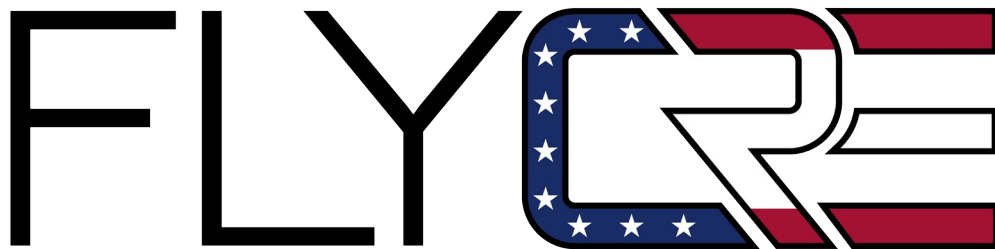


Defensible by Record: Documenting Fuel Modification Zones and Defensible Space



A DIVISION OF BURGE CORPORATION

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Revised October 2026

Executive Summary

A fuel modification zone is never finished. It is planted, inspected, and signed off once, and then it has to be maintained for as long as the homes behind it stand. Where the Orange County Fire Authority is the fire authority, its fuel modification guideline requires maintenance at least twice a year and says fuel modification zones must be maintained "in perpetuity" [1]. Grass grows back, dead plants pile up, and crews change. Years later, when someone asks whether the work was done, the answer usually comes down to whatever records the association or agency happened to keep.

Those records matter more every year. California's defensible space law already requires 100 feet of defensible space around structures in covered areas [2][3]. A statewide ember-resistant Zone 0 rule for the first 5 feet around buildings was approved by the State Board of Forestry and Fire Protection on August 19, 2026, but the package was withdrawn from Office of Administrative Law review on September 8, 2026, and as of October 21, 2026 it has not been resubmitted or taken effect [4][5][18]. Sellers of homes in high and very high fire hazard severity zones must provide documentation of defensible space compliance where a local ordinance or inspection program provides for it, or else agree in writing that the buyer will obtain it [6]. The California Department of Insurance recognizes two community-wide programs, Firewise USA and Fire Risk Reduction Communities, in its Safer from Wildfires framework [7].

Aerial documentation gives associations, cities, and fire agencies a dated, consistent record of fuel modification zones and community edges, captured on a schedule that matches the maintenance cycle. It does not replace fire agency inspections or make compliance determinations. It gives the people who make those decisions a clear record of what the ground looked like, and when.

This paper covers the rules that drive fuel modification maintenance, what published research says about defensible space, how aerial records are captured, and where the limits of that record are. It closes with a recordkeeping checklist any association or agency can use.

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1. Introduction

Most of the wildfire conversation in California focuses on rules: how wide the zones are, which plants are allowed, what Zone 0 will require. Far less attention goes to the question that comes after the rules: how anyone shows, years later, that the rules were followed.

1.1 The Maintenance Problem

A fuel modification zone can be built correctly and still fall out of standard in a single season. OCFA's guideline lists the routine tasks: cutting grasses to 4 inches after they seed, removing dead and dying vegetation and litter, removing invasive species, maintaining irrigation, and replacing dead plants with approved species [1]. Most of that work happens on slopes residents rarely walk, done by crews the board may never meet.

1.2 Who Answers for It

Under OCFA's guideline, the property owner is responsible for maintaining fuel modification areas, and in common areas the CC&Rs must make the association's fire prevention maintenance duty an express obligation [1]. When an association maintains these areas, the guideline says the landscape maintenance company or property manager shall inspect them throughout the year [1]. Cities and fire agencies carry their own responsibilities for public open space, parks, and the edges where public land meets private communities.

In every case, someone is accountable for work that is hard to see and easy to forget.

1.3 Scope of This Paper

This paper is about records: what rules create the need for them, what a good record looks like, and how aerial capture can provide one. It does not explain how to design a fuel modification zone, which plants to use, or how to comply with any specific requirement. Those questions belong to the fire authority having jurisdiction, licensed landscape architects, and other qualified professionals.

2. The Rules That Apply

2.1 State Defensible Space Law

Two state laws set the baseline. Public Resources Code section 4291 applies to anyone who owns, leases, controls, operates, or maintains a building in the State Responsibility Area. It requires 100 feet of defensible space around the structure, but not beyond the property line, with more intense fuel reduction between 5 and 30 feet and an ember-resistant zone within 5 feet [2]. Government Code section 51182 sets a parallel requirement for occupied structures in very high fire hazard severity zones designated by local agencies [3].

CAL FIRE describes the same space in three parts: Zone 0 within 5 feet of the home, Zone 1 within 30 feet, and Zone 2 out to 100 feet or the property line [8].

2.2 Zone 0: Adopted, Not Yet in Effect

The ember-resistant zone in state law does not take effect until the Board of Forestry updates both its regulations and its defensible space guidance document. Under PRC 4291(g), it then applies to new structures, and to existing structures three years after that date [2].

- **August 19, 2026:** the Board approved Zone 0 regulations for homes in the State Responsibility Area and in very high fire hazard severity zones in Local Responsibility Areas, with a phased schedule for existing homes [4].
- **September 8, 2026:** the Office of Administrative Law lists the Zone 0 Defensible Space package, file 2026-0828-03E, as withdrawn [5].
- **October 21, 2026:** OAL's list of emergency regulations under review includes no Zone 0 package [18].

As of this writing, the Zone 0 regulation is not in effect. Associations and agencies should watch for a final rule, because its phase-in deadlines will run from the date it takes effect. A dated record of conditions near structures before and after that date will be useful no matter what the final text says.

2.3 Orange County Fire Authority Guideline C-05

Where OCFA is the fire authority, fuel modification plans for new construction follow Guideline C-05, dated January 1, 2026. It applies to new structures in or next to wildfire risk areas, including State Responsibility Areas and High and Very High Fire Hazard

Severity Zones in Local Responsibility Areas [1]. The standard fuel modification width is 170 feet, measured horizontally from the structure [1].

Zone	Minimum Width	Summary of Requirements
Zone A	20 feet	Flat and irrigated, highly fire resistant plants, no combustible construction. The first 5 feet is an Immediate Zone with no combustible bark or mulch and no dead or dying plants.
Zone B	50 feet	Automatically irrigated, approved plants, no combustible construction. May be dry where plant selection and design allow.
Zone C	50 feet	Not irrigated. Shrub and tree coverage up to 50 percent, with required spacing near structures.
Zone D	50 feet	Not irrigated. Shrub and tree coverage up to 70 percent.

Source: OCFA Guideline C-05 [1]. Zone widths can shift under an approved plan, so the approved plan for each property controls.

The guideline also sets the maintenance schedule. Maintenance happens a minimum of twice each year, first in middle to late spring and again in early to middle fall [1]. OCFA may inspect established fuel modification areas, and owners must keep their approved fuel modification plans [1].

2.4 Other Jurisdictions

Not every Orange County city follows OCFA. Laguna Beach, for example, has its own fire department, and OCFA does not perform inspections there [9]. Outside Orange County, county fire departments and city fire agencies set their own fuel modification standards. The first step for any association or agency is to confirm which fire authority has jurisdiction and which standard applies.

3. Why Records Matter

The rules create obligations. Records are how an association or agency shows it met them.

3.1 Proving the Maintenance Cycle

A twice yearly maintenance requirement leaves two questions every year: was the work done, and was it done in the right window [1]? Invoices show that a contractor was paid. They do not show what the slope looked like afterward. A dated record captured after each cycle shows what the slope looked like on a known date, which helps the people responsible answer both questions.

3.2 Property Sales

Since July 1, 2021, California Civil Code section 1102.19 has required sellers of residential property in high or very high fire hazard severity zones to give buyers documentation of compliance with the state defensible space law or a local vegetation management ordinance, where a local ordinance or inspection program provides for it. If the seller has not obtained that documentation, the buyer and seller must agree in writing that the buyer will [6]. For associations whose common area zones border those homes, a dated record of those zones can be useful context during a sale.

3.3 Insurance Recognition

The California Department of Insurance's Safer from Wildfires framework describes mitigation at three levels: the structure, its immediate surroundings, and the community [7]. At the community level it recognizes two programs:

- **Firewise USA:** a recognition program sponsored by the National Fire Protection Association [7]. Sites range from 8 to 2,500 dwelling units, update a community risk assessment every five years, keep a three year action plan, hold an outreach event each year, and invest at least one volunteer hour per dwelling unit each year or the equivalent value [10]. Activities are reported each year to keep the site in good standing [11].
- **Fire Risk Reduction Communities:** a list of local agencies in the State Responsibility Area or very high fire hazard severity zones that meet best practices for local fire planning, maintained by the Board of Forestry under PRC 4290.1. The current list took effect July 1, 2026, and runs until the next list on July 1, 2028 [12].

Both programs ask participants to show work over time. Recognition and any resulting insurance treatment are decided by the program and the insurer, not by a documentation provider. A dated record makes that reporting easier and the work easier to see.

3.4 Disputes

Fuel modification disputes tend to come up after something goes wrong: a fire, a slope failure, a neighbor complaint, or a contract disagreement with a landscape vendor. In each case, the party with a clear, dated record of conditions over time is in a better position than the party relying on memory. Our companion paper, *The Future of Roofing Documentation*, covers how digital records are treated as evidence.

4. What the Research Says About Defensible Space

Defensible space works best when it is maintained close to structures. A study of 1,000 destroyed and 1,000 surviving structures in San Diego County, using pre-fire aerial photography from fires between 2001 and 2010, found that defensible space was most effective at 5 to 20 meters from the structure (about 16 to 66 feet; the published abstract lists 16 to 58 feet). Distances beyond about 30 meters, roughly 100 feet, did not add protection, even on steep slopes [13].

The same study found that reducing woody cover by up to 40 percent immediately next to a structure, and keeping vegetation from overhanging or touching it, were among the most effective measures. The authors also found that factors such as housing density and distance from major roads explained structure loss better than defensible space alone, and concluded that defensible space is one part of a broader approach that includes building design, education, and land use planning [13]. CAL FIRE likewise calls the first five feet from a home the most important [8].

Two lessons follow for recordkeeping. First, conditions near structures and at community edges deserve the closest attention, because that is where the research points. Second, defensible space is one factor among many, which is why a record should describe conditions plainly and leave conclusions about risk to the professionals responsible for them.

The San Diego County study itself depended on aerial photography taken before each fire [13]. Imagery taken for some other purpose ended up being the record researchers used to reconstruct what defensible space looked like. A record captured on purpose, on a schedule, is better.

5. Aerial Documentation of Fuel Modification Zones

5.1 What Is Captured

Every FlyCRE flight captures four data layers, delivered in this order:

- **Orthomosaic:** a single overhead map of the zone built from many overlapping images, so the whole slope can be viewed and compared, not just the parts someone photographed.
- **Thermal:** a record of surface temperature differences at the time of capture.
- **Asset Visibility:** close views of features such as v-ditches, access roads, fences, and the transition between irrigated and non-irrigated zones.
- **Multispectral:** additional spectral bands that can be used to calculate vegetation indexes such as NDVI. The U.S. Geological Survey describes NDVI as a way to quantify vegetation greenness, useful for understanding vegetation density and changes in plant health [14].

Each layer has limits. NDVI measures greenness, not plant species, flammability, or compliance with a planting palette. Thermal imagery records surface temperatures at one moment and depends on conditions at the time. Neither one tells anyone whether a zone meets a standard. They give qualified people a consistent record to review.

5.2 Timing

The most useful records line up with the maintenance cycle. For areas under OCFA's guideline, that means capturing around the spring and fall maintenance windows [1]. A capture before maintenance shows the starting condition. A capture after shows the result. Over several years, the series shows how conditions change from cycle to cycle, so qualified reviewers can compare them against the approved plan.

5.3 Consistency

Saved flight plans let us fly the same area the same way each cycle, so each record lines up with the last one. Every image carries a GPS position and capture time, and every capture is stored so it can be compared with earlier and later flights.

5.4 Measurements

Orthomosaic maps allow approximate measurements, such as the width of a cleared band or the area of a slope. These measurements are for tracking and reference. They are not

survey grade, are not certified by a licensed land surveyor, and should not be used to establish property lines or legal boundaries. Survey grade work belongs to a licensed surveyor under a separate agreement.

5.5 Privacy

Wildfire documentation focuses on fuel modification zones, common areas, open space, and community edges. Flight plans are limited to the areas we are hired to document, and we do not target private residences or property outside that scope. All data is loaded into our encrypted platform and released only to the client who ordered it. It is never published or used as a sample.

6. Flight Operations and Wildfire Safety

Every FlyCRE flight is flown under 14 CFR Part 107 by FAA certified remote pilots, within visual line of sight, and at or below 400 feet above ground level except as Part 107 allows near structures [15]. Near airports in controlled airspace, we request authorization through the FAA's LAANC system before takeoff [16].

We schedule wildfire documentation outside active incidents, never during one. Temporary flight restrictions are typically put in place during wildfires, and an unauthorized drone near a fire can ground firefighting aircraft until the area is clear. Interfering with firefighting can bring federal civil penalties of more than \$25,000 under current inflation adjustments, as well as criminal prosecution [17][19]. As the Know Before You Fly campaign puts it: if you fly, we can't [17]. We do not fly near active fires.

7. What Aerial Documentation Does Not Do

FlyCRE provides aerial site documentation, and we are deliberate about where that service ends:

- **No compliance determinations:** we do not determine whether a zone, a lot, or a community meets any fire code, guideline, ordinance, or regulation. The fire authority having jurisdiction makes that call.
- **No inspections:** our records do not replace inspections by OCFA, CAL FIRE, or any other fire agency, or the inspections throughout the year the guideline expects from a landscape company or property manager.
- **No plant identification guarantees:** imagery shows vegetation cover and greenness. Identifying species and confirming an approved palette belongs to qualified professionals on the ground.
- **No insurance outcomes:** recognition programs and insurers decide eligibility and pricing. We do not promise discounts or outcomes.
- **No surveying:** measurements are approximate and not survey grade.

Within those limits, a dated aerial record gives boards, managers, agencies, and their contractors a shared reference that does not depend on anyone's memory.

8. Conclusion

Fuel modification is a maintenance obligation that never ends, carried out on slopes few people see, by crews that change over time. The rules are getting more detailed, the attention from buyers and insurers is growing, and statewide Zone 0 rules are still pending. Through all of it, the same question keeps coming back: can you show the work was done?

A dated aerial record, captured on the same plan every cycle and stored where it can be compared year over year, is a direct answer to that question. It does not decide anything for the fire authority, the insurer, or the board. It gives each of them the same clear picture of the ground.

Documented Today, Defensible Tomorrow.

Appendix

A. Regulatory References

- **Public Resources Code section 4291:** defensible space in the State Responsibility Area, including the ember-resistant zone and its timing [2].
- **Government Code section 51182:** defensible space in locally designated very high fire hazard severity zones [3].
- **Public Resources Code section 4290.1:** the Fire Risk Reduction Community list [12].
- **Civil Code section 1102.19:** defensible space documentation in residential sales in high and very high fire hazard severity zones [6].
- **OCFA Guideline C-05 (January 1, 2026):** fuel modification plans and maintenance where OCFA is the fire authority [1].
- **14 CFR Part 107:** operating rules for small unmanned aircraft [15].

B. Research and Agency Guidance

Syphard, Brennan, and Keeley, *International Journal of Wildland Fire*, 2014 [13]

- **What they did:** compared 1,000 destroyed and 1,000 surviving structures in San Diego County fires from 2001 to 2010 using pre-fire aerial photography.
- **What they found:** defensible space was most effective at 5 to 20 meters (about 16 to 66 feet) from the structure, distances beyond about 100 feet did not add protection, and reducing woody cover right next to structures was among the most effective measures.
- **Why it matters:** the area closest to structures deserves the closest documentation, and aerial imagery was the record the researchers relied on.

CAL FIRE Defensible Space Guidance [8]

- **What it says:** defensible space is described in three zones out to 100 feet, and the first five feet from a home is called the most important.
- **Why it matters:** records should capture conditions near structures and community edges, not only the outer slopes.

USGS on NDVI [14]

- **What it says:** NDVI quantifies vegetation greenness and helps in understanding vegetation density and changes in plant health.
- **Why it matters:** NDVI is a useful layer for tracking change, but greenness is not the same as compliance or fire behavior.

C. Recordkeeping Checklist for Associations and Agencies

This checklist applies whether or not you use aerial documentation. It is a starting point, not legal advice.

- Confirm which fire authority has jurisdiction over each fuel modification area and which guideline or ordinance applies.
- Keep a copy of every approved fuel modification plan, as OCFA's guideline requires [1].
- Confirm in your CC&Rs and vendor contracts who is responsible for each zone.
- Schedule maintenance in the windows your guideline sets, and record the date each cycle is completed.
- Capture a dated record of each zone after every maintenance cycle, using the same coverage each time.
- Keep the original files and note who captured them, when, and how.
- Log fire agency inspection notices, findings, and follow-up actions with dates.
- If you participate in Firewise USA, keep records of hours and investment as you go, not at renewal time.
- If you are a city or fire agency, track the Fire Risk Reduction Community list cycle and its application windows.
- Watch for the final Zone 0 regulation and its effective date.

D. Sources

- [1] Orange County Fire Authority. "Guideline C-05, Vegetation Management Guideline: Technical Design for New Construction Fuel Modification Plans and Maintenance Program." January 1, 2026. <https://storageocfaprod001.blob.core.windows.net/blobocfaprod01/2025/12/C-05-Vegetation-Management-2025.pdf>
- [2] California Public Resources Code section 4291. https://california.public.law/codes/public_resources_code_section_4291
- [3] California Government Code section 51182. https://california.public.law/codes/government_code_section_51182
- [4] Rural County Representatives of California. "California Board of Forestry and Fire Protection Approves Zone 0 Defensible Space Regulations." August 20, 2026. <https://www.rcrcnet.org/general/california-board-of-forestry-and-fire-protection-approves-zone-0-defensible-space-regulations/>
- [5] California Office of Administrative Law. "Recent Actions Taken on Emergency Regulations" (file 2026-0828-03E, Zone 0 Defensible Space, withdrawn September 8, 2026). https://oal.ca.gov/emergency_regulations/Recent_Actions_Taken_on_Emergency_Regulations/
- [6] California Civil Code section 1102.19. https://california.public.law/codes/civil_code_section_1102.19
- [7] California Department of Insurance. "Safer from Wildfires." <https://www.insurance.ca.gov/01-consumers/200-wrr/safer-from-wildfires.cfm>
- [8] CAL FIRE. "Defensible Space." <https://www.fire.ca.gov/dspace>
- [9] Orange County Fire Authority. "Defensible Space Disclosure FAQ." <https://ocfa.org/rsg/faq>
- [10] County of Placer. "Firewise USA Community Program." <https://www.placer.ca.gov/5739/Firewise-USA-Community-Program>
- [11] National Fire Protection Association. "Firewise USA Annual Renewal Information." <https://www.nfpa.org/education-and-research/wildfire/firewise-usa/annual-renewal-information>
- [12] California State Board of Forestry and Fire Protection. "Fire Risk Reduction Community List." <https://bof.fire.ca.gov/projects-and-programs/fire-risk-reduction-community-list>
- [13] Syphard AD, Brennan TJ, Keeley JE. "The role of defensible space for residential structure protection during wildfires." *International Journal of Wildland Fire*, vol. 23, no. 8, 2014, pp. 1165 to 1175. <https://doi.org/10.1071/WF13158>
- [14] U.S. Geological Survey. "Landsat Normalized Difference Vegetation Index." <https://www.usgs.gov/landsat-missions/landsat-normalized-difference-vegetation-index>
- [15] Code of Federal Regulations, 14 CFR Part 107. "Small Unmanned Aircraft Systems." <https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-107>
- [16] Federal Aviation Administration. "UAS Data Exchange (LAANC)." https://www.faa.gov/uas/getting_started/laanc
- [17] Know Before You Fly. "Avoid Wildfires." <https://knowbeforeyoufly.org/compliance-and-safety/avoid-wildfires/>
- [18] California Office of Administrative Law. "Emergency Regulations Under Review" (checked October 21, 2026). https://oal.ca.gov/emergency_regulations/emergency_regulations_under_review/

[19] Code of Federal Regulations, 14 CFR 13.301. "Inflation adjustments of civil monetary penalties" (maximum for 49 U.S.C. 46320 violations on or after December 30, 2024).
<https://www.law.cornell.edu/cfr/text/14/13.301>