

M. Richards



# WATER MANAGEMENT

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## GARDENER'S REFERENCE

*With California's hot, dry summers, paying attention to the water needs of even a small garden can begin to feel like a full-time job. With acres of lush lawns and thirsty plants, how do Filoli gardeners stay on top of the water needs of so much greenery? Garden and maintenance staffs manage Filoli's irrigation needs with a balance of science and art. An irrigation system is used to calculate and supply even, appropriate amounts of water when and where it is needed. Gardeners themselves tweak and fine-tune that*

*system even more, to ensure that those calculations are appropriate to prevent over or under-watering. Even then, it is often a tenuous balance to provide adequate water for mixed plantings of both water-thirsty and drought tolerant plants which share the same root zone.*

### **Filoli's Water Supply**

When Filoli was constructed, many wells were dug, creeks and springs were tapped, and a small reservoir was built on the property. That water supply was never sufficient, and for many years Filoli has drawn water from Crystal Springs Reservoir. In 1988, following California's last major drought, Filoli's water system was upgraded to include an automated irrigation system to improve the efficiency of water use at Filoli, and to decrease our dependence on outside sources of water. As a part of that project, the property's three functional wells were retrofitted, and their water is now pumped into a 25,000-gallon storage tank on the property. We use that well water in our ponds because it does not contain the disinfectant chloramine, which is added to drinking water by the San Francisco Public Utilities Commission, and which is toxic to fish and amphibians. Another 150,000-gallon tank stores water pumped from the neighboring Pulgas Water Temple and supplies the fire main and drinking water, and most of our summer irrigation water.

### **Automated Irrigation System**

Filoli's automated system makes it possible for gardeners to efficiently supply appropriate amounts of irrigation to turf, annuals, and perennials. Filoli has 20 clocks located throughout the gardens that control over three hundred valves, or irrigation zones. Horticulturists program these clocks monthly, basing run times on plant material, soil type, rainfall, and seasonal evapotranspiration (ET) rates (available from the California Irrigation Management Information System, CIMIS). Further adjustments are made throughout the month as needed. While an automated system does improve efficiency, it is not effortless to maintain. Irrigation heads must be monitored, fine-tuned and replaced if mechanisms clog, crack, break, or are blocked. Gardeners also use a soil auger to probe the soil, verifying that the soil is evenly moist to an appropriate depth; some plants must still be spot-watered by hand or using a 'water horse' (see top image), particularly where neighboring plants would suffer from over-watering. Our automatic system is a useful tool to save time and water resources, but it is not a replacement for a gardener's watchful eye.

## Mixed Water Needs

One of the greatest hurdles for watering the garden, and one drawback of automated irrigation, is satisfying the disparate water needs of neighboring plants. Filoli was designed in the style of an English garden, with mixed plantings from five continents growing under and around Mediterranean species and our own native oaks. Today, these plants share the same root zone, but often have vastly different watering requirements. One of our most challenging examples is the effort to maintain lawns around mature native oaks, which are susceptible to oak root fungus if they receive too much summer water. Since being taken over by the National Trust for Historic Preservation, seven of Filoli's mature oaks have failed from sensitivity to neighboring irrigation; establishing new trees in their place is a slow and costly process. If there's a lesson to be learned from this landscape, it is the importance of matching plantings with compatible irrigation needs.



*One way Filoli manages native oaks in lawns is by creating dry zones around the trees that receive no irrigation.*

### Types of Irrigation

Filoli's irrigation system is designed with underground pipe and concealed equipment to preserve the old character of the garden. Surface irrigation pipe is easily damaged in cultivation and planting, and maintenance can be costly.

The majority of Filoli's irrigation runs on overhead sprinklers; these put out large volumes of water (measured in gallons per minute) and uniformly cover large areas, making them perfect for lawns and other planted areas with homogenous water needs. These sprinklers are typically run in the early morning, to minimize drifting spray due to winds, minimize evaporation from the soil surface, and ensure that leaves dry by evening—stagnant, moist foliage is commonly a breeding ground for fungus and plant diseases. Drip, microspray emitters, and soaker hoses are all effective for widely spaced plants like fruit trees and vegetable crops.

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### References & Further Reading:

Herrington, D. (1998). The Filoli Water System. *The Sundial Times*, 17, 4.  
Ewing: [www.ewing1.com](http://www.ewing1.com)  
Rain Bird: [www.rainbird.com](http://www.rainbird.com)  
Hunter: [www.hunterindustries.com](http://www.hunterindustries.com)  
California Irrigation Management Information System:  
[www.cimis.water.ca.gov/cimis/welcome.jsp](http://www.cimis.water.ca.gov/cimis/welcome.jsp)

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*Filoli Gardener's Reference sheets are created by Filoli's garden staff to answer common questions regarding Filoli's traditional horticultural practices. This sheet may be accessed from the Filoli website.*

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