting access to disaster areas.

Persons have the right to stay on their property if they so desire, if in doing so, they do not hinder the efforts of fire personnel or do not contribute to the danger of the disaster situation. In fires or floods, able-bodied persons who wish to remain may be able to aid public safety personnel in saving their property or may even save their own home unassisted.

If at all possible, there should be several phases of road closures within an impending disaster area:

(1) In an area that could potentially be involved in the disaster, but presently is not, people without purpose (such as people not living in the area) would be restricted from entry to reduce traffic problems or the potential for looting.

(2) In areas of imminent danger with limited access or egress, people would be discouraged from entry even though they live in the area. Those who are adamant after being informed of the dangers would probably be permitted entry.

(3) In areas presently involved in an emergency where extreme danger to life exists and where traffic must
The steps to take in emergency rehabilitation of an area after a fire depend on the location of the property, the time of year, the intensity of the fire, the erosion potential, and the kinds of plants present. Figure 8 illustrates some post-fire emergency rehabilitation measures.

If the fire occurs in midsummer and the burned watershed cover consists primarily of landscape plants with a large proportion of resprouting ground covers and shrubs, all that may be necessary for rehabilitation is to periodically irrigate and perhaps fertilize. Adequate moisture, heat, and nutrients will encourage rapid resprouting so that a good foundation plant cover can be established before the heavy winter rains return.

Postfire management of native plants is similar to the procedure outlined above. Plants should be allowed to resprout and establish themselves from seeds. Thinning of seedlings, as well as removal of dead stems and branches, can begin the following spring after the rainy season is over. The first year’s thinning of native plants should be very light, followed by heavier thinning the second and third years after clear species patterns and densities have emerged. Timing becomes critical when a hot fire occurs in late fall. In neighborhoods where steep, long slopes overlook canyons and endanger the lives and property of canyon residents, neighbors should work together to quickly establish an emergency vegetation cover before heavy winter rains begin.

Vegetative Measures
Aerial emergency seeding efforts by public agencies primarily employ ryegrass which can be viewed as a “band-aid” measure meant to duplicate or complement nature’s own “band-aid” of post-fire herbaceous plants. However, in 1980 the biological group of resource professionals and scientists of an interagency task assembled to produce an Interagency Field Guide for Vegetative Emergency Burn Rehabilitation for California recommended against broadcast-seeding burns in chaparral and coastal sage scrub ecosystems. They stated that seeding is primarily done in response to perceived political and social needs, and as far as the natural system is concerned the introduction of exotic species, in most cases, is not necessary. Nevertheless, when homeowners face excessive erosion on steep, burned slopes previously largely covered with landscaping where little or no post-fire herbaceous regeneration of native vegetation can be expected, a quick vegetative emergency erosion control cover is often required that could include hand-seeding with grains. This is especially important if down-slope values to be protected are homes.

Seeds of annual grasses present before the fire will germinate quickly with any moisture because most seeds are incorporated into the soil layer. On the other hand seeds exposed at the soil surface will not germinate and root unless encouraged by 4 to 5 days of moist, overcast weather. The least time- and labor-consuming emergency measure for homeowners is therefore to broadcast annual ryegrass or other quickly germinating species at the rate of 15 to 30 lb. per acre, rake the seeds about 1/2 inch deep into the soil where feasible, and then water lightly and regularly. Watering may be necessary two or more times a day during hot weather.

Grasses have fibrous root systems that are very effective in competing for soil moisture. When replanting of shrubs or ground covers is planned for the spring or begins immediately after the fire, annual grasses must be separated from
such plants and should be seeded in contour rows. Such rows should parallel the slope and are easily established with a hoe. They should be spaced about 3 feet apart but could be closer in steeper terrain and on fine-textured soils with low infiltration rates. The ground covers are planted between the contour rows. Contours are very effective in reducing erosion because the ridges and trenches form a series of mini-terraces allowing water to infiltrate into the soil. This increases plant growth, reduces runoff, conserves soil moisture, and prevents soil losses. Do not use contour rows in active landslide areas. Cover these areas with plastic using the guidelines discussed in the next section.

Barley is an effective species for contour row planting. Seeds should be soaked overnight in gunnysacks (cloth bags) in leaky trashcans. The recommended seeding rate is 150 lb./acre with about an equal amount of ammonium phosphate fertilizer. Seeds should be buried about 1/2 to 1 inch deep and the soil tamped. Where possible, the site should be lightly watered to promote rapid germination. Rapid germination also reduces excessive depredation of seeds by birds and rodents. Barley is readily available from feed stores, but buy only re-cleaned barley; rolled barley (used for feed) will not germinate. Annual grasses, such as ryegrass and barley, die with the return of hot weather and then present a fire hazard and also continued competition with landscape plants if allowed to go to seed. Plants should therefore be cut down to stubble in spring before this happens and the stubble used as mulch.

Mechanical Measures

Flood control offices in many jurisdictions provide excellent advice and pamphlets on mechanical measures for use in emergency situations. The most effective methods for homeowner use are wooden deflector barriers (usually plywood) and sandbags that rechannel mudflow safely around structures. Figure 9 shows that the placement of such structures is critical in achieving the desired results. Sandbags should be filled half-full with sand or soil and the flaps tied under and pointed in the direction of the water source. Bags should be tamped and tightly fitted and each layer staggered, as when building a brick wall. Rows should not be more than three layers high unless they are pyramidal or supported by a building.

Figure 8. Immediately after a fire, emergency measures should be taken to rehabilitate the watershed.

Figure 9. Sandbags divert flowing mud.

Barley contours effectively reduce soil erosion.
Summary

The plastic is well anchored and covers the whole slope. Some other effective measures are check dams to reduce gully erosion, chain link fences to control rockfall, and guniting of steep slopes and spreading of plastic to eliminate water infiltration. Plastic sheets should be 6 mil (0.006-inch-thick) because they are sturdier than 4 mil. The slope should be covered completely and the plastic should be anchored by partially filled sandbags. On steep slopes, the sandbags should be connected using ropes. Plastic sheets that cover only a small section of a slope (as when some sheets have blown away) concentrate the rainwater and are responsible for localized saturated soils and slippage.

Applying The Lessons Learned

Basic Wildland-Urban Interface Fire Safety Concepts

1. A wood shingle roof has a generally higher probability of catching fire from burning firebrands than native chaparral vegetation.
2. Even with 100 feet of 'brush clearance,' a house with a wooden roof has a 21 times greater probability of burning from a house with a non-wood roof.
3. A small two-story structure on level ground can create enough radiant heat during its burnout period to ignite wood siding, etc., on homes within an approximately 60-foot radius.
4. While the burnout period for chaparral fuels in a wind-driven fire is generally less than 15 minutes, the burnout period for structural fuels (houses) may last hours. During this time period your home may be subjected not only to invisible radiant heat from a neighboring burning house, but also to visible firebrands that may invade your home unnoticed.

(Re) landscaping

5. For a point source of radiation such as a tree or bush, the heat intensity decreases with the square of the distance from the source. Thus, a tree burning within 20 feet of a window transfers only one-fourth the heat to the house compared with a tree burning within 10 feet of a window, and only one-sixteenth the heat compared with a tree burning within 5 feet.
6. For a line source of radiation, such as a hedge or row of trees, the heat intensity only decreases with the distance instead of the square of the distance and a house receives the heat from all points along the line. Thus the heat intensity received 20 feet from a burning hedge is still one-half that at 10 feet and one-fourth that at 5 feet.
7. Increasing the number of flammable landscape plants around a home and increasing the number of tree species can create enough radiant heat during its burnout period to ignite wood siding, etc., on homes within an approximately 60-foot radius.
8. The term 'fire resistant' is a misnomer in relation to flammability of plants and gives the homeowner a false sense of security, as all plants will burn under the proper weather conditions. In the absence of the "safety" plants, the home will burn from the surrounding fuel.
9. Landscape fuels that burn adjacent to a house create enough conductive and radiant heat to ignite wood siding, wooden decks, trellises, and to break windows. Unprotected windows are often the 'Achilles heel' for fire entry even on a fire-safe designed home.
10. A six-foot-tall mature, continuous chaparral fuel mass burning on steep slopes can create enough radiant heat during its burnout period to ignite upslope homes more than 100 feet away (in other words, on a slope).

Survey fire damage in relation to topography (the whole watershed) and structures.

Obtain expert advice immediately and coordinate quick action with other residents.

Use vegetative as well as mechanical emergency measures effectively, taking care to avoid possible damage to other properties.
Lessons from the Ashes

A Few More Things to Keep In Mind In Protecting Your Home

1. 75% of buildings destroyed had wooden shingle roofs. The natural ventilation of wood shingles over 1-hour fire resistive materials in new construction permits the wind effect to be much more powerful. In areas of heavy winds, this factor increases building destruction.

2. 80% of dwellings destroyed had unobstructed eave edges. The eaves of these buildings took up to one half hour of water pressure and flow was dependent on limited hydrant use. When water is available, with the latter being generall

3. 92% of dwellings destroyed had windows as their point of fire entry. Windows are the most effective way to be protected against a fire. All windows should be protected with clear, tempered glass and be able to withstand a large amount of water pressure. Windows can be protected with fire-resistant glazing, reflective coatings, or fire-resistant film.

4. 3% of dwellings destroyed had underflooring as their point of fire entry. Underflooring is a common point of entry for wildland fires. This is because it provides a path for the fire to spread quickly. It is the same as when your family attempts to take simultaneous showers throughout the house. Firefighters and water available, with the latter being genera...
and a return of the fire as the wind shifts can extend this burnout period to many hours. Homes must therefore be attended throughout the burnout period of surrounding fuels.

Fire Exposure (Risk)

Wildland fire exposure or risk can be defined as the probability that a given home, subdivision, or community will experience wildland fires within a given time period. So, be prepared, understand, and work to minimize the risks. Fire becomes a way of life and it is highly likely that your community will encounter fire on an average of about every ten years if situated adjacent to or within watersheds covered by native chaparral.

The degree of exposure (risk) an individual home, community, or section of a community faces is a function of the fire history (frequency and severity) in the surrounding vegetation or probability of fire within a certain vegetation type, increase in fire frequency brought on by encroachment of the community into flammable watershed areas and nearby human activity, and site-specific exposure factors such as the proximity to flammable vegetation, siting of structures, construction materials, construction style, etc. (see: Fire Hazard).

Remember that effective fire protection starts in the planning process. Homeowners and homeowner associations, as responsible partners, should get involved in this process as well as in preparing pre-fire plans in cooperation with fire protection agencies. Allowing homes to be rebuilt after a fire on an even larger scale and with greater density, not significantly improving the infrastructure to enhance ingress and egress, not widening streets and driveways, not improving water supply and water flow, and not strictly enforcing fuel modification and maintenance that eliminate flammable fuels leads to man-made fire disasters on a cyclical basis.

To account for site-specific risk and hazard factors often not addressed by public agencies, fire insurance carriers generally require "brush clearance" much in excess of 200 feet. Satellite imagery to assess risk factors such as proximity to "brush" will be an ever-increasing first low-cost step in the future in assessing insurability in fire-prone environments.

Where the risk cannot be spread, insurers are unlikely to insure or will raise their rates.

Fire Hazard

You, as a homeowner or homebuyer, can affect fire hazard much more than fire risk. By remembering and understanding the basic principles, you can turn the odds in your favor and make your home and community safer. So, again, be prepared, understand where you can be effective, and work to minimize the risks.

Wildland fire hazard can be defined as the potential severity of a fire in a given area due to the availability of:

1. Natural vegetative fuels
   - Type and size of fuels, age, fuel continuity, fuel loading (amount of fuel), litter production (amount and type of litter produced by the plant during its seasonal growing cycle).

2. Landscaping/ornamental fuels
   - Type and size of fuels, age, fuel continuity, fuel loading (amount of fuel), litter production (amount and type of litter produced by the plant during its seasonal growing cycle), maintenance of flammable landscape vegetation (or lack thereof) to make it less flammable or "nonflammable."

3. Man-made structural fuels and their design/location
   - Size and type of flammable structural components such as wood roofs, wood decks, operable windows, non-protected exterior walls, and underfloor and attic vents (permitting fire entry into the interior of the structure), flammable fencing and railing, non-skirted underflooring of houses or decks (unprotected from fire entry from underneath or the sides), flammable outdoor furniture, etc.

4. Topography (terrain)
   - Topography and the siting of a structure are very critical factors in fire exposure or risk. For example, fire can travel uphill 16 times faster than downhill. A fire spreading uphill resembles a fire spreading before a strong wind. Other factors being equal, a fire burning on level ground will spread twice as fast when it reaches 30% slopes. The rate of spread will again double as the slope makes 55%. Heat energy release rates will be correspondingly faster and airflows as indicated by greater flame length per foot of fireline.

5. Typical fire weather conditions
   - Low humidity, strong drying winds, and high temperature.

6. The overall development pattern of the area
   - Location and siting of homes within mountain topography, homes located along ridges with minimum setbacks, homes located in saddles or small valleys, homes located on ridgelines near the top and sides, homes located on the west side of ridges, homes located on the south side of ridges, and on the leeward side of ridges.

Remember that effective fire protection starts in the planning process. Homeowners and homeowner associations, as responsible partners, should get involved in this process as well as in preparing for fire plans in cooperation with fire protection agencies. Allowing homes to be rebuilt after a fire on an even larger scale and with greater density, not significantly improving the infrastructure to enhance ingress and egress, not widening streets and driveways, not improving water supply and water flow, and not strictly enforcing fuel modification and maintenance that eliminate flammable fuels leads to man-made fire disasters on a cyclical basis.
To Provide Added Fire Protection in and Around Your Home and Garage:

- Remove any combustible structural fuels within the 100-foot minimum safety zone. Realize that wooden fences can act as fire fuses that lead fire directly to a structure.
- As required by code, screen the chimney to prevent sparks from igniting the roof or flammable vegetation. Use half-inch wire mesh.
- Keep all trees, shrubs, or other vegetation adjacent to or overhanging any structure free of dead limbs, branches, and other combustible matter.
- Keep the roof and rain gutters free of dead leaves, twigs, and other combustible matter.
- Keep all combustible rubbish in non-combustible rubbish containers with tight-fitting lids.
- Stack woodpiles neatly and compactly in a location remote from buildings, wood fences, and other combustible materials.
- Keep all flammable fuels for a minimum of twenty feet from liquefied petroleum gas storage tanks.
- Provide effective fuel breaks in excess of twenty feet wide on either side of roads leading to your house by clearing all flammable fuels. Greatly increase this distance in steeper terrain.

California law requires you to:

1. Maintain an effective firebreak by removing and clearing away flammable vegetation and combustible growth from areas within (a minimum of) thirty feet of buildings or structures (Exception: Single specimens of trees, ornamental shrubbery, or similar plants used as ground covers, provided they do not form a means of rapidly transmitting fire from the native growth to any structure);
2. Maintain additional fire protection or firebreaks by removing brush, flammable vegetation and combustible growth located within one hundred feet of such buildings or structures, when such buildings or structures are designated by the California Fire Department of Forestry and Fire Protection's Fire Hazard Severity Zone Classification system. Exception: Grass and other vegetation located more than thirty feet from buildings or structures need not be removed where necessary to stabilize the soil and prevent erosion;
3. Remove portions of trees which extend within ten feet of the outlet of a chimney;
4. Maintain trees adjacent to or overhanging a building free of deadwood; and
5. Maintain the roof of a structure free of leaves, needles, or other dead vegetative growth.
Honorable Commissioners, here are the Malibu Monarch Project’s comments on agenda item 5B. Please let me know if you have any questions, Thank you, Patt
November 17, 2019

Re: Agenda Item 5B  11-18-19LCPA No. 19-002 and ZTA No. 19-004—Foster Fire-Resistant Landscapes

Honorable Planning Commissioners,

The Malibu Monarch Project (MMP) respectfully asks you not to ban planting Eucalyptus trees in Monarch overwintering sites.

By way of back ground: tens of thousands of monarchs used to overwinter in Malibu in years past and 3 years ago the count was less than 700. The Woolsey fire destroyed many overwintering butterflies and their roosting sites

Eucalyptus are the favorite roosting sites for Monarchs who overwinter in Malibu. They provide the proper roosting site conditions such as dappled sunlight and wind breaks which Monarch’s need for protection.

The California monarch is on the verge of extinction for 3 specific reasons: pesticide use, development and loss of overwintering habitat. An exception needs to be made since many of these known and yet to be known sites are in need of restoration due to site habitat loss from the fire, development and old age and are located in developable areas.

Also, if a monarch restoration expert recommends an ordinance banned tree species for a site’s restoration an exception should be made in this instance also for the sake of the Monarch’s survival.

Hardening structures with known methods, restricting development in high risk areas of the wildland urban interface, burying electrical wires, and excluding use of equipment and practices known to spark a fire, such as weed whackers, on red flag days would clearly temper our exposure to wildfire and keep the wildland safer as well.

Thank you for considering our comments.

Sincerely.

Patt Healy,
Malibu Monarch Project.
The Malibu City Council will hold a public hearing on **Monday, January 13, 2020, at 6:30 p.m.** in the **Council Chambers, Malibu City Hall, 23825 Stuart Ranch Road, Malibu, CA**, for the project identified below.

**LOCAL COASTAL PROGRAM AMENDMENT NO. 19-002 AND ZONING TEXT AMENDMENT NO. 19-004** – The City Council will consider amendments to the Local Coastal Program (LCP) and Malibu Municipal Code Title 17 (Zoning Ordinance) and Chapter 9.22 (Landscape Water Conservation), and the Planning Commission’s recommendations to foster more fire-resistant landscapes, including creating new restrictions on certain species and mulches, height limits in areas of overhead power line easements, spacing of accessory structures, restrictions on flammable materials and plants within five feet of structures, and related amendments.

Applicant: City of Malibu  
Location: Citywide  
Case Planner: Jessica Cleavenger, (310) 456-2489, extension 234  
jcleavenger@malibucity.org

In accordance with the California Environmental Quality Act (CEQA), Public Resources Code Section 21080.9, CEQA does not apply to activities and approvals by the City as necessary for the preparation and adoption of an LCP amendment. This application is for an LCP amendment which must be certified by the California Coastal Commission before it takes effect. Local Implementation Plan Section 1.3.1 states that the provisions of the LCP take precedence over any conflict between the LCP and the City’s Zoning Ordinance. In order to prevent an inconsistency between the LCP and the City’s Zoning Ordinance, if the LCP amendment is approved, the City must also approve the corollary amendment to the Zoning Ordinance. This amendment is necessary for the preparation and adoption of the LCPA and because they are entirely dependent on, related to, and duplicative of, the exempt activity, they are subject to the same CEQA exemption. In addition, the Planning Director has analyzed the proposed amendments. CEQA applies only to projects which have the potential for causing a significant effect on the environment. Pursuant to CEQA Guidelines Section 15061(b)(3), where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. The Planning Director has determined that there is no possibility the amendment will have a significant effect on the environment and accordingly, the exemption set forth in Section 15061(b)(3) applies.

A written staff report will be available at or before the hearing. All persons wishing to address the City Council will be afforded an opportunity in accordance with the Council’s procedures.

Copies of all related documents are available for review at City Hall during regular business hours. Written comments may be presented to the City Council at any time prior to the beginning of the public hearing.

**IF YOU CHALLENGE THE CITY’S ACTION IN COURT, YOU MAY BE LIMITED TO RAISING ONLY THOSE ISSUES YOU OR SOMEONE ELSE RAISED AT THE PUBLIC HEARING DESCRIBED IN THIS NOTICE, OR IN WRITTEN CORRESPONDENCE DELIVERED TO THE CITY, AT OR PRIOR TO THE PUBLIC HEARING.**

If there are any questions regarding this notice, please contact Jessica Cleavenger, at (310) 456-2489, extension 234.

**BONNIE BLUE**  
Planning Director

Publish Date: December 19, 2019