



Landscaping Water Budget Calculations

This handout describes the equations and values used for water budget calculations to design a landscape, as required by SMC 19.37 and pursuant to State Law. For more details on landscaping, irrigation and usable open space requirements, see **SMC 19.37**.

BACKGROUND

The City of Sunnyvale has adopted additional water-efficient landscaping and irrigation regulations, pursuant to State Law. These regulations are anticipated to stretch our limited water supplies, reduce water waste in irrigation, and increase drought resistance.

In addition to minimum required landscaped areas and usable open space, the following projects are subject to water efficiency design, planting and irrigation requirements:

- **Single-family and duplex projects:** Installation of 500 sq. ft. or more of landscaping in conjunction with NEW construction of a dwelling unit on an existing lot.
- **All other projects:** New landscaping installations 500 sq. ft. or more or rehabilitated landscaping projects 1,000 sq. ft. or more.

Landscaping and irrigation plans are required to be prepared by a **certified professional**, unless the project includes less than 2,500 sq. ft. of landscaped area.

WATER EFFICIENCY DESIGN

Landscaping projects that require review and approval by the Planning Division are required to be based on one of two landscaping design options:

- **Option 1:** NO turf/lawn or high water use plants and at least 80% of plants installed are native, low water or no water use plants. Refer to the *Landscaping Resources* handout.
- **Option 2:** If the turf limitation is not selected, landscaping shall be designed based on **water budget calculations**.

Completed water budget calculation worksheets are required to be submitted if Option 2 is selected. This handout includes the water budget calculation worksheets and instructions for **OPTION 2 for residential projects**. For mixed use projects, consult with the Planner on duty to determine if the calculation worksheets for nonresidential projects or a combination is appropriate.

Refer to the Landscaping Requirements and Landscaping Resources handouts and Chapter 19.37 of the Sunnyvale Municipal Code for more information. Please contact the Planning Division if you have any questions.



MAXIMUM APPLIED WATER ALLOWANCE

PROJECT #:

$$MAWA = (ET_o) \times (0.62) \times [(0.55 \times LA) + (0.45 \times SLA)]$$

ET _o **	San Jose (Sunnyvale)	
		45.30 ETo (inches/year)
Enter total project Landscaped Area		2,400 LA (square feet)
Enter Special Landscaped Area		500 SLA (square feet)
RESULTS:		
		43,392.87 MAWA (gallons/year)

** Eto Values derived from Appendix A of the CA Model Water Efficient Landscape Ordinance, CA Dept. of Water Resources

- MAWA= Maximum applied water allowance (gallons per year)
- ET_o = Reference Evapotranspiration (inches per year)
- 0.55 = ET Adjustment Factor (ETAF) for residential projects
- LA = Planted landscaped area including SLA and not including hardscapes. Also include surface area of water features not using recycled water.
- 0.62 = Conversion Factor (to gallons per square foot)
- SLA = Portion of the Landscaped Area identified as Special Landscaped Area. Also include surface area of water features using recycled water.
- 0.45 = The additional ET Adjustment Factor for SLA (1.0 - 0.55 = 0.45)



ESTIMATED TOTAL WATER USE

PROJECT #:

ETWU = (ETo) x (0.62) x [(PF x HA)/IE + SLA]

Irrigation Efficiency Values

Drip System	0.81
Overhead Spray System	0.75
Water Feature/Other	0.75

ETWU =

Estimated total water use per year (gallons per year)

ETo = Reference Evapotranspiration (inches per year)

PF = Plant Factor from WUCOLS* or equivalent reference subject to approval

HA = Hydrozone Area (square feet)

SLA = Special Landscaped Area (square feet)

0.62 = Conversion Factor (to gallons per square foot)

IE = Average Irrigation Efficiency (minimum 0.75, assumed to be 0.76 for overhead spray system and 0.81 for drip system)

Plant Water Use Type	Plant Factor
Very Low	0 - 0.1
Low	0.2 - 0.3
Moderate	0.4 - 0.6
High	0.7 - 1.0
Water Feature (High)	1.0
SLA	1.0

HYDROZONE TABLE

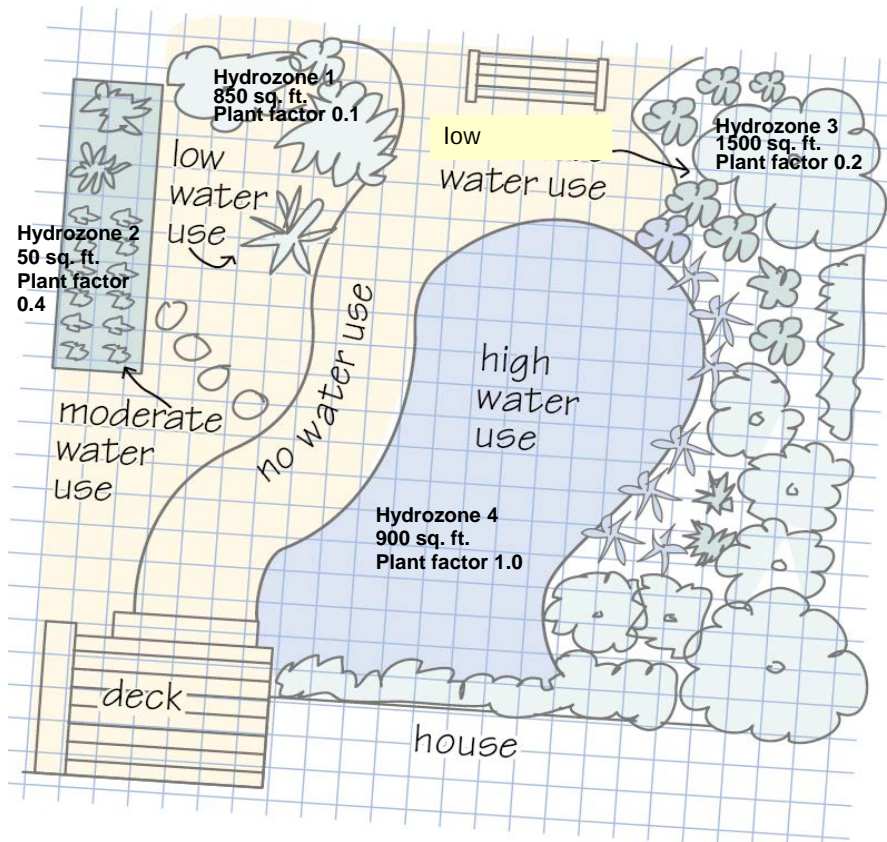
Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Irrigation Type	Irrigation Efficiency (IE)	Hydrozone Area (HA) (sq ft)	[PF x HA]/IE (sq ft)
Zone 1	Very Low	0.1	Drip System	0.81	880	109
Zone 2	Moderate	0.6	Overhead Spray System	0.75	20	16
Zone 3	Water Feature (High)	1.0	Water Feature/Other	0.75	600	800
Zone 4	Low	0.2	Drip System	0.81	400	99
SLA		1			500	
		Sum			2,400	1,023

RESULTS	MAWA	ETWU	Comparison
MAWA =	43,393	ETWU =	42,786 gallons/year

ETWU must be less than or equal to MAWA

ETWU complies with MAWA

Example of a simple landscaping plan and water budget calculations



Graphic obtained from GardenSoft CD software, "Water-Wise Gardening for Santa Clara County" and slightly modified

Total Landscaped Area (including water feature and excluding hardscape) = 3,300 square feet

Estimated Total Water Use CANNOT EXCEED Maximum Applied Water Allowance
Maximum Applied Water Allowance (MAWA):

$$MAWA = (ET_o) (0.62) [(0.55 \times LA) + (0.45 \times SLA)]$$

$$MAWA = (45.3) (0.62) [(0.55 \times 3300) + (0.45 \times 0)]$$

$$= \underline{50,976 \text{ gallons per year}}$$

Estimated Total Water Use (ETWU):

$$ETWU = (ET_o)(0.62) \left(\frac{PF \times HA}{IE} + SLA \right)$$

Hydrozone Table for Calculating ETWU

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	Irrigation Efficiency (IE)	[PF x HA]/IE (square feet)
1	Low water use	0.1	850	0.81	105
2	Moderate water use	0.4	50	0.81	25
3	Low water use	0.2	1500	0.81	370
4	Water Feature/Pool	1.0	900	0.75	1200
Sum of [PF x HA]/IE =					1700

$$ETWU = (45.3)(0.62)(1700)$$

Estimated Total Water Use = 47,746 gallons per year

ETWU 47,746 is less than MAWA 50,976 ETWU complies with MAWA