

Water Efficient Landscaping Information and Application Package

January 1, 2016



Introduction

The purpose of this document is to provide guidance to project applicants regarding compliance with the City of West Sacramento's Water Efficient Landscape ordinance (Title 13, Section 13.04, Article XII of the City's Municipal Code).

Projects which must comply:

1. New development projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check, or design review.
2. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review.

Cemeteries and existing landscapes must meet some, but not all of the provisions of the ordinance. Please refer to the ordinance, and check with City staff to determine which sections are applicable.

Landscapes with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements, or conform to the prescriptive measures of the ordinance. If you wish to use the prescriptive measures, see the ordinance text for more details.

Projects using graywater or captured rainwater for irrigation may only be required to comply with certain sections of the ordinance. Please refer to the ordinance text, and check with City staff for more information.

Note that you may still be required to submit landscape and irrigation plans to verify conformance to other Planning requirements even if your project does not meet the criteria above.

This ordinance does not apply to:

1. registered local, state or federal historical sites
2. ecological restoration projects that do not require a permanent irrigation system
3. mined-land reclamation projects that do not require a permanent irrigation system
4. plant collections, as part of botanical gardens and arboretums open to the public

Compliance with the Water Efficient Landscaping ordinance consists of an application package known as the Landscape Documentation Package, and a Certificate of Completion package once the project has been completed. All items required for each of these packages will be discussed on the following pages. Where appropriate, sample forms have been provided which may be used in lieu of creating your own form for submittal. Examples utilizing sample calculations have also been provided to assist in demonstrating the use of the required equations.

Landscape Documentation Package

For projects which must comply, as noted above, project applicants must submit a Landscape Documentation Package. The Landscape Documentation Package consists of the following items:

1. Project Information
2. Water Efficient Landscape Worksheet
3. Soil Analysis and Report
4. Landscape Plan
5. Irrigation Plan
6. Grading Plan



LANDSCAPE DOCUMENTATION PACKAGE

PROJECT INFORMATION SHEET

Applicant Information:

Submittal Date: _____

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

Property Owner or his/her designee:

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

Project Address and Location:

Street Address	Parcel or lot number, if available.
City	State Zip Code

Project Information:

Project Type/Description	
Total Landscape Area (square feet)	Water Supply Type (potable, well, recycled, etc.)

Check those items that are included as part of this package:

<input type="checkbox"/> Project Information (above)	<input type="checkbox"/> Landscape Plan (3 sets)
<input type="checkbox"/> Water Efficient Landscape Worksheet (2 copies)	<input type="checkbox"/> Irrigation Plan (3 sets)
<input type="checkbox"/> Soil Analysis/Report (2 copies)	<input type="checkbox"/> Grading Plan (3 sets)

I agree to comply with the requirements of the City of West Sacramento's Water Efficient Landscape Ordinance and hereby submit a complete Landscape Documentation Package.

Applicant Signature Date

WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is a required element of the Landscape Documentation Package.

Worksheet Format

The worksheet table should contain at least the following information:

- Hydrozone Label / Planting Description—Zone or valve designations, or other designations corresponding to the landscape and irrigation plans.
- Plant Water Use Type(s)--High, Medium, or Low. Group Special Landscape Areas (SLAs) separately.
- Plant Factor—PF. The plant factor used shall be from the Water Use Classification of Landscape Species (WUCOLS) published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, latest edition. A copy of the document can be accessed here: www.water.ca.gov/wateruseefficiency/docs/wucols00.pdf. Alternatively, the plant factor may be from horticultural researchers with academic institutions or professional associations as approved by the California Department of Water Resources. .
The plant factor ranges from 0 to 0.1 for very low water use plants, from 0.1 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants.
- Irrigation Method—Overhead spray or Drip
- Irrigation Efficiency—IE. Use minimums 0.75 for overhead spray, and 0.81 for drip.
- ETAF—ET Adjustment Factor. Divide individual PF/IE. ETAF for Special Landscape Areas shall not exceed 1.0.
- Hydrozone Area—HA (in square feet).
- ETAF multiplied by the Hydrozone Area.
- ETWU—Estimated Total Water Use in Annual Gallons Required as calculated on the next page.
- MAWA—Maximum Applied Water Allowance in Annual Gallons Allowed as calculated on the next page.

All water features shall be included in a high water use hydrozone and temporarily irrigated areas shall be included in a low water use hydrozone.

See the example table below. Fill out all highlighted columns/rows. Use as many line items as necessary to define all landscape areas. The sum of the square footage of all hydrozone areas should equal the total landscape area as noted on the Project Information Sheet.

Hydrozone Label/Planting Description	Plant Water Use Type—High, Med, Low, V Low	Plant Factor (PF)	Irrigation Method—OH Spray, Drip, Rotor	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (HA) in sq ft	(ETAF)(HA)	ETWU
Regular Landscape Areas								
					Totals	(A)	(B)	
Special Landscape Areas								
					1			
					1			
					Totals	(C)	(D)	
Average (Site-wide) ETAF						ETWU Total		
							MAWA	

Water Budget Calculations

Water budget calculations for a landscape project compare the Maximum Applied Water Allowance (MAWA), to the Estimated Total Water Use (ETWU). For all landscape projects under this ordinance, ETWU shall be less than MAWA.

Reference Evapotranspiration (ETo)

For both the ETWU and MAWA calculations, project applicants shall use the Reference Evapotranspiration (ETo) values for West Sacramento as determined by the City of West Sacramento Parks and Recreation Department. Current values are **51.0 for areas north of the Deep Water Ship Channel**, and **52.5 for areas in Southport** (south of the Deep Water Ship Channel). The City reserves the right to update these values as they may change. Check with staff to verify the current ETo value(s).

Estimated Total Water Use (ETWU)

The project's Estimated Total Water Use (ETWU) shall be calculated using the following formula:

$$\text{ETWU (gallons/yr)} = (\text{ETo} - \text{Eppt}) (0.62) [((\text{ETAF}) (\text{HA})) + \text{SLA}]$$

Average (Site-wide) ETAF

The project's Average (Site-wide) ETAF for landscape areas shall be 0.55 or less for residential areas, and 0.45 or less for non-residential areas, and shall be calculated using the following formulas:

$$\text{ETAF (Site-wide) without SLAs} = \text{Value B from above table} / \text{Value A from above table}$$

$$\text{ETAF (Site-wide) with SLAs} = \frac{(\text{Value B from above table}) + (\text{Value D from above table})}{(\text{Value A from above table}) + (\text{Value C from above table})}$$

Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance (MAWA) shall be calculated using the following formula:

$$\text{MAWA (gallons/yr)} = (\text{ETo} - \text{Eppt}) (0.62) [(\text{ETAF}) (\text{HA}) + ((1 - \text{ETAF}) (\text{SLA}))]$$

In the ETWU and MAWA equations above,

ETo	= Reference Evapotranspiration (inches) (Use 51.0 or 52.5; see above)
Eppt	= 25% of the average rainfall (inches per year)
0.62	= Conversion factor to gallons per square foot
PF	= Plant Factor from WUCOLS (see Section 13.04.1120)
IE	= Irrigation Efficiency (minimum 0.75 for OH Spray, minimum 0.81 for Drip)
HA	= Landscaped Area (square feet)
SLA	= Special Landscape Area (square feet)

In the ETWU equation above,

$$\text{ETAF} = \text{ET Adjustment Factor} = \text{PF} / \text{IE for the individual hydrozones}$$

In the MAWA equation above,

$$\text{ETAF} = \text{ET Adjustment Factor} = 0.55 \text{ for residential, or } 0.45 \text{ for non-residential}$$

EXAMPLE WATER BUDGET CALCULATIONS

The example calculations below are hypothetical to demonstrate proper use of the equations and do not represent an existing and/or planned landscape project. The ETo values used in these calculations are for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use applicable reference evapotranspiration data, or soil moisture sensor data.

Example 1:

A hypothetical non-residential landscape project in West Sacramento, CA, north of the Deep Water Ship Channel, with an irrigated landscape area of 40,000 square feet without any Special Landscape Area (SLA= 0, no edible plants, recreational areas, or use of recycled water).

Step 1: Fill out the Water Efficient Landscape Worksheet for the landscape project. See the sample worksheet below for this example.

Hydrozone Label/Planting Description	Plant Water Use Type— High, Med, Low, V Low	Plant Factor (PF)	Irrigation Method— OH Spray, Drip, Rotor	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (HA) in sq ft	(ETAF)(HA)	ETWU
1	High	0.7	Drip	0.81	0.864	3,000	2,593	
2	Medium	0.5	OH	0.75	0.667	13,000	8,667	
3	Low	0.3	Drip	0.81	0.370	11,000	4,074	
4	V Low	0.1	Drip	0.81	0.123	13,000	1,605	
					Totals	40,000	16,939	
Average (Site-wide) ETAF						ETWU Total		
								MAWA

Step 2: ETWU calculations: Estimated Total Water Use (ETWU) shall be calculated using the equation below.

$$\text{ETWU (gallons/yr)} = (\text{ETo} - \text{Eppt}) (0.62) [(\text{ETAF}) (\text{HA}) + \text{SLA}]$$

where:

- ETWU = Estimated Total Water Use per year (gallons)
- ETo = Reference Evapotranspiration (inches per yr) = 51.0 for this example
- Eppt = N/A for this example
- 0.62 = Conversion Factor to gallons per square foot
- ETAF = ET Adjustment Factor = PF / IE
- PF = Plant Factor from WUCOLS
- IE = Irrigation Efficiency (min 0.75 for OH spray, min 0.81 for drip)
- HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
- SLA = Special Landscape Area (square feet)

$$\text{Individual ETWU for Area \#2} = (51.0 - 0) (0.62) [(8,667) + 0] = 274,051 \text{ gal/yr}$$

$$\text{Total (Calculated) ETWU} = (51.0 - 0) (0.62) [(16,939) + 0] = 535,611 \text{ gal/yr}$$

$$\text{Average (Site-wide) ETAF} = 16,939 / 40,000 = 0.42$$

Fill out the ETWU column, ETWU Total, and Average (Site-wide) ETAF.

Hydrozone Label/Planting Description	Plant Water Use Type— High, Med, Low, V Low	Plant Factor (PF)	Irrigation Method— OH Spray, Drip, Rotor	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (HA) in sq ft	(ETAF)(HA)	ETWU
1	High	0.7	Drip	0.81	0.864	3,000	2,593	81,990
2	Medium	0.5	OH	0.75	0.667	13,000	8,667	274,051
3	Low	0.3	Drip	0.81	0.370	11,000	4,074	128,820
4	V Low	0.1	Drip	0.81	0.123	13,000	1,605	50,750
					Totals	40,000	16,939	
Average (Site-wide) ETAF					0.42	ETWU Total		535,611
								MAWA

Step 3: MAWA calculation: Maximum Applied Water Allowance (MAWA) shall be calculated using the equation below.

$$MAWA = (ET_o - Eppt) (0.62) [(ETAF) (HA) + ((1 - ETAF) (SLA))]$$

where

- MAWA = Maximum Applied Water Allowance (gallons per year)
- ET_o = Reference Evapotranspiration (inches per year) = 51.0 for this example
- Eppt = N/A for this example
- 0.62 = Conversion Factor to gallons per square foot
- ETAF = ET Adjustment Factor (ETAF) = 0.55 for residential, 0.45 for non-residential
- HA = Total Hydrozone Area including SLA (square feet)
- SLA = Special Landscape Area (square feet) = 0 for this example

$$MAWA = (51.0 - 0) (0.62) [(0.45) (40,000 \text{ square feet}) + (1 - 0.45) (0)]$$

$$= 569,160 \text{ gallons per year}$$

If necessary, to convert from gallons per year to hundred-cubic-feet (ccf) per year, use the conversion of:
100 cubic ft = 748 gallons

$$MAWA = (569,160 \text{ gal/yr}) / (748 \text{ gal/ccf}) = 761 \text{ hundred-cubic-feet per year}$$

Insert the MAWA value into the table.

Step 4: Compare ETWU with MAWA: For this example MAWA = 569,160 gallons per year, and ETWU = 535,611 gallons per year, which is less than MAWA. In this example, the water budget complies with the MAWA.

Example 2:

In this next hypothetical example, the landscape project in West Sacramento, CA is a residential project south of the DWSC, but still has a total landscape area of 40,000 square feet. Within the 40,000 square foot project, there is now a 2,000 square foot Special Landscape Area planted with edible plants. See the ordinance text for a further description of other Special Landscape Areas.

Step 1: Fill out the Water Efficient Landscape Worksheet for the landscape project. See the sample worksheet below for this example.

Hydrozone Label/Planting Description	Plant Water Use Type— High, Med, Low, V Low	Plant Factor (PF)	Irrigation Method— OH Spray, Drip, Rotor	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (HA) in sq ft	(ETAF)(HA)	ETWU
Regular Landscape Areas								
1	High	0.8	Drip	0.81	0.988	6,000	5,926	
2	Medium	0.6	OH	0.75	0.800	13,000	10,400	
3	Low	0.3	OH	0.75	0.400	11,000	4,400	
4	V Low	0.1	Drip	0.81	0.123	8,000	988	
					Totals	38,000	21,714	
Special Landscape Areas								
A					1	2,000	2,000	
					Totals	2,000	2,000	
Average (Site-wide) ETAF						ETWU Total		
							MAWA	

Step 2: ETWU calculations: Estimated Total Water Use (ETWU) shall be calculated using the equation below.

$$\text{ETWU (gallons/yr)} = (\text{ETo} - \text{Eppt}) (0.62) [(\text{ETAF}) (\text{HA}) + \text{SLA}]$$

where:

- ETWU = Estimated Total Water Use per year (gallons)
- ETo = Reference Evapotranspiration (inches per yr) = 52.5 for this example
- Eppt = N/A for this example
- 0.62 = Conversion Factor to gallons per square foot
- ETAF = ET Adjustment Factor = PF / IE
- PF = Plant Factor from WUCOLS
- IE = Irrigation Efficiency (min 0.75 for OH spray, min 0.81 for drip)
- HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
- SLA = Special Landscape Area (square feet)

$$\text{Individual ETWU for Area \#2} = (52.5 - 0) (0.62) [(10,400) + 0] = 338,520 \text{ gal/yr}$$

$$\text{Total ETWU} = (52.5 - 0) (0.62) [21,714 + 2,000] = 771,890 \text{ gal/yr}$$

$$\text{Average (Site-wide) ETAF} = [21,714 + 2,000] / [38,000 + 2,000] = 0.59$$

****This Average (Site-wide) ETAF value is not acceptable for this project.** The designer must modify some of the factors in the design, and recalculate all values to effectively reduce this value to 0.55 or less.

Fill out the ETWU column, ETWU Total, and Average (Site-wide) ETAF.

Hydrozone Label/Planting Description	Plant Water Use Type— High, Med, Low, V Low	Plant Factor (PF)	Irrigation Method— OH Spray, Drip, Rotor	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Area (HA) in sq ft	(ETAF)(HA)	ETWU
Regular Landscape Areas								
1	High	0.8	Drip	0.81	0.988	6,000	5,926	192,891
2	Medium	0.6	OH	0.75	0.800	13,000	10,400	338,520
3	Low	0.3	OH	0.75	0.400	11,000	4,400	143,220
4	V Low	0.1	Drip	0.81	0.123	8,000	988	32,159
					Totals	38,000	21,714	
Special Landscape Areas								
A					1	2,000	2,000	65,100
					Totals	2,000	2,000	
Average (Site-wide) ETAF					0.57**	ETWU Total		771,890
								MAWA

**This Average (Site-wide) ETAF value is not acceptable for this project. The designer must modify some of the factors in the design, and recalculate all values to effectively reduce this value to 0.55 or less.

Step 3: MAWA calculation: Maximum Applied Water Allowance (MAWA) shall be calculated using the equation below.

$$MAWA = (ET_o - Eppt) (0.62) [(ETAF) (HA) + ((1 - ETAF) (SLA))]$$

where

MAWA = Maximum Applied Water Allowance (gallons per year)
 ET_o = Reference Evapotranspiration (inches per year) = 52.5 for this example
 Eppt = N/A for this example
 0.62 = Conversion Factor to gallons per square foot
 ETAF = ET Adjustment Factor (ETAF) = 0.55 for residential, 0.45 for non-residential
 HA = Total Hydrozone Area including SLA (square feet)
 SLA = Special Landscape Area (square feet)

$$MAWA = (52.5 - 0) (0.62) [(0.55) (40,000 \text{ sf}) + (1 - 0.55) (2,000 \text{ sf})]$$

$$= 745,395 \text{ gallons per year}$$

To convert from gallons per year to hundred-cubic-feet (ccf) per year, use the conversion of:
 100 cubic ft = 748 gallons

$$MAWA = (745,395 \text{ gal/yr}) / (748 \text{ gal/ccf}) = 997 \text{ hundred-cubic-feet per year}$$

Step 4: Compare ETWU with MAWA: For this example MAWA = 745,395 gallons per year, and ETWU = 771,890 gallons per year, which is more than MAWA. In this example, the designer must modify the planting and irrigation plans to revise the zones, the irrigation types/methods, the plantings, etc., then revise the worksheet and recalculate the water budget to make sure it complies with the MAWA.

SOIL ANALYSIS REPORT

In order to reduce runoff and encourage healthy plant growth, a soil analysis and report shall be completed by the project applicant, or his/her designee, as follows:

1. Submit soil samples to a laboratory for analysis and recommendations.
 - a. Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.
 - b. The soil analysis shall include:
 1. soil texture;
 2. infiltration rate determined by laboratory test or soil texture infiltration rate table;
 3. pH;
 4. total soluble salts;
 5. sodium;
 6. percent organic matter; and
 7. recommendations.
 - c. In projects with multiple landscape installations (i.e. production home developments) a soil sampling rate of 1 in 7 lots or approximately 15% will satisfy this requirement. Large landscape projects shall sample at a rate equivalent to 1 in 7 lots.
2. The project applicant, or his/her designee, shall comply with one of the following:
 - a. If significant mass grading **is not** planned, the **soil analysis/report shall be submitted** to the City of West Sacramento **as part of the Landscape Documentation Package**; or
 - b. If significant mass grading **is** planned, the **soil analysis/report shall be submitted** to the City of West Sacramento **as part of the Certificate of Completion**.
3. The soil analysis/report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans based on information in the soil analysis report.
4. The project applicant, or his/her designee, shall submit documentation verifying implementation of soil analysis/report recommendations to the City of West Sacramento with the Certificate of Completion.

LANDSCAPE PLAN

For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. To that end, a landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.

1. Plant Material
 - a. Any plant or tree conforming to the City's Landscape Development Guidelines and the City's Master Tree List may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. Plants within City rights-of-way or easements will be subject to review and approval by the City. Methods to achieve water efficiency shall include one or more of the following:
 1. protection and preservation of native species and natural vegetation;
 2. selection of plants based on local climate suitability, disease and pest resistance;
 3. selection of water-conserving plant, tree and turf species, especially local native plants;
 4. selection of plants from local and regional landscape program plant lists;
 5. selection of trees based on the City's Master Tree List as appropriate for the planting area.
 - b. Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use, as specified in Section 13.04.1120.F.2.d.

- c. Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. Methods to achieve water efficiency shall include one or more of the following:
 - 1. Use the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate.
 - 2. Recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure [e.g., buildings, sidewalks, power lines]; allow for adequate soil volume for healthy root growth.
 - 3. Consider the solar orientation for plant placement to maximize summer shade and winter solar gain.
- d. Turf is not allowed on slopes greater than 1:4 where the toe of the slope is adjacent to an impermeable hardscape and where 1:4 means 1 foot of vertical elevation change for every 4 feet of horizontal length.
- e. High water use plants, characterized by a plant factor of 0.7 to 1.0, are prohibited in street medians.
- f. A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291(a) and (b). Avoid fire-prone plant materials and flammable mulches, especially in and around parking lots.
- g. The use of invasive plant species, such as those listed by the California Invasive Plant Council, is strongly discouraged. The use of invasive plant species within City right-of-way or easements will not be permitted.
- h. The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.

2. Water Features.

- a. Recirculating water systems shall be used for water features.
- b. Where available, recycled water shall be used as a source for decorative water features.
- c. Surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.
- d. Pool and spa covers are highly recommended.

3. Soil Preparation, Mulch and Amendments.

- a. Prior to the planting of any materials, compacted soils shall be transformed to a friable condition. On engineered slopes, only amended planting holes need meet this requirement.
- b. Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 13.04.1120.D).
- c. For landscape installations, 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. Soils with greater than 6% organic matter in the top 6 inches of soil are exempt from adding compost and tilling.
- d. A minimum three inch (3") layer of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers, or direct seeding applications where mulch is contraindicated. To provide habitat for beneficial insects and other wildlife, up to 5% of the landscape area may be left without mulch. Designated insect habitat must be included in the landscape design plan as such.
- e. Stabilizing mulching products shall be used on slopes that meet current engineering standards.
- f. The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement.
- g. Organic mulch made from recycled or post-consumer materials shall take precedence over inorganic materials or virgin forest products unless the recycled post-consumer organic products are not locally available.
- h. The use of flammable mulches shall be avoided as noted in Section 13.04.1120.E.1.f.

4. Design Content.

The landscape design plan shall, at a minimum:

- a. delineate and label each hydrozone by number, letter, or other method;
- b. identify each hydrozone as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation;
- c. identify recreational areas;
- d. identify areas permanently and solely dedicated to edible plants;
- e. identify areas irrigated with recycled water;
- f. identify type of mulch and application depth;
- g. identify soil amendments, type, and quantity;
- h. identify type and surface area of water features;
- i. identify hardscapes (pervious and non-pervious);
- j. identify location and installation details, and 24-hour retention or infiltration capacity of any applicable stormwater best management practices that encourage on-site retention and infiltration of stormwater. Project applicants shall refer to the City's Municipal Code, Section 13.10 Urban Stormwater Quality Management and Discharge Control, and the Regional Water Quality Control Board for information on any applicable stormwater technical requirements. Stormwater best management practices are encouraged in the landscape design plan and examples are provided in Section 13.04.1180.
- k. identify any applicable rain harvesting or catchment technologies as discussed in Section 13.04.1180 and their 24-hour retention or infiltration capacity;
- l. identify any applicable graywater discharge piping, system components and area(s) of distribution;
- m. contain the following statement: "I have complied with the criteria of the ordinance and applied them for the efficient use of water in the landscape design plan"; and
- n. bear the signature of a licensed landscape architect, licensed landscape contractor, or any other person authorized to design a landscape. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agriculture Code.)

IRRIGATION PLAN

This section applies to landscaped areas requiring permanent irrigation, not areas that require temporary irrigation solely for the plant establishment period. For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufacturers' recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance.

An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.

1. System

- a. Landscape water meters, defined as either a dedicated water service meter or submeter, shall be installed for all non-residential irrigated landscapes of 1,000 sq. ft. but not more than 5,000 sq.ft (the level at which Water Code 535 applies) and residential irrigated landscapes of 5,000 sq. ft. or greater. A landscape water meter may be either:
 1. a water meter on a water service specifically dedicated to landscape use; or
 2. a submeter on the irrigation leg of a water service which supplies both domestic and irrigation water.
- b. Automatic irrigation controllers utilizing either evapotranspiration, soil moisture sensor data, or other such self-adjusting controllers, utilizing non-volatile memory shall be required for irrigation scheduling in all irrigation systems.
- c. If the water pressure is below or exceeds the recommended pressure of the specified irrigation devices, the installation of a pressure regulating device is required to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.

1. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed to meet the required dynamic pressure of the irrigation system.
 2. Static water pressure, dynamic or operating pressure and flow reading of the water supply shall be measured at the point of connection. These pressure and flow measurements shall be conducted at the design stage. If the measurements are not available at the design stage, the measurements shall be conducted at installation.
- d. Rain sensors, either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions shall be required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
 - e. Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) 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 (such as a main line break) or routine repair.
 - f. Backflow prevention devices shall be required to protect the water supply from contamination by the irrigation system. For additional backflow prevention requirements, the project applicant shall refer to the City's Municipal Code, Section 13.04 Water Service System, Title XI Protection of Drinking Water.
 - g. Flow sensors that detect high flow conditions created by system damage or malfunction are required for all non-residential landscapes and residential landscapes of 5000 sq. ft. or larger.
 - h. Master shut-off valves are required on all projects except landscapes that make use of technologies that allow for the individual control of sprinklers that are individually pressurized in a system equipped with low pressure shut down features.
 - i. The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
 - j. Relevant information from the Soil Analysis Report, such as soil type and infiltration rate, shall be utilized when designing irrigation systems.
 - k. The design of the irrigation system shall conform to the hydrozones of the landscape design plan.
 - l. The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria as described in Section 13.04.1120.C regarding the Maximum Applied Water Allowance.
 - m. All irrigation emission devices must meet the requirements set in the American National Standards Institute (ANSI) standard, American Society of Agricultural and Biological Engineers'/International Code Council's (ASABE/ICC) 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard, All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.
 - n. The project applicant is encouraged to inquire with the City about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
 - o. In mulched planting areas, the use of low volume irrigation is recommended to maximize water infiltration into the root zone.
 - p. Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
 - q. Head to head coverage is recommended. However, sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
 - r. Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to hardscapes or in high traffic areas of turf.
 - s. Check valves or anti-drain valves are required on all sprinkler heads where low point drainage could occur.
 - t. Areas less than ten (10) feet in width in any direction shall be irrigated with a drip irrigation system, subsurface drip irrigation system, or other means that produces no runoff or overspray. Such areas that fall within City rights-of-way or easements shall

utilize low volume irrigation, specifically multi-stream, multi-trajectory rotator heads, or drip irrigation, if possible.

- u. Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, subsurface drip, or other low flow technology. The setback area may be planted or unplanted. The surfacing of the setback area may be mulch, gravel, or other porous material, subject to other applicable City regulations based on the setback area location. These restrictions may be modified if:
 - 1. the landscape area is adjacent to permeable surfacing and no runoff occurs; or
 - 2. the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
 - 3. the irrigation designer specifies an alternative design or technology (including multi-stream, multi-trajectory rotator sprinklers), as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design criteria in Section 13.04.1120.F.1.h. Prevention of overspray and runoff must be confirmed during the irrigation audit.
- v. Slopes greater than 1:4 shall not be irrigated with an irrigation system with an application rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.

2. Hydrozones.

- a. Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
- b. Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
- c. Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf to facilitate the appropriate irrigation of trees. The mature size and extent of the root zone shall be considered when designing irrigation for the tree.
- d. Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:
 - 1. the plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
 - 2. the plant factor of the higher water using plant is used for calculations.
- e. Individual hydrozones that mix high and low water use plants shall not be permitted.
- f. On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Hydrozone Information Table (see Section 13.04.1120.C.1). This table can also assist with the irrigation audit and programming the controller.

3. Design Content.

The irrigation design plan, at a minimum, shall contain:

- a. location and size of separate water meters for landscape—delineate whether the landscape water supply is connected to, or separate from the domestic supply;
- b. 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;
- c. static water pressure at the point of connection to the public water supply;
- d. flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
- e. recycled water irrigation systems as specified in Section 13.04.1150;
- f. the following statement: “I have complied with the criteria of the City of West Sacramento’s Water Efficient Landscape Ordinance and applied them accordingly for the efficient use of water in this irrigation design plan” ; and
- g. the signature of a licensed landscape architect, certified irrigation designer, licensed landscape contractor, or any other person authorized to design an irrigation system. (See Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the Business and Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the Food and Agricultural Code.)

GRADING PLAN

For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste. A grading plan shall be submitted as part of the Landscape Documentation Package. A comprehensive grading plan prepared by a civil engineer for other City permits may satisfy this requirement.

1. The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including:
 - a. height of graded slopes
 - b. drainage patterns
 - c. pad elevations
 - d. finish grade
 - e. stormwater retention improvements, if applicable
2. To prevent excessive erosion and runoff, it is highly recommended that project applicants:
 - a. grade so that all irrigation and normal rainfall remains within property lines and does not drain onto non-permeable hardscapes
 - b. avoid disruption of natural drainage patterns and undisturbed soil
 - c. avoid soil compaction in landscape areas
3. The grading design plan shall contain the following statement: "I have complied with the criteria of the City of West Sacramento's Water Efficient Landscaping Ordinance and applied them accordingly for the efficient use of water in the grading plan" and shall bear the signature of a licensed professional as authorized by law.

CERTIFICATE OF COMPLETION

A. GENERAL

The Certificate of Completion shall include the following six (6) elements:

1. project information sheet that contains:
 - a. date
 - b. project name
 - c. project applicant name, telephone, and mailing address
 - d. project address and location
 - e. property owner name, telephone, and mailing address
2. mylar and digital "as-built" record drawings in a format acceptable to the City shall be included with the Certificate of Completion unless this requirement is waived in writing by the City.
3. certification by either the signer of the landscape plan, the signer of the irrigation plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;
 - a. where there have been significant changes made in the field during construction, these "as-built" or record drawings shall be included with the certification;
 - b. A diagram of the irrigation plan showing hydrozones shall be kept with the irrigation controller for subsequent management purposes.
4. irrigation scheduling parameters used to set the controller (see subsection B)
5. landscape and irrigation maintenance schedule (see subsection C)
6. irrigation audit report (see subsection D)
7. soil analysis/report, if not submitted with the Landscape Documentation Package, and documentation verifying implementation of soil report recommendations (see Section 13.04.1120.D)

The project applicant shall submit the signed Certificate of Completion to the City of West Sacramento for review, and ensure that copies of the approved Certificate of Completion are submitted to the property owner or his or her designee.

Upon receipt of the signed Certificate of Completion from the project applicant, the City of West Sacramento shall approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the City of West Sacramento shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

B. IRRIGATION SCHEDULING

For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:

1. Irrigation scheduling shall be regulated by automatic irrigation controllers.
2. Overhead irrigation shall be scheduled as defined by the City's Urban Water Management Plan, unless weather conditions prevent it. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
3. For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the Estimated Total Water Use. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.
4. Parameters used to set the automatic controller shall be developed and submitted for each of the following:
 - a. the plant establishment period
 - b. the established landscape
 - c. temporarily irrigated areas
5. Each irrigation schedule shall consider for each station all of the following that apply:
 - a. irrigation interval (days between irrigation)
 - b. irrigation run times (hours or minutes per irrigation event to avoid runoff)
 - c. number of cycle starts required for each irrigation event to avoid runoff
 - d. amount of applied water scheduled to be applied on a monthly basis
 - e. application rate setting
 - f. root depth setting
 - g. plant type setting
 - h. soil type
 - i. slope factor setting
 - j. shade factor setting
 - k. irrigation uniformity or efficiency setting

C. LANDSCAPE AND IRRIGATION MAINTENANCE SCHEDULE.

1. A regular maintenance schedule shall include, but not be limited to:
 - a. routine inspection
 - b. auditing
 - c. adjustment and repair of the irrigation system and its components
 - d. aerating and dethatching turf areas
 - e. topdressing with compost
 - f. replenishing mulch
 - g. fertilizing
 - h. pruning
 - i. weeding in all landscape areas
 - j. removing obstructions to emission devices

Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

Repair of all irrigation equipment shall be done with the originally installed components or their equivalents or with components with greater efficiency.

Project applicants are encouraged to implement established landscape industry sustainable Best Practices for all landscape maintenance activities.

D. IRRIGATION AUDIT

1. All landscape irrigation audits shall be conducted by the City landscape irrigation auditor or a third party certified landscape irrigation auditor. Landscape audits shall not be conducted by the person who designed the landscape or installed the landscape.

2. In large projects or projects with multiple landscape installations (i.e. production home developments) an auditing rate of 1 in 7 lots or approximately 15% will satisfy this requirement.
3. For new construction and rehabilitated landscape projects installed after December 1, 2015, as described in Section 13.04.1100:
 - a. the project applicant shall submit an irrigation audit report with the Certificate of Completion to the City of West Sacramento that may include, but is not limited to:
 1. inspection,
 2. system tune-up,
 3. system test with distribution uniformity, reporting overspray or run off that causes overland flow, and
 4. preparation of an irrigation schedule, including configuring irrigation controllers with application rate, soil types, plant factors, slope, exposure and any other factors necessary for accurate programming;

SOIL MANAGEMENT REPORT AND IMPLEMENTATION OF RECOMMENDATIONS

Per the City's Water Efficient Landscape ordinance Section 13.04.1120.D, attach two (2) complete copies of the soil analysis report, if not previously submitted with the Landscape Documentation Package; and attach documentation verifying implementation of the recommendations from the soil analysis report.

Verification that the recommendations made in the soil analysis report were implemented per the report is required regardless of whether the soil analysis report has been previously submitted with the Landscape Documentation Package.



LANDSCAPE CERTIFICATE OF COMPLETION

PART 1 Applicant Information:

Submittal Date: _____

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

Property Owner or his/her designee:

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

Project Address and Location:

Street Address	Parcel or lot number, if available.
City	State Zip Code

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 my/our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule.

 Property Owner Signature Date

Please complete the items below:

Submittal Date of the Landscape Documentation Package to the City of West Sacramento _____.

Approval Date the Landscape Documentation Package by the City of West Sacramento _____.

For Staff Use: Certificate of Completion is _____ Approved or _____ Denied

Staff Signature: _____ Date: _____

LANDSCAPE CERTIFICATE OF COMPLETION (CONT.)

Project Name or Address	Submittal Date
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CERTIFICATION OF INSTALLATION

I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the City's Water Efficient Landscape ordinance and that the landscape planting and irrigation installation conform to 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.

IRRIGATION SCHEDULING

Attach a sheet defining the parameters for setting the irrigation schedule on the controller(s) per the City's Ordinance Section 13.04.1130.B.

SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach a schedule of Landscape and Irrigation Maintenance per the City's Ordinance Section 13.04.1130.C.

LANDSCAPE IRRIGATION AUDIT REPORT

Attach a Landscape Irrigation Audit Report for the project per the City's Ordinance Section 13.04.1130.D.

SOIL MANAGEMENT REPORT AND IMPLEMENTATION OF RECOMMENDATIONS

Per the City's Ordinance Section 13.04.1120.D, attach:

- A. Two (2) complete copies of the soil analysis report, if not previously submitted with the Landscape Documentation Package; and
- B. Documentation verifying implementation of the recommendations from the soil analysis report.

Note: Verification that the recommendations made in the soil analysis report were implemented per the report is required regardless of whether the soil analysis report has been previously submitted with the Landscape Documentation Package.

For Staff Use:

Item	Submitted? Y/N or N/A	Date Received	Staff initials
Irrigation Schedule			
Landscape/Irrigation Maintenance Schedules			
Irrigation Audit Report			
Soil Management Report			
Soil Management Report Implementation Documentation			