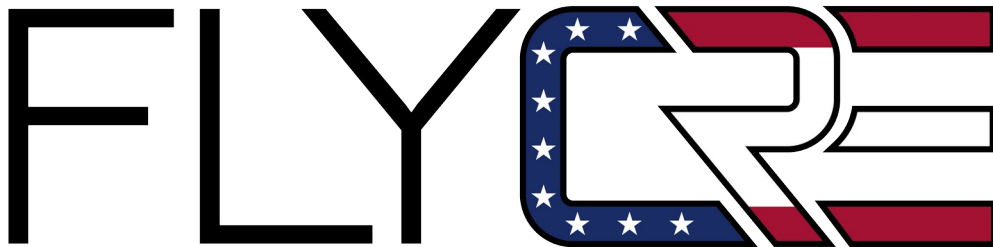


**Every Acre on Record:
Documenting Parks, Sports Fields, Golf Courses,
and Orchards**



A DIVISION OF BURGE CORPORATION

Prepared by: FlyCRE Chief Technology Officer

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Executive Summary

California has started drawing lines through its lawns. Under AB 1572, potable water may not be used to irrigate nonfunctional turf on most public agency properties starting January 1, 2027, on other commercial, industrial, and institutional properties starting January 1, 2028, and in association common areas starting January 1, 2029 [1]. Turf in an area a property owner or governmental agency has designated for recreation, such as a sports field, golf course, playground, or picnic ground, or for community gatherings, is functional [2]. Turf in street rights of way and parking lots, and turf fenced off to permanently prevent people from using it for recreation or assembly, is not [2].

At the same time, the State Water Board's conservation regulation gives every urban retail water supplier an annual water use objective, with landscape budgets for commercial, industrial, and institutional sites on dedicated irrigation meters and new requirements for large landscapes [3]. Owners of commercial, industrial, and institutional properties (other than cemeteries) with more than 5,000 square feet of irrigated area, and associations with more than 5,000 square feet of irrigated common area, will have to certify compliance to the State Water Board every three years, starting June 30, 2030, and June 30, 2031, respectively [1].

All of this turns on a question that is easy to ask and hard to answer from the ground: what is planted where, how is each area used, and how has it changed? Parks departments, golf courses, school districts, associations, and orchard operators manage large properties they rarely see from above.

Aerial documentation gives them a dated, measured map of every managed acre, captured the same way each season. This paper covers the water rules reshaping managed landscapes, why records matter under those rules, what published research says about aerial sensors on turf and orchards, and where the limits of an aerial record are. It closes with a recordkeeping checklist.

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1. Introduction

People notice managed landscapes. A park, a golf course, or a row of orchard blocks is judged by residents, members, buyers, and regulators who see it every day. The people responsible for those landscapes are being asked to use less water, convert some turf, keep the rest playable, and show their work.

1.1 Who This Paper Is For

- **Parks and recreation departments** managing parks, sports fields, medians, and open space.
- **Golf courses** balancing playing conditions with water budgets.
- **School districts and sports complexes** maintaining fields that see heavy use.
- **Associations and master planned communities** with common area turf facing the 2029 deadline.
- **Orchard and agricultural operators** tracking blocks across a growing season.
- **Landscape contractors** who maintain these properties and need a record of their work.

1.2 Scope of This Paper

This paper is about documentation. It does not tell anyone which turf to remove, how to irrigate, how to fertilize, or how to classify a specific area under the law. Those decisions belong to property owners, water suppliers, the State Water Board, and qualified professionals such as agronomists, golf course superintendents, licensed landscape architects, and certified irrigation specialists.

2. The Water Rules Reshaping Managed Landscapes

2.1 AB 1572 and Nonfunctional Turf

AB 1572 (Chapter 849, Statutes of 2023) added definitions to Water Code section 10608.12 and created a phased ban in section 10608.14, among other changes [1][2]. SB 1139 (Chapter 88, Statutes of 2026), effective January 1, 2027, amends the enforcement and penalty provisions of section 10608.14 so that the Monterey Peninsula Water Management District may enforce the ban and impose penalties under a local ordinance or policy; it does not change the deadlines [12]. The definitions matter as much as the deadlines.

- **Functional turf:** turf located in a recreational use area or community space. Turf enclosed by fencing or other barriers that permanently prevent human access for recreation or assembly is not functional turf [2].
- **Recreational use area:** an area designated by a property owner or a governmental agency to accommodate foot traffic for recreation, formal or informal, including sports fields, golf courses, playgrounds, picnic grounds, and pet exercise areas [2].
- **Community space:** an area designated by a property owner or a governmental agency for civic, ceremonial, or other community events or social gatherings [2].
- **Nonfunctional turf:** any turf that is not functional turf, including turf in street rights of way and parking lots [2].

The ban on potable water for nonfunctional turf phases in by property type [1]:

Property Type	Ban Begins	Certification to the State Water Board
Department of General Services properties	January 1, 2027	Likely covered by subdivision (e)(1), which applies to institutional properties with more than 5,000 square feet of irrigated area; State Water Board guidance does not yet address these properties [1][13]
Local government, public agency, and public water system properties (outside disadvantaged communities)	January 1, 2027	Likely covered by subdivision (e)(1), which applies to institutional properties with more than 5,000 square feet of irrigated area; State Water Board guidance does not yet address these properties [1][13]

Property Type	Ban Begins	Certification to the State Water Board
Other institutional properties, and all commercial and industrial properties (cemeteries excluded)	January 1, 2028	Owners with more than 5,000 square feet of irrigated area (cemeteries excluded), starting June 30, 2030, then every three years through 2039
Association, common interest development, and community service organization common areas	January 1, 2029	Owners with more than 5,000 square feet of irrigated common area, starting June 30, 2031, then every three years through 2040
Public agency properties in disadvantaged communities	January 1, 2031, or when state funding is available, if later	Likely covered by subdivision (e)(1), which applies to institutional properties with more than 5,000 square feet of irrigated area; State Water Board guidance does not yet address these properties [1][13]

Source: California Water Code section 10608.14 [1]. The ban does not apply to the extent water is needed to keep trees and other perennial non-turf plantings healthy or to address an immediate health and safety need, and the State Water Board may postpone a deadline by up to three years for good cause [1]. The ban does not apply to individual residential properties, but association common areas are covered [4][13].

2.2 The State Water Board's Conservation Regulation

The State Water Board's regulation, known as Making Conservation a California Way of Life, took effect January 1, 2025 [3]. Among its provisions:

- **Water use objectives:** each urban retail water supplier calculates an annual objective and, beginning January 1, 2027, demonstrates compliance each year [3].
- **Landscape budgets:** the objective includes budgets for residential outdoor use and for commercial, industrial, and institutional landscapes on dedicated irrigation meters, with efficiency factors that tighten in steps through 2040 [3].
- **Large landscapes:** commercial, industrial, and institutional landscapes of half an acre or larger on mixed-use meters must be identified, then served by dedicated irrigation meters or in-lieu technologies with best management practices, on deadlines that run through 2039 [3].
- **Remote sensing:** the regulation accepts measurements collected with accurate remote sensing methods as a way to document newly constructed landscape area, and lists remote sensing as an example of the in-lieu technologies suppliers may use for large landscapes [3].

The practical effect is that suppliers will be measuring irrigated landscape area and tracking it over time, and the property owners they serve can expect closer attention to it. These rules are written for urban landscapes; orchard and agricultural operators should confirm with their water supplier whether any of them apply.

2.3 Turf Replacement Programs

Rebate programs help pay for turf conversion. The regional turf replacement program described by the Municipal Water District of Orange County requires approval before work begins, a mandatory pre-inspection, pre and post project photos, and a mandatory post-inspection that measures the completed area, with the final rebate based on that measured area [5]. Commercial applications are capped at 50,000 square feet and public agency applications at 200,000 square feet per application, and projects must stay compliant for 15 years [5].

3. Why Records Matter

Every one of these rules depends on knowing what is on the ground, where, and when.

3.1 The Functional Line Is a Mapped Line

Whether turf is functional depends on whether the property owner or a governmental agency has designated the area for recreation or community gatherings, and whether fencing or other barriers permanently prevent access [2]. On a park, a golf course, or an association's common area, that line runs through the property. A dated map showing where turf sits, where the fences and paths are, and how areas are laid out gives owners and their advisors a clear starting point for those decisions.

3.2 Before and After Conversion

Turf conversions change a property permanently. A record captured before conversion shows what was there. A record captured after shows the result. Rebate programs run their own inspections and measurements [5], but an owner's own dated record of the property as a whole is useful long after a single rebate file is closed.

3.3 Certification Cycles

Certification every three years through 2039 or 2040 [1] means larger commercial, industrial, and institutional owners and associations will need to show the same thing four times over nearly a decade. A consistent series of records, captured the same way each cycle, makes that easier to support.

3.4 Budgets, Boards, and Contracts

Golf course owners, park commissions, and association boards regularly approve water budgets and landscape contracts. A dated map of conditions across the whole property lets them see what changed and where, without relying on a walk of selected areas. It also gives owners and contractors a shared record of the property's condition when a contract starts or ends.

4. What the Research Says About Aerial Sensors on Turf and Orchards

Published research has tested aerial sensors on turf and orchards [6][7][8]. The results are promising, and the authors are candid about the limits.

- **Turf:** a 2016 study compared NDVI measured by a drone with a multispectral sensor against NDVI from a handheld ground sensor on several warm season turfgrasses. The two were strongly correlated, with correlation coefficients from 0.83 to 0.97 depending on the grass. The authors concluded that drone imagery could assess nitrogen status and its variation within a species, and suggested drones suit large areas such as golf courses, while a handheld sensor is cheaper and more practical for small areas [6].
- **Orchards:** a 2012 study flew a drone with thermal and hyperspectral cameras over a citrus orchard under different irrigation treatments. Crown temperature was the best single predictor of stomatal conductance, a measure of how open a leaf's pores are. NDVI, by contrast, had no significant relationship with stomatal conductance in that study [7].
- **Across crops:** a 2015 review of drones for assessing water stress found that multispectral indices such as NDVI relate to plant water status, but that they have performed differently in different crops [8].
- **What NDVI measures:** the U.S. Geological Survey describes NDVI as a way to quantify vegetation greenness, useful for understanding vegetation density and changes in plant health [9].

The studies point to three things. First, aerial data can record meaningful patterns across a large property that are hard to see on foot. Second, no single index tells the whole story, and the same index can behave differently from one crop or grass to another. Third, turning those patterns into decisions about water, nutrients, or plant health requires qualified people who know the site. A record is the starting point for their work, not a substitute for it.

5. Aerial Documentation for Managed Landscapes

5.1 What Is Captured

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

- **Orthomosaic:** a single overhead map of the property built from many overlapping images, showing turf, planting beds, hardscape, fences, and paths in one view.
- **Thermal:** a record of surface temperature differences at the time of capture.
- **Asset Visibility:** close views of features such as irrigation controllers, drains, fencing, cart paths, and the edges of converted areas.
- **Multispectral:** spectral bands that can be used to calculate vegetation indexes such as NDVI [9].

Each layer records how the property looked at one time under one set of conditions. Like any field measurement, thermal and multispectral readings change with time of day, weather, and season. The layers are most useful when compared with earlier captures made the same way.

5.2 Timing

The most useful schedule follows the property's own calendar: the start and end of the irrigation season, before and after renovation or conversion work, and at regular intervals in between. For thermal and multispectral layers, capturing at a consistent time of day and in similar weather keeps records comparable.

5.3 Consistency

Saved flight plans let us fly each property the same way each cycle. 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 area measurements, such as the area of a turf section or a converted bed. They are for tracking and reference. They are not survey grade and are not certified by a licensed land surveyor. Rebate programs and water suppliers use their own measurement methods, and those methods govern their decisions [5].



5.5 Data Ownership and Privacy

All data from every flight is loaded into our encrypted platform and released only to the client who ordered it. It is never published or used as a sample. Flight plans are limited to the areas we are hired to document, and we do not target private residences or property outside that scope.

6. Flight Operations

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 [10]. Part 107 also limits flights over people, so flights over parks, fields, and courses are scheduled around play, practice, and events [10]. In controlled airspace, we obtain FAA authorization before takeoff, through LAANC where it is available [10][11].

7. What Aerial Documentation Does Not Do

FlyCRE documents sites from the air. Here is what we do not do:

- **No agronomic diagnosis:** we do not determine plant health, nutrient status, disease, or the cause of any pattern in the data.
- **No irrigation or fertility recommendations:** decisions about water and nutrients belong to the superintendent, agronomist, or irrigation professional.
- **No classification decisions:** we do not decide whether any area is functional or nonfunctional turf. Under the statute, that turns on designation and access [2], and those decisions rest with the owner, the water supplier, and the agencies that enforce the law.
- **No compliance or rebate outcomes:** water suppliers, rebate programs, and the State Water Board make those decisions.
- **No surveying:** measurements are approximate and not survey grade.

Within those limits, a dated aerial record gives owners, managers, and the professionals they rely on the same view of every managed acre.

8. Conclusion

California's water rules are reaching further into managed urban landscapes. The functional line runs through parks and common areas, large landscapes are being measured against budgets, and certifications will repeat four times through 2039 or 2040.

Through all of it, the same questions keep coming back: what is planted where, how is it used, and how has it changed? A dated aerial record, captured the same way each season, shows what is planted where and how it has changed, with a map instead of a memory. It does not replace the people who make decisions about water, turf, and trees. It gives them a better place to start.

Documented Today, Defensible Tomorrow.

Appendix

A. Regulatory References

- **Water Code section 10608.12:** definitions of functional turf, nonfunctional turf, recreational use area, and community space [2].
- **Water Code section 10608.14:** the nonfunctional turf ban, deadlines, exceptions, and certification [1].
- **California Code of Regulations, Title 23, Chapter 3.5, Urban Water Use Efficiency and Conservation (Making Conservation a California Way of Life):** urban water use objectives and commercial, industrial, and institutional performance measures [3].
- **14 CFR Part 107:** operating rules for small unmanned aircraft, including operations over people [10].

B. Research Summaries

Caturegli et al., PLoS ONE, 2016 [6]

- **What they did:** compared drone-based NDVI with a handheld ground sensor on warm season turfgrasses under different nitrogen rates.
- **What they found:** strong correlation between the two (0.83 to 0.97), and drone imagery tracked nitrogen status within a species.
- **Why it matters:** drone data can record turf patterns across large areas such as golf courses, and the authors note a handheld sensor is more practical for small areas.

Zarco-Tejada, Gonzalez-Dugo, and Berni, Remote Sensing of Environment, 2012 [7]

- **What they did:** flew thermal and hyperspectral sensors over a citrus orchard under different irrigation treatments and compared the data with measurements on the trees.
- **What they found:** crown temperature was the best single predictor of stomatal conductance, while NDVI showed no significant relationship with it.
- **Why it matters:** different layers record different things, and greenness alone does not describe a tree's water status.

Gago et al., Agricultural Water Management, 2015 [8]

- **What they did:** reviewed the use of drones to assess water stress in agriculture.
- **What they found:** multispectral and thermal data relate to plant water status, but indexes have performed differently across crops.
- **Why it matters:** results from one crop or site do not automatically transfer to another, which is why interpretation belongs to people who know the site.

C. Landscape and Water Recordkeeping Checklist

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

- Identify which nonfunctional turf deadline applies to each property you own or manage.
- Map where turf is located on each property and how each area is designated and used.
- Note fences and barriers that permanently prevent access to turf areas.
- Ask your water supplier about its rules, dedicated irrigation meters, and large landscape requirements.
- Capture a dated record before any turf conversion and again after it is complete.
- Keep rebate applications, approvals, inspection results, and measured areas with your own records.
- Keep the same capture schedule each season so records can be compared.
- Store original files with capture dates and who captured them.
- Calendar the certification dates that apply to your properties.

D. Sources

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