
Water Efficient Landscapes



**Division of Planning, Engineering, and Environmental Compliance
City of Monterey**

Introduction

The State of California adopted new legislation (AB 1881). The legislation required local agencies to adopt a water efficient Landscape Ordinance.

Applicability

Landscape plans are required for projects that require a building permit, design review and new or rehabilitated landscapes.

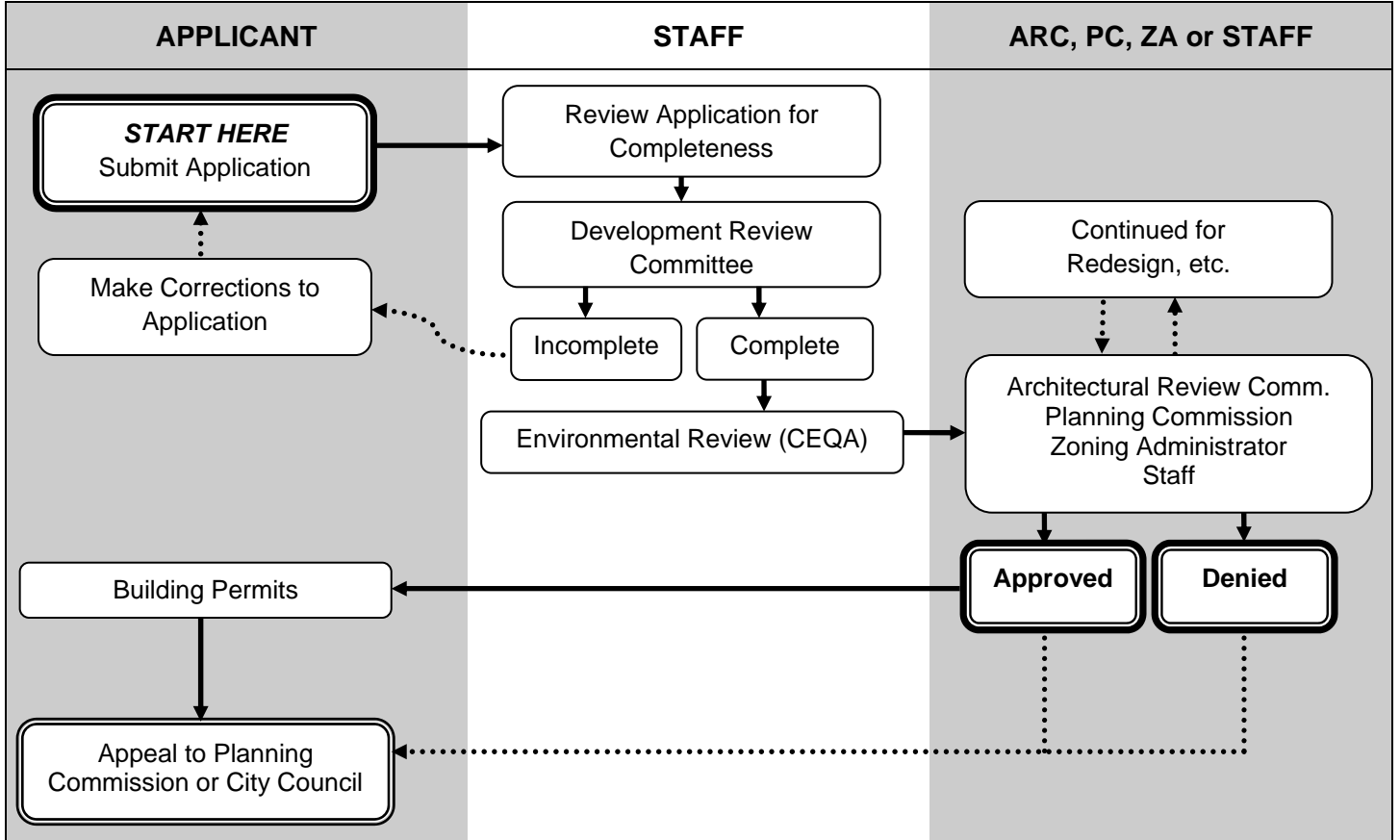
The Ordinance applies to residential landscape areas greater than 5,000 square feet and non-residential projects with landscape areas equal to or greater than 2,500 square feet. A residential project includes single-family dwellings and two unit duplexes. A non-residential project includes commercial projects as well as residential projects consisting of three or more units.

Findings

The appropriate decision making body or administrative staff shall determine from the information submitted whether the proposed landscape plan satisfies the following findings:

1. The estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance.
2. A soil management report was prepared and 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 in order to reduce runoff and encourage healthy plant growth.
3. The Landscape Plan is consistent with the design and performance standards of the Zoning Code.
4. The Landscape Plan meets the objectives of the landscape design guidelines.
5. The Grading Plan has been designed to minimize soil erosion, runoff, and water waste.
6. The Irrigation Plan and Schedule is consistent with the design and performance standards of the Zoning Code provisions and the manufacturers' recommendations.
7. The irrigation system and its related components have been designed to allow for proper installation, management, and maintenance.
8. All irrigation schedules have been developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health.

TYPICAL REVIEW PROCESS



SUBMITTAL CHECKLIST

Every application must include both Application Forms and Plans.
The specific requirements are described below¹.

LANDSCAPE DOCUMENTATION PACKAGE SUBMITTAL REQUIREMENTS

The project applicant shall submit a Landscape Documentation Package to the City of Monterey Plans and Public Works Department for review and approval.

The Landscape Documentation Package shall include:

1. Project information: date, project applicant, property owner, project address, parcel number, total landscape area (square feet), project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed), water supply type (e.g., potable, recycled, well) and identify the local retail water purveyor if the applicant is not served by a private well;
2. Soils report;
3. Landscape design plan;
4. Grading plan;
5. Irrigation design plan;
6. Irrigation schedule;
7. Water efficient landscape worksheet; and,
8. Applicant signature and date with statement, "I agree to comply with the requirements of the water efficient landscape ordinance".

Soils Report

1. A description of the site's soils. This description shall be based on laboratory analysis, a copy of which shall be submitted with the report. Soil sampling shall be conducted in accordance with laboratory protocol, including adequate sampling depth for the intended plants;
2. The signature of a licensed Professional Engineer (Soils Engineer) or other person qualified to prepare a Soils Report; and,
3. The soil analysis may include: soil texture; infiltration rate determined by laboratory test or soil texture infiltration rate table; pH; total soluble salts; sodium; percent organic matter.

Landscape Design Plan

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

1. Plant materials;
2. Each hydrozone by number, letter, or other method;
3. 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;
4. Recreational areas;
5. Areas permanently and solely dedicated to edible plants;
6. Areas irrigated with recycled water;
7. Type of mulch and application depth;
8. Soil amendments, type, and quantity;
9. Type and surface area of water features;
10. Hardscapes (pervious and non-pervious);
11. Location and installation details of any applicable storm water best management practices that encourage on-site retention and infiltration of storm water. Storm water best management practices are specified in the Monterey Regional Storm Water Management Program;
12. Any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.);

¹ At the discretion of the Chief of Planning, Engineering and Environmental Compliance, submittal of any submittal items may be waived if the project can be sufficiently described and considered without such information. Please inquire prior to submittal of an application.

13. Any approved greywater system;
14. 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,
15. 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 and amendments thereto.)

Grading Design Plan

1. Total cubic yards of soil removed and transported to the site;
2. Height of graded slopes;
3. Identify areas of slope $\geq 25\%$;
4. Drainage patterns;
5. Pad elevations;
6. Finish grade;
7. Location and installation of any applicable storm water best management practices as specified in the Monterey Regional Storm Water Management Program;
8. Contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading design plan" and shall bear the signature of a licensed professional as authorized by law; and
9. Bear the signature of a licensed civil engineer.

Irrigation Design Plan

1. Irrigation system;
2. The irrigation schedule, including:
 - 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; and,
 - l. Plant establishment period.
3. Location and size of separate water meters for landscape;
4. 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;
5. Static water pressure at the point of connection to the public water supply;
6. Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station;
7. Recycled water irrigation systems;
8. Contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the irrigation design plan"; and,
9. Bear 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.)

The Certificate of Completion minimum submittal requirements include:

1. Project information sheet that contains date; project name; project applicant name, telephone, and mailing address; project address and location; and property owner name, telephone, and mailing address; property owner signature;
2. Certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package;
3. Where there have been significant changes made in the field during construction, these “as-built” or record drawings shall be included with the certification;
4. Irrigation scheduling parameters used to set the controller;
5. Landscape and irrigation maintenance schedule. A regular maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing and obstruction 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. A project applicant is encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance;
6. Irrigation audit report. All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor. The irrigation audit report shall include an inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule; and,
7. Soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations.

SECTION B. WATER BUDGET CALCULATIONS

Section B1. Maximum Applied Water Allowance (MAWA)

The project's Maximum Applied Water Allowance shall be calculated using this equation:

$$MAWA = (ETo) (0.62) [(0.7 \times LA) + (0.3 \times SLA)]$$

where:

MAWA= Maximum Applied Water Allowance (gallons per year)

ETo = Evapotranspiration (inches per year)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
1.7	1.8	2.7	3.5	4.0	4.1	4.3	4.2	3.5	2.8	1.9	1.5	36.0

0.7 = ET Adjustment Factor (ETAF)

LA = Landscaped Area includes Special Landscape Area (square feet)

0.62 = Conversion factor (to gallons per square foot)

SLA = Portion of the landscape area identified as Special Landscape Area (square feet)

0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

Maximum Applied Water Allowance = _____gallons per year

Show calculations.

Effective Precipitation (Eppt)

If considering Effective Precipitation, use 25% of annual precipitation. Use the following equation to calculate Maximum Applied Water Allowance:

$$MAWA = (ETo - Eppt) (0.62) [(0.7 \times LA) + (0.3 \times SLA)]$$

Maximum Applied Water Allowance = _____gallons per year

Show calculations.

The project's Estimated Total Water Use is calculated using the following formula:

$$ETWU = (ETo)(0.62) \left(\frac{PF \times HA}{IE} + SLA \right) \text{ where:}$$

ETWU = Estimated total water use per year (gallons per year)

- ETo = Reference Evapotranspiration (inches per year)
- PF = Plant Factor from WUCOLS (see Definitions)
- HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
- SLA = Special Landscape Area (square feet)
- 0.62 = Conversion Factor (to gallons per square foot)
- IE = Irrigation Efficiency (minimum 0.71)

Effective Precipitation = A local agency may consider Effective Precipitation (25% of annual precipitation) in tracking water use and may use the following equation to calculate Maximum Applied Water Allowance:

$$MAWA = (ETo - Eppt) (0.62) [(0.7 \times LA) + (0.3 \times SLA)].$$

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
	SLA		Sum	

Estimated Total Water Use = _____ gallons

Show calculations.

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		

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 substantially 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.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance.

PART 5. LANDSCAPE IRRIGATION AUDIT REPORT

Attach Landscape Irrigation Audit Report.

PART 6. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the Landscape Documentation Package.

Attach documentation verifying implementation of recommendations from soil analysis report.



Landscape Design Standards and Guidelines

Division of Planning, Engineering, and Environmental Compliance
City of Monterey

STANDARDS

Performance Standards

1. Landscape Design
 - a. Recirculating water systems shall be used for all water features.
 - b. Recycled water, when available, shall be used as a source for all 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. A minimum 2" 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.
 - e. Stabilizing mulching products shall be used on slopes.
 - f. The mulching portion of the seed/mulch slurry in hydro-seeded applications shall meet the mulching requirement
 - g. Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected.
2. Irrigation Design
 - a. All irrigation systems shall use automatic irrigation controller utilizing either evapotranspiration or soil moisture sensor data.
 - b. All irrigation systems shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance. Pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices shall be installed when necessary to meet the required dynamic pressure of the irrigation system if the static pressure is above or below the required dynamic pressure of the irrigation system.
 - c. 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 for connections that are existing. If the connections have not been installed prior to the design stage, the measurements shall be conducted upon installation.
 - d. A rain sensor either integral or auxiliary, shall be required on all irrigation systems to effectively suspend irrigation during rain or alter irrigation operation during unfavorable weather conditions, as appropriate for local climatic conditions.
 - 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. (Contact the Monterey Permits and Inspection Division for additional information).
 - g. 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.
 - h. To prevent water waste resulting from inefficient landscape irrigation, runoff leaving the target landscape due to low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures shall be prohibited.

- i. Restrictions regarding overspray and runoff 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.
- j. Relevant information from the soil management plan, 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 schedule design and performance standards as described in Section 38-143 regarding the Maximum Applied Water Allowance. It is highly recommended that the project applicant or local agency inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.
- m. In mulched planting areas, the use of drip irrigation is required to maximize water infiltration into the root zone.
- n. Sprinkler heads and other emission devices shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
- o. Sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
- p. Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to high traffic areas.
- q. Check valves or anti-drain valves are required for all irrigation systems.
- r. Narrow or irregularly shaped areas, including turf, less than eight (8) feet in width in any direction shall be irrigated with subsurface irrigation or low volume irrigation system.
- s. 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, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. 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, as part of the Landscape Documentation Package and clearly demonstrates strict adherence to irrigation system design and performance standards in Section 38-143. Prevention of overspray and runoff must be confirmed during the irrigation audit.
- t. Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.
- u. Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
- v. Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.
- w. Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turf.
- x. 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 (Refer to City Submittal Requirements). This table can also assist with the irrigation audit and programming the controller.
- y. Individual hydrozones that mix high and low water use plants shall not be permitted.
- z. Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if the plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or the plant factor of the higher water using plant is used for calculations.

- aa. For the purpose of determining Maximum Applied Water Allowance, average irrigation efficiency is assumed to be 0.71. Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71.
 - bb. The installation of recycled water irrigation systems shall allow for the current and future use of recycled water.
 - cc. Irrigation systems and decorative water features shall use recycled water unless a written exemption has been granted by the local water purveyor stating that recycled water meeting all public health codes and standards is not available and will not be available for the foreseeable future.
 - dd. All recycled water irrigation systems shall be designed and operated in accordance with all applicable local and State laws.
 - ee. Landscapes using recycled water are considered Special Landscape Areas. The ET Adjustment Factor for Special Landscape Areas shall not exceed 1.0.
3. Irrigation Schedule
- a. Irrigation scheduling shall be regulated by automatic irrigation controllers.
 - a. Overhead irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent it. If allowable hours of irrigation differ from the local water purveyor, the stricter of the two shall apply. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
 - b. 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.

GUIDELINES

Plant Materials.

Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance. To encourage the efficient use of water, the following is highly recommended: protection and preservation of native species and natural vegetation; selection of water-conserving plant and turf species; selection of plants based on disease and pest resistance; selection of trees based on applicable local tree ordinances or tree shading guidelines; and selection of plants from local and regional landscape program plant lists.

- a. Each hydrozone shall have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use.
 - b. Plants shall be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. To encourage the efficient use of water, the following is highly recommended:
 - i. 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;
 - ii. 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]; and,
 - iii. Consider the solar orientation for plant placement to maximize summer shade and winter solar gain.
 - c. Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means one foot of vertical elevation change for every four feet of horizontal length (rise divided by run x 100 = slope percent).
 - d. 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 Monterey City Code, Chp 13, Appendix "M": SECTION M109 - DEFENSIBLE SPACE, subsection M109.1 Standard defensible space requirements. Avoid fire-prone plant materials and highly flammable mulches.
 - e. The use of invasive and/or noxious plant species is strongly discouraged. If proposed, submit a justification statement.
2. Use of pool and spa covers is encouraged.

Grading

To prevent excessive erosion and runoff, it is highly recommended that project grading is designed to:

1. Preserve all irrigation and normal rainfall within property lines and does not allow runoff onto non-permeable hardscapes;
2. Avoid disruption of natural drainage patterns and undisturbed soil; and,
3. Avoid soil compaction in landscape areas.

Irrigation

1. Dedicated landscape water meters are highly recommended on landscape areas smaller than 5,000 square feet to facilitate water management.
2. High flow sensors that detect and report high flow conditions created by system damage or malfunction are recommended