

Terminology

The **water budget** method is scientifically based and consistent with those used by industry and academic institutions including the Irrigation Association, California Polytechnic Irrigation Training and Research Center and the University of California Davis. The budget methodology is also used in the California Department of Water Resources: Model Water Efficient Landscape Ordinance (MWEL0). The formula used for analysis in the Large Landscape Program is shown below.

- **($E_{to} \times 0.623 \times K_c \times LA / D.U. / 7.48$) = cubic foot (cf) of water**
 1. **E_{to}** = evapotranspiration, a number measured through the Agrimet weather station, maintained by the Bureau of Reclamation. Provides a daily water need for reference plant material.
 2. **0.623** = conversion factor from inches to gallons/square foot (ft²)
 3. **K_c** = weighted crop coefficient (0.7) applied to all the landscaped area of a parcel representative of 66% cool season grass and 34% shrubs found in the average Bend landscape.
 4. **LA** = (ft²) of landscape area on a parcel.
 5. **D.U.** = Distribution Uniformity. An efficiency measure used to account for additional water needed due to system inefficiencies.
 6. **7.48** = gallons per cubic foot of water.

Distribution uniformity refers to how evenly water is applied over a given area in the form of a percentage. The WaterWise Program uses a target uniformity of 70% for any given system. If an irrigation system fails to meet 70%, there is opportunity for maintenance or equipment upgrades to improve the uniformity of irrigation and find additional water savings. If a system has uniformity below 40%, it is not advised to regularly run the system.

When a station's crop type is labeled as "mixed", it means that the station waters an area comprised of multiple plant types. This often means watering to the need of the higher water requiring plant (I.E. lawns) and overwatering the other vegetation (I.E. shrubs). Similarly, if a station is comprised of "mixed" equipment, the time required to water will be longer for the sprinklers that apply water slower, whereas the irrigation equipment on the same station with a faster application will over water in the allotted time.

Precipitation rate refers to how much and how quickly irrigation equipment applies water to a given landscape. Target precipitation rates according to the Irrigation Association are 1-2.5"/hr for fixed sprays, 0.1-1.5"/hr for rotors, and <1"/hr for rotary nozzles.

To further evaluate system performance, WaterWise staff collected data additional to what is required for the budget to uncover problems and determine maintenance solutions. Hydraulics conditions of an irrigation system can have adverse effects on the efficiency of irrigation if data exceeds certain levels. In irrigation, **pressure** refers to the force of water over a one square inch surface area noted as **PSI** (pound-force per square inch). Pressure is essential in pushing water through pipes. **Dynamic pressure** refers to the pressure of the system in operation (water in motion). Manufacturer designed operating pressure is 30 PSI for fixed sprays, 45 -60 PSI for rotors, and 40-45 PSI for rotary nozzles. Higher operating pressures increase the flow of water going through the sprinklers and when too high, can cause misting, increased overspray, run-off, system strain, and high-operating costs. If operating pressures are low, sprinklers may have a reduced throw or not pop-up at all, which is usually due to a leak, clog, or the station being over capacity (too many sprinklers operating at once).

