

# **EXHIBIT 4**

http://ucanr.edu/sites/UrbanHort/Water\_Use\_of\_Turfgrass\_and\_Landscape\_Plant\_Materials/Easy\_Calculators\_for\_Estimating\_Landscape\_Water\_h

Easy Calculators for ...

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## Easy Calculators for Estimating Landscape Water Requirements

### Getting Estimates of Landscape Water Demand

The links at the bottom of this page provide calculators that apply the [SLIDE approach](#) to generate water demand estimates for different types of established lawns/turf and landscape plants, whether the water is supplied by precipitation, irrigation, or a combination. The calculators estimate the amount of water particular types of plants require in order to provide acceptable landscape performance. After downloading a calculator file, be certain to click the yellow *Enable Editing* box if it appears at the top of the file page before proceeding.

Separate calculators deal with different types of plant materials and settings. It is assumed the plants are well-established in the landscape. There are calculator pages for:

- lawns/turfgrasses - includes situations where there are trees in a lawn area.
- mass plantings of non-turf, perennial groundcovers - includes situations where trees or shrubs are planted within a mass planting of non-turf groundcover and it is assumed at least 80% of the ground is covered by plant canopy of some sort.
- beds or mass plantings of annual and herbaceous perennial flowers and similar plants - includes situations where trees or shrubs are planted within a mass planting of non-turf groundcover and it is assumed at least 80% of the ground is covered by plant canopy of some sort..
- individual trees or shrubs - any situation where the canopies of trees, shrubs or a mix of them cover less than 80% of the ground within the planting.
- groupings and mixed plantings of trees or shrubs - any situation where the canopies of trees, shrubs, or a mix of them results in canopy covering 80% or more of the ground within a planting.

To use these calculators, you simply need to determine the type of plants and planting involved, then enter

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Current Projects  
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■ Estimating Water Requirements of Landscape Trees in California  
■ Estimating Landscape Water Requirements Using SLIDE  
■ ET: Evapotranspiration and Plant Water Use  
■ Plant Factor or Crop Coefficient: What's the difference??  
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To use these calculators, you simply need to determine the type of plants and planting involved, then enter the size of plant or planted area and the daily reference evapotranspiration (ET<sub>o</sub>) amount for your location. Enter an historic average daily ET<sub>o</sub> or anticipated daily ET<sub>o</sub> value representative of the period if you are using the estimator to predict water needs for a future or hypothetical period. For the most accurate irrigation need estimates when setting irrigation schedules, enter a current (real-time) daily or average ET<sub>o</sub> value that represents the calendar period of interest. Historic and real-time ET<sub>o</sub> values for California locations can be found at the [California Irrigation Management Information System \(CIMIS\) web site](#).

The water requirement for trees located in turfgrass and mixed plantings of non-turf groundcover, annual flowers, or herbaceous perennials will be met by the water requirement of the non-tree plants.

Use the calculator results as starting points for the amount of water required from irrigation or from a combination of precipitation and irrigation. The calculators provide water demand per day or week but not all plantings require irrigation on a daily or

weekly interval. The daily numbers can be used to estimate the amount of water required for plantings that are irrigated every few days and those irrigated less frequently than once per week.

Established turf will require irrigation about 2-3 times per week in summer to perform well, while many non-turf plants will require irrigation every 1-6 weeks depending on their rooting depth and the soil water holding capacity. After setting an initial irrigation schedule, monitor plant performance for a few weeks to a month. If plants appear to be stressed or under-watered, then increase the water amount or apply less water more frequently; if plants appear to be over-watered or if their performance is good but greater water conservation is desired, then decrease the water amount or apply the same amount of water less frequently by extending the interval between irrigations. Many landscape plants, including turf, will survive with minimal performance (little growth or vigor, browning and loss of foliage, wilting, significant thinning out) if water is reduced by up to 30% of the calculated amount for a few months. Always adjust water amount gradually in increments of 10% or change irrigation frequency by a few days at a time and observe plants' performance to see if they respond favorably before making any further adjustment.

**Water Demand Calculators**  
(may not work with Excel for Macintosh)

[Lawn and Turfgrass Water Demand Calculator 2.0](#)

[Mass Plantings or Beds of Annual Flowers and Bedding Plants Water Demand Calculator 2.0](#)

[Mass Plantings or Beds of Herbaceous Perennial Flowers and Similar Plants Water Demand Calculator 2.0](#)

[Non-turf Perennial Groundcover Water Demand Calculator 2.0](#)

[Individual Tree and Shrub Water Demand Calculator 2.0](#)

[Groupings and Mass Plantings of Trees and Shrubs Water Demand Calculator 2.0](#)

In medians where trees are planted with turf and the irrigation of turf has been terminated, I suggest retrofitting with a surface drip irrigation system using tubing with inline emitters and then applying 2-3 inches of organic mulch over the lines. Ideally, if the turf is not yet dead, it should be chemically killed with glyphosate or similar product so that it will not compete for water any further. I also suggest that the drip system wet at least 50% of the soil surface within the median. The less of the tree root system covered the more frequent the area will need to be irrigated since only a portion of the former root system will be receiving water. I recommend you consult with a professional irrigation designer or irrigation engineer to plan retrofit irrigation systems tailored to the unique median configurations.

In the interim, the existing spray irrigation systems can be used to irrigate the trees.

In this scenario where the old spray system is used, I suggest applying water every 7-14 days and using the above calculators to determine how much water (inches of water from spray heads) should be applied for the interval. It might require several shorter irrigation cycles over a couple of days to apply the target amount of water

since this interval could result in applying 1.5 inches of water or more per event so that the tree root system is wetted to the depth needed. Irrigation might be needed by the trees already if irrigation was stopped weeks ago.

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