

Landscaping Water Budget Calculations

This handout describes the equations and values used for water budget calculations to design a landscape, as required by City of Lodi Municipal Code and pursuant to State Law. For more details on landscaping and irrigation requirements, see Section 17.30.

BACKGROUND

The City of Lodi has adopted additional water-efficient landscaping and irrigation regulations, pursuant to State Law for landscape areas greater than 500 sq. ft. that are subject to Permit review.

In addition to minimum required landscaped areas and usable open space, the following projects are subject to water efficiency design, planting and irrigation requirements, and will require review and approval by the Planning Division:

Single-family and duplex projects: Construction of a NEW dwelling unit with installation of 1,000 sq. ft. or more of landscaping.

All other projects: New or rehabilitated landscaping equal to or greater than 1,000 sq. ft.

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.

Directions

The "ETWU" is determined from the design plans and selected plants and water features. It provides an estimate of the water needed annually to keep the landscaping healthy and attractive, and to sustain any water features (if included). The resulting ETWU value must be less than the MAWA value. To calculate the ETWU:

- 1) Enter information in the Hydrozone Table below by referring to the completed landscaping plan. Enter each hydrozone and indicate the plant water use type, plant factor (PF) and size of area (HA).
 - Plants with similar water needs shall be grouped together in hydrozones (see Ch. 17.30 of the Lodi Municipal Code for more detailed requirements).
 - Refer to WUCOLS¹ and other resources for lists of plants and their water needs, or consult your local nursery. If you know the plant water use type, but not the specific "Plant Factor", choose the middle number in the range provided (e.g., for low water use plant, choose 0.2).
 - For areas that mix plants with different water uses, the plant factor is based on the proportion of the respective plant factors (e.g., if half of a 500 square foot area area is high water use at 0.8 and the other half is moderate at 0.5, enter 0.8 for 250 square feet of area and 0.5 for the other 250 square feet of area); OR use the higher water using plant factor (e.g. taking the example above, enter 0.8 for all 500 square feet of area).
 - All water features not using recycled water shall be considered a high water use hydrozone with Plant Factor of 1.0.

¹ WUCOLS means the Water Use Classification of Landscape Species published by the University of California cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

www.water.ca.gov/wateruseefficiency/docs/wucols00.pdf

- 2) Multiply the Plant Factor by the size of the hydrozone area for each hydrozone (PF x HA). Add all of the PF x HA values together.
- 3) If completing this form electronically, the ETWU will be calculated automatically. If completing this form manually, calculate the ETWU by plugging in the values for "PF x HA" (sum of all hydrozones), "IE" (0.7 if the default value) and "SLA" into the ETWU equation.
- 4) The resulting ETWU value must be less than the MAWA. If the resulting ETWU value is greater than the MAWA, modify your landscaping design drawings by considering lower water use plants to replace turf or other high water use plants.

KEY TERMS

Plant Factor (PF) is a factor, when multiplied by Eto, estimates the amount of water needed by plants. For purpose of calculation of the ETWU, use values from WUCOLS, or equivalent reference subject to approval by Public Works.

Irrigation Efficiency (IE) means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices.

ET Adjustment Factor (ETAF) means a factor that adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscaped area. ETAF for a Special Landscaped Area is assumed to be 1.0.

Water feature means a design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas, and swimming pools that are installed in the landscape area.

Special Landscaped Area (SLA) means an area of the landscaping dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water, and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.



MWELO SUBMITTAL CHECKLIST **PERFORMANCE APPROACH**

Submittal Date: _____
Project Address: _____
Applicant Name: _____ Phone: _____

The following checklist provides a list of information that **must be included on the plans** before your permit application can be processed.

Landscape Documentation Package (Title 23, Chapter 2.7 §492.3)

- The project's address, total landscape area, water supply type, and contacts shall be stated on the plans.
- Add, sign and date the following statement on the plans:**
 - "I agree to comply with the requirements of the water efficient landscape ordinance and submit a complete Landscape Documentation Package."*
- Water Efficient Landscape Worksheet that includes a hydrozone information table and water budget calculations shall be submitted for plan check.
- A landscape design plan and irrigation design plan shall be submitted for plan check.

Water Efficient Landscape Worksheet (Title 23, Chapter 2.7 §492.4 and §492.13)

- Incorporate the Water Efficient Landscape Worksheet into plans. Show that the Maximum Applied Water Allowance (MAWA) meets or exceeds the calculated Estimated Total Water Use (ETWU).
- The evapotranspiration adjustment factor (ETAF) for the landscape project shall not exceed a factor of 0.55 for residential areas or 0.45 for non-residential areas.
- For the purpose of calculating ETWU, the irrigation efficiency is assumed to be 0.75 for overhead spray devices and 0.81 for drip system devices.
- The plant factor used shall be from WUCOLS or from horticultural researchers with academic institutions. WUCOLS plants database can be found on-line at: <http://ucanr.edu/sites/WUCOLS/>
- All water features shall be included in the high water use hydrozone. All temporary irrigated areas shall be included in the low water use hydrozone.
- All Special Landscape areas shall be identified on the plans. The ETAF for new and existing (non- rehabilitated) Special Landscape Areas shall not exceed 1.0.

Landscape Design Plan (Title 23, Chapter 2.7 §492.6)

- The landscape design plans, at a minimum, shall:**
 - Delineate and label each hydrozone by number, letter, or other methods.

- Identify each hydrozone as low, moderate, high water, or mixed water use.
 - Identify recreational areas, areas solely dedicated to edible plants, areas irrigated with recycled water, type and surface area of water features, impermeable and permeable hardscape, and any infiltration systems.
- For hydrozone with a mix of both low and moderate water use plants or both moderate and high water use plants, the higher plant factor or the plant factor based on the proportions of the respective plant water uses shall be used. Hydrozones containing a mix of low and high water use plants is not permitted.
- Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape.
- Add note to plans:**
- *“Recirculating water systems shall be used for water features”*
 - *“A minimum 3-inch layer of mulch shall be applied on all exposed soil surfaces of planting areas except turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated.”*
 - *“For soils less than 6% organic matter in the top 6 inches of soil, compost at a rate of a minimum of four cubic yards per 1,000 square feet of permeable area shall be incorporated to a depth of six inches into the soil”*

Irrigation Design Plan (Title 23. Chapter 2.7 §492.7)

- The irrigation plans, at a minimum, shall contain the following:
- Location and size of spate water meters for landscape
 - Location, type, and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices.
 - Static water pressure at the point of connection the public water supply
 - Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station.
- A dedicated water service meter or private sub-meter shall be installed for all (non-residential irrigated landscapes of at least 1,000sqft) (residential irrigated landscape areas of at least 5,000sqft).
- Manual shut-off valves shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency or routine repair.
- Areas less than 10-feet in width in any direction shall be irrigated with subsurface or drip irrigation.
- Overhead irrigation shall not be permitted within 24-inches of any non-permeable surface.
- Add note to plans:**
- *“Pressure regulating devices are required if water pressure is below or exceeds the recommended pressure of the specified irrigation devices.”*
 - *“Check valves or anti-drain valves are required on all sprinkler heads where low point drainage could occur.”*

Required Statements and Certification (Title 23, Chapter 2.7 §492.6, §492.7 and §492.9)

- Add the following statement on the landscape and irrigation plans:
 - *“I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plans”.*
- The final set of landscape and irrigation plans shall bear the signature of a licensed landscape architect, licensed landscape contractor, certified irrigation designer, licensed architect, licensed engineer, licensed land surveyor, or personal property owner.
- Add note to plans:**
 - *“A diagram of the irrigation plan showing hydrozones shall be kept with the irrigation controller for subsequent management purposes.”*
 - *“A Certificate of Completion shall be filled out and certified by either the designer of the landscape plans, irrigation plans, or the licensed landscape contractor for the project”.*
 - *“An irrigation audit report shall be completed at the time of final inspection.”*



MWELo PROJECT INFORMATION

On April 1, 2015, Governor Brown issued Executive Order, EO B-29-15 directing the Department of Water Resources to update a previous Model Water Efficient Landscape Ordinance (MWELo) to be more stringent and reduce landscape water use. Effective December 1, 2015, local agencies are required to enforce the MWELo within their jurisdictions. More information can be found at <http://www.water.ca.gov/wateruseefficiency/landscapeordinance/>

Project Information:

Owner: _____ Phone: _____

Address: _____ Email: _____

Site Address: _____ APN #: _____

Project Type: Residential Non-residential Landscape rehabilitation

- This construction project is exempt because there will not be more than 500 sq ft of landscape area installed. (*This provision is applicable to residential and non-residential projects*)
- Currently, this project does not include landscaping. I am aware that future landscape installations may be required to comply with the Model Water Efficient Landscape Ordinance (MWELo) requirements per California Code of Regulations, Title 23, Division 2, Chapter 2.7.
- The project does incorporate landscaping and will comply with an MWELo Master Plan specific to the subdivision. Subdivision Name: _____
- This project does incorporate landscaping in excess of 500 sq ft. (*Please provide the information below and specify the compliance method to be used*):

Total Landscape Area (sq. ft.): _____ Special Landscape Area (sq. ft.) _____

Turf Area (sq. ft.): _____ Non-Turf Area (sq. ft.) _____

(For residential projects the total turf area shall not exceed 25% of the landscape area. Turf is not allowed in non-residential projects.)

Compliance Method

- Prescriptive (The prescriptive compliance method, also known as Appendix D, may only be used for landscape areas 2500 sq. ft. or less. Items included in Appendix D Checklist on the reverse side shall be included on plans.)
- Performance (See separate Performance Checklist and include information on plans.)

Signature

I certify the above information is correct and agree to comply with the requirements of the MWELo.

Signature of property owner or authorized representative

Date

For Staff Use Only:**MWELO Performance Approach Documentation Checklist**

- Completed Project Information Worksheet
- Landscape Design Plan
- Grading Design Plan
- Irrigation Design Plan
 - Dedicated irrigation sub-meter for non-residential with aggregate area of 1,000 ≥5,000 sqft
 - Flow sensors on all non-residential
 - Dedicated irrigation sub-meter for residential with aggregate area ≥5,000 sqft
 - Flow sensors on all residential with aggregate area ≥5,000 sqft
- Water Efficient Landscape Worksheet(s)
- Soil Analysis Report
 - Soil Texture
 - Infiltration rate
 - pH, organic matter, etc.
- Certificate of Completion: (required after installation, prior to Certificate of Occupancy)
 - Certificate of Installation
 - Irrigation Scheduling
 - Landscape and Irrigation Maintenance Schedules
 - Soil amendment delivery tags
- Irrigation Audit Report (required after installation, prior to Certificate of Occupancy)



WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and it is a required element of the Landscape Documentation Package.

Reference Evapotranspiration (ETo) _____

Hydrozone # /Planting Description ^a	Plant Factor (PF)	Irrigation Method ^b	Irrigation Efficiency (IE) ^c	ETAF (PF/IE)	Landscape Area (sq. ft.)	ETAF x Area	Estimated Total Water Use (ETWU) ^e
Regular Landscape Areas							
					(A)	(B)	
Special Landscape Areas							
				1			
				1			
				1			
Totals					(C)	(D)	
						ETWU Total	
						Maximum Allowed Water Allowance (MAWA)^e	

^a**Hydrozone #/Planting Description**

- E.g
 1.) front lawn
 2.) low water use plantings
 3.) medium water use planting

^b**Irrigation Method**

- overhead spray
 or drip

^c**Irrigation Efficiency**

- 0.75 for spray head
 0.81 for drip

^d**ETWU (Annual Gallons Required) =**

$Eto \times 0.62 \times ETAF \times Area$
 where 0.62 is a conversion factor that converts acre-inches per acre per year to gallons per square foot per year.

^e**MAWA (Annual Gallons Allowed) = $(Eto) (0.62) [(ETAF \times LA) + ((1-ETAF) \times SLA)]$**

where 0.62 is a conversion factor that converts acre-inches per acre per year to gallons per square foot per year, LA is the total landscape area in square feet, SLA is the total special landscape area in square feet, and ETAF is .55 for residential areas and 0.45 for non-residential areas.

ETAF Calculations

Regular Landscape Areas

Total ETAF x Area	(B)
Total Area	(A)
Average ETAF	B ÷ A

Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for non-residential areas.

All Landscape Areas

Total ETAF x Area	(B+D)
Total Area	(A+C)
Sitewide ETAF	(B+D) ÷ (A+C)



WATER EFFICIENT LANDSCAPE CERTIFICATE OF COMPLETION

This certificate is filled out by the project applicant upon completion of the landscape project.

PART 1. PROJECT INFORMATION SHEET

Date		
Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Project Address and Location:

Street Address	Parcel, tract or lot number, if available.	
City	Latitude/Longitude (optional)	
State	Zip Code	

Property Owner or his/her designee:

Name	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Property Owner

"I/we certify that I/we have received copies of all the documents within the Landscape Documentation Package and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule."

Property Owner Signature

Date

Please answer the questions below:

1. Date the Landscape Documentation Package was submitted to the local agency _____
2. Date the Landscape Documentation Package was approved by the local agency _____
3. Date that a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the local water purveyor _____

PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE LANDSCAPE DOCUMENTATION PACKAGE

"I/we certify that based upon periodic site observations, the work has been completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the approved Landscape Documentation Package."

Signature*	Date	
Name (print)	Telephone No.	
	Fax No.	
Title	Email Address	
License No. or Certification No.		
Company	Street Address	
City	State	Zip Code

*Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor.

PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per ordinance Section 492.10.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per ordinance Section 492.11.

PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report per ordinance Section 492.12.

PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package per ordinance Section 492.6.

Attach documentation verifying implementation of recommendations from soil analysis report per ordinance Section 492.6.