

GUIDELINES

FOR IMPLEMENTATION OF THE

CITY OF LAGUNA NIGUEL

WATER EFFICIENT LANDSCAPING

REGULATIONS

ADOPTED BY CITY COUNCIL RESOLUTION NO. 2015 - 1183

DECEMBER 15, 2015

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1. PURPOSE AND APPLICABILITY

1.1 Purpose

(a) The primary purpose of these Guidelines is to provide procedural and design guidance for *project applicants* proposing landscape installation or rehabilitation projects that are subject to the requirements of the *Water Efficient Landscaping Regulations*. This document is also intended for use and reference by City staff in reviewing and approving designs and verifying compliance with the Guidelines. The general purpose of the *Water Efficient Landscaping Regulations* and Guidelines is to promote the design, installation, and maintenance of landscaping in a manner that conserves regional water resources by ensuring that landscaping projects are not unduly water-needy and that irrigation systems are appropriately designed and installed to minimize water waste.

Other regulations affecting landscape design and maintenance practices are potentially applicable and should be consulted for additional requirements. These regulations include but may not be limited to:

- (1) State of California Assembly Bill 1881;
- (2) National Pollutant Discharge Elimination Permit for the Municipal Separate Storm Sewer System;
- (3) Orange County Fire Authority Regulations for Fuel Modification in the Landscape;
- (4) Water Conservation and Drought Response Regulations of the Local Water Purveyor (Moulton Niguel Water District);
- (5) Regulations of the Moulton Niguel Water District governing use of Recycled Water;
- (6) Zoning Code, including but not limited to the community design guidelines (sections 9-1-162.3 and 9-1-163.3 of the Municipal Code) for multifamily residential, commercial and industrial landscape requirements.
- (7) Building Code;
- (8) Specific Plans, Master Plans, General Plan, or similar documents; and
- (9) Conditions of approval for a specific project.

1.2 **Applicability**

(a) The Water Efficient Landscaping Regulations and these Guidelines apply to all of the following landscape projects:

(1) New landscape projects with an aggregate landscape area equal to or greater than 500 square feet, requiring a building or landscape permit, plan check and which are otherwise subject to design review and approval of a landscape plan pursuant to a discretionary permit (e.g., site development permit, coastal development permit, variance, use permit, minor adjustment and/or changed plan);

(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 and which are otherwise subject to design review and approval of a landscape plan pursuant to a discretionary permit (e.g., site development permit, coastal development permit, variance, use permit, minor adjustment and/or changed plan);

(3) New or rehabilitated landscape projects with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements of this ordinance or conform to the prescriptive measures contained in Appendix A; and

(4) New or rehabilitated landscape projects using treated or untreated graywater or rainwater capture on site, any lot or parcels within the project that has less than 2,500 square feet of landscape area and meets the lot or parcel's landscape water requirement (Estimated Total Water Use) entirely with the treated or untreated graywater or though stored rainwater capture on site is subject only to Appendix A.

(b) The requirements of the Guidelines may be partially or wholly waived, at the discretion of the city or its designee, for landscape rehabilitation projects that are limited to replacement plantings with equal or lower water needs and where the irrigation system is found to be designed, operable and programmed consistent with minimizing water waste in accordance with local water purveyor regulations.

(c) Unless otherwise determined by the *City*, the Water Efficient Landscape Regulations and these Guidelines do 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; or
- (4) Plant collections, as part of botanical gardens and arboretums open to the public.

2. SUBMITTAL REQUIREMENTS FOR NEW LANDSCAPE INSTALLATIONS OR LANDSCAPE REHABILITATION PROJECTS

Design review and approval is typically required for landscape projects that are subject to a discretionary permit (e.g., site development permit, coastal development permit, use variance, use permit, minor adjustment and/or changed plan). Discretionary projects with conditions of approval may be approved administratively by City staff, or acted on formally by the Planning Commission, City Council, or other jurisdictional authority. A typical standard condition of approval reads:

“Landscaping for the project shall be designed to comply with the City’s Water Efficient Landscape Regulations and with the Guidelines for Implementation of the Water Efficient Landscape Regulations.”

2.1 Elements of the Landscape Documentation Package

(a) A *Landscape Documentation Package* is required to be submitted by the *project applicant* for review and approval prior to the issuance of ministerial permits for landscape or water features by the City, and prior to start of construction. Unless otherwise directed by the City, the *Landscape Documentation Package* shall include the following elements either on plan sheets or supplemental pages as directed by the City:

- (1) Project Information, including, but not limited to, the following:
 - (A) Date;
 - (B) Project name;
 - (C) Project address, parcel, and/or lot number(s);
 - (D) Total landscaped area (square feet) and rehabilitated landscaped area (if applicable);

- (E) Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed);
- (F) Project water supply type (e.g., potable, recycled, or well) and identification of the local retail water purveyor if the *project applicant* is not served by a private well;
- (G) Checklist or index of all documents in the *Landscape Documentation Package*;
- (H) Project contacts, including contact information for the *project applicant* and *property owner*;
- (I) A *Certification of Design* in accordance with Appendix B of these *Guidelines* that includes a *landscape professional's* professional stamp, as applicable, signature, contact information (including email and telephone number), license number, and date, certifying the statement that “The design of this project complies with the requirements of the City’s *Water Efficient Landscaping Regulations*” and shall bear the signature of the *landscape professional* as required by law; and
- (J) Any other information the City deems relevant for determining whether the landscape project complies with the *Water Efficient Landscaping Regulations* and these *Guidelines*.

(2) *Maximum Applied Water Allowance (MAWA)* and *Estimated Applied Water Use (EAUW)* expressed as annual totals including, but not limited to, the following:

- (A) A *Water Efficient Landscape Worksheet* (optional at discretion of the City) for the landscape project;
- (B) *Hydrozone* information table (optional at the discretion of the City) for the landscape project; and
- (C) Water budget calculations (optional at the discretion of the City) for the landscape project.

(3) A soil management report or specifications, or specification provision requiring soil testing and amendment recommendations and implementation to be accomplished during construction of the landscape project.

(4) A landscape design plan for the landscape project.

- (5) An irrigation design plan for the landscape project.
- (6) A grading design plan, unless grading information is included in the landscape design plan for the landscape project or unless the landscape project is limited to replacement planting and/or irrigation to rehabilitate an existing landscaped area, or does not otherwise propose changes to grading and drainage.

2.2 Water Efficient Landscape Calculations and Alternatives

- (a) The *project applicant* shall provide the calculated *Maximum Applied Water Allowance (MAWA)* and *Estimated Applied Water Use (EAWU)* for the *landscaped area* as part of the *Landscape Documentation Package* submittal to the City. The *MAWA* and *EAWU* shall be calculated based on completing the *Water Efficient Landscape Worksheets* (in accordance with the sample worksheets in Appendix C which contain information on the plan factor, irrigation method, irrigation efficiency and area associated with each hydrozone. Calculations are then made to show that the evapotranspiration adjustment factor (ETAF) for the landscape project does not exceed a factor of 0.55 for residential areas and 0.45 for non-residential areas, exclusive of Special Landscape Areas. The ETAF for a landscape project is based on the plant factors and irrigation methods selected. The Maximum Applied Water Allowance is calculated based on the maximum ETAF allowed (0.55 for residential areas and 0.45 for non-residential areas) and expressed as annual gallons required. The *EAWU* is calculated based on the plants used and irrigation method selected for the landscape design.
- (b) The *EAWU* allowable for the *landscaped area* shall not exceed the *MAWA*. The *MAWA* shall be calculated using an *evapotranspiration adjustment factor (ETAF)* of 0.55 for residential areas and 0.45 for non-residential areas, except for the portion of the *MAWA* applicable to any *special landscaped areas* within the landscape project, which shall be calculated using an *ETAF* of 1.0. Where the design of the *landscaped area* can otherwise be shown to be equivalently water-efficient, the *project applicant* may submit alternative or abbreviated information supporting the demonstration that the annual *EAWU* is less than the *MAWA*, at the discretion of and for the review and approval of the City and/or local water purveyor.
- (c) Water budget calculations shall adhere to the following requirements:
 - (1) The *MAWA* and *EAWU* shall be calculated using the *Water Efficient Landscape Worksheets* and equation presented in Appendix C.

(2) For the calculation of the *MAWA* and *EAWU*, a *project applicant* shall use the *ET₀* values from the closest location listed the Reference Evapotranspiration Table in Appendix D. For geographic areas not covered in Appendix D, data from other cities, or zip codes, located nearby in the same *reference evapotranspiration* zone may be used.

(3) For calculation of the *EAWU*, the *plant water use factor* shall be determined as appropriate to the project location from the *Water Use Efficiency of Landscape Species (WUCOLS)* Species Evaluation List or from horticultural researchers with academic institutions or professional associations as approved by the California Department of water Resources (DWR). The *plant factor* ranges from 0 to 0.1 for very low water use plants, 0.1 to 0.3 for low water use plants, 0.4 to 0.6 for moderate water use plants, and 0.7 to 1.0 for high water use plants. *Plant factors* for some commonly available species are listed in Appendix G.

(4) For calculating the *EAWU*, the plant water use factor shall be determined for each hydrozone based on the highest-water-use plant species within the zone; or for mixed-plant-factor zones may be determined based on the proportions of the respective plant water uses and their plant factor. The *plant factor* for each hydrozone may be further refined as a “landscape coefficient,” according to protocols defined in detail in the *WUCOLS* document, to reflect planting density and microclimate effects on water need at the option of the *project applicant* or the *City*.

(5) For calculation of the *EAWU*, the area of a water feature shall be defined as a high water use hydrozone with a *plant factor* of 1.0.

(6) For calculation of the *EAWU*, a temporarily irrigated hydrozone area, such as an area of highly drought-tolerant native plants that are not intended to be irrigated after they are fully established, shall be defined as a very low water use hydrozone with a *plant factor* of 0.1.

(7) For calculation of the *MAWA*, the *ETAF* for *special landscaped areas* shall be set at 1.0. For calculation of the *EAWU* and comparison to the *MAWA*, the *ETAF* for *special landscaped areas* shall be calculated as the *special landscaped area (SLA) plant factor* derived from Appendix G or WUCOLS, divided by the *SLA irrigation efficiency factor*, determined based on the type of irrigation system used. For a landscape project entirely composed of *special landscape areas*, the calculated *ETAF* for the *EAWU* cannot exceed 1.0.

(8) For calculation of the EAWU, *irrigation efficiency* of the irrigation heads used within each hydrozone shall be assumed to be as follows, unless otherwise indicated by the irrigation equipment manufacturer's specifications or demonstrated by the *project applicant*:

Irrigation Method	DU _{LQ}	DU _{LH} *	EU	IE**
Spray nozzles	65%	79%		71%
High efficiency spray nozzles	70%	82%		73%
Multi stream/Multi trajectory rotary (MSMT) nozzles	75%	85%		76%
Stream rotor nozzle	70%	82%		73%
Microspray	75%	85%		76%
Bubblers			85%	77%
Drip emitter			90%	81%
Subsurface drip			90%	81%

*DU_{LH} = .386 + (.614)(DU_{LQ})

** IE (spray) = (DU_{LH})(IME)

** IE (drip) = Emission uniformity (EU)(IME)

(d) The *Maximum Applied Water Allowance* shall adhere to the following requirements:

(1) The *Maximum Applied Water Allowance* shall be calculated using the equation presented in Appendix C. The *reference evapotranspiration (ET₀)* values used in this calculation are from the *Reference Evapotranspiration Table* in Appendix D and are for planning purposes only. For actual irrigation scheduling, automatic irrigation controllers are required and shall use current *ET₀* data, such as from the California Irrigation Management Information System (CIMIS), other equivalent data, or soil moisture sensor data.

2.3 Soil Management Report

(a) All planted landscape areas are required to have friable soil to maximize retention and infiltration. On engineered slopes, only amended planting holes need meet this requirement. In order to reduce *runoff* and encourage healthy plant growth, a soil management report and/or specification shall be completed by the *project applicant*, or his/her designee, as follows:

(1) Submit soil samples to a certified agronomic soils 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 may include, but is not limited to:

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 that are installing landscaping) a soil sampling rate of 1 in 7 lots or approximately 15% will satisfy this requirement; evenly disbursed throughout the development. Large landscape projects shall sample at a rate equivalent to 1 in 7 lots or approximately 15% landscaped area.

(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 local agency 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* as part of the *Certification of Completion*.
- (C) The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans in order to make any necessary adjustments to the design plans.
- (D) The *project applicant*, or his/her designee, shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with the *Certification of Completion*.

2.4 Landscape Design Plan

(a) For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project. The following design criteria shall be submitted as part of the *Landscape Documentation Package*.

(1) Plant Material

(A) Any plant may be selected for the *landscaped area* provided the *EAWU* in the *landscaped area* does not exceed the *MAWA*. Methods to achieve water efficiency shall include one or more of the following:

1. Protection and preservation of non-invasive *water-conserving plant, trees and turf species*;
2. Selection of *water-conserving plant, tree and turf species*;
3. Selection of plants based on local climate suitability, disease and pest resistance;
4. Selection of trees based on applicable City and local tree ordinances or tree shading guidelines and size at maturity as appropriate for the planting area;
5. Selection of plants from local and regional landscape program plant lists; and,
6. Selection of plants from local Fuel Modification Plan Guidelines.

(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 2.5(a)(2)(D) of these *Guidelines*.

(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, and power lines) and allow for adequate soil volume for healthy root growth; and,
3. Consider the solar orientation for plant placement to maximize summer shade and winter solar gain.

(D) *Turf* is discouraged on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape. “25% slope” means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

(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 and fuel modification zones shall comply with requirements of the local Fire Authority, where applicable and refer to the local Fuel Modification Plan Guidelines. When conflicts between water conservation and fire safety design elements exist, the fire safety requirements shall have priority.

(G) The use of *invasive plant species*, such as those listed by the California Invasive Plant Council, is strongly discouraged.

(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 *water efficient plant species* as a group.

(2) Water Features

(A) Recirculating water systems shall be used for water features.

(B) Where available and consistent with public health guidelines, recycled water shall be used as a source for decorative water features.

(C) The surface area of a water feature shall be included in the high water use *hydrozone* area of the EAWU calculation, and shall be assigned an ETAF of 1.0.

(D) Pool and spa covers are highly recommended.

(3) *Soil Preparation, Mulch and Amendments*

(A) 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.

(B) Stabilizing mulching products shall be used on slopes that meet current engineering standards.

(C) The mulching portion of the seed/*mulch* slurry in hydro-seeded applications shall meet the mulching requirement.

(D) Soil amendments shall be incorporated according to recommendations of the soil report and what is appropriate for the plants selected (see Section 2.3 of these *Guidelines*).

(E) Prior to planting of any materials, compacted soils shall be transformed to a friable condition. On engineered slopes, only amended planting holes need to meet this requirement.

(F) Organic mulch materials made from recycled or post-consumer shall take precedence over inorganic materials or virgin forest products unless the recycled post-consumer organic products are not locally available. Organic mulches are not required where prohibited by local fuel Modification Plan Guidelines or other applicable local ordinances.

(G) 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.

(b) The landscape design plan, at a minimum, shall:

- (1) Delineate and label each *hydrozone* by number, letter, or other method;

- (2) Identify each *hydrozone* as low, moderate, high water, or mixed water use. Temporarily irrigated areas of the *landscaped area* shall be included in the low water use *hydrozone* for the water budget calculation;
- (3) Identify recreational areas;
- (4) Identify areas permanently and solely dedicated to edible plants;
- (5) Identify areas irrigated with recycled water;
- (6) Identify type of *mulch* and application depth;
- (7) Identify soil amendments, type, and quantity;
- (8) Identify type and surface area of water features;
- (9) Identify *hardscapes* (*pervious* and *non-pervious*);
- (10) Identify location and installation details, and 24-hour retention or infiltration capacity, of any applicable storm water best management practices that encourage on-site retention and infiltration of storm water. Storm water best management practices are encouraged in the landscape design plan, to the extent found to be compatible with public safety, geotechnical stability constraints and vector control needs. Project applicants shall refer to the local agency or regional Water Quality Control Board for information on any applicable storm water technical requirements. Examples include, but are not limited to:
 - (A) Infiltration beds, swales, and basins that allow water to collect and soak into the ground;
 - (B) Constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants; and
 - (C) *Pervious* or porous surfaces (e.g., permeable pavers or blocks, *pervious* or porous concrete, etc.) that minimize *runoff*.
- (11) Identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.);

- (12) Contain the following statement: “I have complied with the criteria of the *Water Efficient Landscape Ordinance* and applied them for the efficient use of water in the landscape design plan;” and
- (13) Bear the signature of a California-licensed landscape professional, licensed landscape contractor or any other person licensed to design a landscape.

2.5 Irrigation Design Plan

- (a) 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 manufacturer’s 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 private sub meter, 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 customer service meter dedicated to landscape use provided by the local water purveyor; or, 2) A privately owned meter or sub meter.
 - (B) Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data with non-volatile memory shall be required for irrigation scheduling in all irrigation systems. The use of U.S. EPA WaterSense labeled devices is recommended as applicable.
 - (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) *Sensors* (rain, freeze, wind, etc.), 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) *Backflow prevention devices* shall be required to protect the water supply from contamination by the irrigation system. A *project applicant* shall refer to the applicable City code (i.e., public health) for additional backflow prevention requirements.

(F) A *master shutoff valve* shall be as close as possible to the point of connection and is required on all projects; with the exception for 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.

(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 5,000 sq. ft. or larger. The flow sensor must be in combination with a master shut-off valve.

(H) *Manual isolation valves* (such as a *gate valve*, *ball valve*, or *butterfly valve*) shall be required downstream of 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.

- (I) The irrigation system shall be designed to operate in a manner that prevents *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 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) 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 ASBE/ICC 802-2014.
- (M) Average *irrigation efficiency* for the project shall be determined in accordance with the EAWU calculation sheet in Appendix C. Unless otherwise indicated by the irrigation equipment manufacturer's specifications or demonstrated by the *project applicant*, the *irrigation efficiency* of the irrigation heads used within each hydrozone shall be assumed to be:

Irrigation Method	DU _{LQ}	DU _{LH} *	EU	IE**
Spray nozzles	65%	79%		71%
High efficiency spray nozzles	75%	85%		76%
Multi stream/Multi trajectory rotary (MSMT) nozzles	75%	85%		76%
Stream rotor nozzle	75%	85%		76%
Microspray	75%	85%		76%
Bubblers			85%	77%
Drip emitter			90%	81%
Subsurface drip			90%	81%

$$* \text{ DU}_{\text{LH}} = .386 + (.614)(\text{DU}_{\text{LQ}})$$

$$** \text{ IE (spray)} = (\text{DU}_{\text{LH}})(\text{IME})$$

$$** \text{ IE (drip)} = \text{Emission uniformity (EU)}(\text{IME})$$

- (N) The irrigation design shall take into account the local water purveyor's constraints due to peak water operating

demands on the water supply system and/or any other water supply or irrigation scheduling restrictions that may impact the effectiveness and operation of the irrigation system.

- (O) In *mulched* planting areas, the use of *low volume irrigation* is encouraged to maximize water infiltration into the root zone; with the exception of areas with fuel modification requirements and/or those that require plant establishment to comply with local grading ordinances.
- (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 joint* components are required on all sprinklers subject to damage that are adjacent to hardscapes or in high traffic areas of turfgrass.
- (S) *Check valves* or *anti-drain valves* are required for 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 subsurface irrigation, or other means that produces no runoff or overspray.
- (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, drip line, or other low-flow or non-spray technology or other irrigation technology that would not cause overspray onto adjacent hardscape. The setback area may be planted or unplanted. The surfacing of the setback may be *mulch*, gravel, step-stones or other porous material. These restrictions may be modified if:
 - 1. The *landscaped area* is adjacent to permeable surfacing and no *runoff* occurs; or
 - 2. The adjacent non-permeable surfaces are designed to drain entirely to landscaping; or

3. Irrigation is with reclaimed water at a turfed recreation area and overspray or runoff does not reach drainage ditches, gutters or drain inlets; or
4. The irrigation designer for the landscape project specifies an alternative design, technology, or site condition, as part of the *Landscape Documentation Package*, and clearly demonstrates strict adherence to the irrigation system design criteria in Section 2.5 (a)(1)(H) hereof.
5. Slopes steeper than 25% (4' horizontal to 1' vertical) 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 of the landscape project specifies an alternative design, technology, scheduling capability and parameters, and/or other mitigating condition(s), as part of the *Landscape Documentation Package*, that clearly demonstrates no *runoff* or erosion will occur.

(2) Hydrozone

- (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) Trees may be placed on separate valves from surrounding shrubs, groundcovers, and *turf* to enable temporary supplemental watering for establishment purposes or drought conditions. 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 respective *plant factors*; or

2. The *plant factor* of the higher water using plant is used for the 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*.

(b) The irrigation design plan, at a minimum, shall contain:

- (1) The location and size of separate water meters for landscape;
- (2) The 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*;
- (3) *Static water pressure* at the point of connection to the public water supply;
- (4) *Flow rate* (gallons per minute), application rate (inches per hour), and design *operating pressure* (pressure per square inch) for each *station*;
- (5) Irrigation schedule parameters necessary to program smart timers specified in the landscape design;
- (6) The following statement: “I have complied with the criteria of the *Water Efficient Landscape Ordinance* and applied them accordingly for the efficient use of water in the irrigation design plan;” and
- (7) The signature of a California-licensed *landscape professional*.

2.6 Grading Design Plan

(a) For the efficient use of water, grading of a landscape project site shall be designed to minimize soil erosion, *runoff*, and water waste. Finished grading configuration of the *landscaped area*, including pads, slopes, drainage, post-construction erosion control, and storm water control Best Management Practices, as applicable, shall be shown on the Landscape Plan unless this information is fully included in separate Grading Plans for

the project, or unless the project is limited to replacement planting and/or irrigation to rehabilitate an existing *landscaped area*.

- (1) The *project applicant* shall submit a landscape grading plan that indicates finished configurations and elevations of the *landscaped area* including:
 - (A) Height of graded slopes;
 - (B) Drainage patterns;
 - (C) Pad elevations;
 - (D) Finish grade; and
 - (E) Storm water retention improvements, if applicable.
- (2) To prevent excessive erosion and *runoff*, it is highly recommended that the *project applicant*:
 - (A) Grade so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable *hardscapes*;
 - (B) Avoid disruption of natural drainage patterns and undisturbed soil; and
 - (C) Avoid soil compaction in *landscaped areas*.

2.7 Certification of Completion

- (a) Landscape project installation shall not proceed until the *Landscape Documentation Package* has been approved by the City and any ministerial permits required are issued.
- (b) The *project applicant* shall notify the City at the beginning of the installation work and at intervals, as necessary, for the duration of the landscape project work to schedule all required inspections.
- (c) *Certification of Completion* of the landscape project shall be obtained through a Certificate of Use and Occupancy or a *Permit* Final. The requirements for the Final Inspection and *Permit* Closure include submittal of:
 - (1) A *Landscape Installation Certificate of Completion* in the form included as Appendix E of these *Guidelines*, which shall include:
 - (i) certification by a *landscape professional* that the *landscape*

project has been installed per the approved *Landscape Documentation Package*; and (ii) the following statement: “The landscaping has been installed in substantial conformance to the design plans, and complies with the provisions of the *Water Efficient Landscape Ordinance* for the efficient use of water in the landscape.”

a. Where there have been significant changes (as deemed by the local permitting agency) made in the field during construction, these “as-built” or record drawings shall be included with the certificate.

b. A diagram of the irrigation plan showing hydrozones shall be kept with the irrigation controller for subsequent management purposes.

(2) Documentation of the irrigation scheduling parameters used to set the *controller(s)*; and

(3) An *irrigation audit* report from a certified irrigation auditor, documentation of enrollment in regional or local water purveyor’s water conservation programs, and/or documentation that the MAWA and EAWU information for the *landscape project* has been submitted to the local water purveyor, may be required at the option of the City.

(a) Landscape audits shall not be conducted by the *person* who designed or installed the landscape.

(b) In large projects or projects with multiple landscape installations (i.e. production home developments or *common interest developments*) an auditing rate of 1 in 7 lots or approximately 15% will satisfy this requirement.

2.8 Post-Installation Irrigation Scheduling

(a) 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 in accordance with the local water purveyor’s Water Conservation Ordinance. Operation of the irrigation system outside the normal *watering window* is allowed for auditing and system maintenance.

2.9 Post-Installation Landscape and Irrigation Maintenance

- (a)** Landscapes shall be maintained to ensure water use efficiency in accordance with City and Water District requirements.

3. PROVISIONS FOR EXISTING LANDSCAPES

- (a)** Irrigation of all *landscaped areas* shall be conducted in a manner conforming to the rules and requirements and shall be subject to penalties and incentives for water conservation and water waste prevention, as determined and implemented by the *local water purveyor* and as may be mutually agreed by the *City*.
- (b)** The City and/or the regional or *local water purveyor* may administer programs such as irrigation water use analyses, irrigation surveys and/or irrigation audits, tiered water rate structures, water budgeting by parcel, or other approaches to achieve landscape water use efficiency community-wide to a level equivalent to or less than would be achieved by applying a *MAWA* calculated with an *ETAF* of 0.8 to all *landscaped areas* in the *City* over one acre in size.
- (c)** The architectural guidelines of a *common interest development*, including apartments, 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.

4. PUBLIC EDUCATION

- (a)** Publications. Education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management, and maintenance that save water is encouraged in the community.
- (b)** Model Homes. All model homes that are landscaped shall use signs and written information to demonstrate the principles of water efficient landscapes as described.
 - (1)** Signs shall be used to identify the model as an example of a water efficient landscape featuring elements such as *hydrozones*, irrigation equipment, and others that contribute to the overall water efficient theme. Signage shall include information about the site water use as designed per the local ordinance; specify who designed and installed the site water efficient landscape; and demonstrate low water use approaches to landscaping such as using appropriate plants, alternative water sources, or rainwater catchment systems.

- (2) Information shall be provided about designing, installing, managing, and maintaining water efficient landscapes.

Appendix A

PRESCRIPTIVE COMPLIANCE OPTION

- (A)** This appendix contains prescriptive requirements which may be used as a compliance option to the Ordinance.
- (B)** Compliance with the following items is mandatory and must be documented in a landscape plan in order to use the prescriptive compliance option:
 - (1)** Submit a Landscape Documentation Package which includes the following elements:
 - (A) Date
 - (B) Project applicant
 - (C) Project address (if available, parcel and/or lot number (s))
 - (D) Total landscape area (square feet), including a breakdown of turf and plant material
 - (E) Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed)
 - (F) 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
 - (G) Contact information for the project applicant and property owner
 - (H) Applicant signature and date with statement, “I agree to comply with the requirements of the prescriptive compliance option to the MWELO”
 - (2)** Incorporate compost at a rate of at least four cubic yards per 1,000 square feet to a depth of six inches into landscaped area (unless contra-indicated by a soil test);
 - (3)** Plant material shall comply with all of the following:
 - (A) For residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plan factor 0.3) for 75% of the plant area excluding edibles and areas using recycled water; For non-residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plan factor 0.3) for 100% of the plant area excluding edibles and areas using recycled water;
 - (B) 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.

(4) Turf Shall comply with all of the following:

- (A) Turf shall not exceed 25% of the landscaped area in residential areas, and there shall be no turf in non-residential areas
- (B) Turf shall not be planted on sloped areas which exceed a slope of 1 foot vertical elevation change for every 4 feet of horizontal length;
- (C) Turf is prohibited in parkways less than 10 feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology that creates no overspray or runoff.

(5) Irrigation systems shall comply with the following:

- (A) Automatic irrigation controllers are required and must use evapotranspiration or soil moisture sensor data
- (B) Irrigation controllers shall be of a type which does not lose programming data in the event the primary power source is interrupted.
- (C) Pressure regulators shall be installed on the irrigation system to ensure the dynamic pressure of the system is within the manufacturers recommended pressure range.
- (D) Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be installed as close as possible to the point of connection of the water supply.
- (E) All irrigation emission devices must meet the requirements set in the ANSI standard, ASABE/ICC802-2014. “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.

(C) At the time of final inspection, the permit applicant must provide the owner of the property with a certificate of completion, certificate of installation, irrigation schedule and a schedule of landscape and irrigation maintenance.

Appendix B

CERTIFICATION OF LANDSCAPE DESIGN

I hereby certify that:

- (1) I am a professional appropriately licensed in the State of California to provide professional landscape design services.
- (2) The landscape design and water use calculations for the property located at _____
(provide street address or parcel number(s)) were prepared by me or under my supervision.
- (3) The landscape design and water use calculations for the identified property comply with the requirements of the City of Laguna Niguel Water Efficient Landscaping Regulations (Municipal Code Sections 6-5-40 to 6-5-45) and the *City of Laguna Niguel Guidelines for Implementation of the Water Efficient Landscaping Regulations*.
- (4) The information I have provided in this Certificate of Landscape Design is true and correct and is hereby submitted in compliance with the City of Laguna Niguel Guidelines for Implementation of the Water Efficient Landscaping Regulations.

Print Name

Date

Signature

License Number

Address

Telephone

E-mail Address

Landscape Design Professional's Stamp
(If applicable)



Appendix C

WATER EFFICIENT LANDSCAPE WORKSHEET

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

Landscape Area Sector Type Residential
(select one): Non-Residential

Reference Evapotranspiration (ET₀)^a: _____

	Hydrozone #/Planting Description	Location	Plant Factor ^b (PF)	Irrigation Method ^c	Irrigation Efficiency ^c (IE)	ETAF (PF/IE)	Landscape Area (sq-ft)	ETAF x Area	Estimated Total Water Use ^d (ETWU)
--	----------------------------------	----------	--------------------------------	--------------------------------	---	--------------	------------------------	-------------	---

Regular Landscape Area

1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Average	Total	Total

Average ETAF for Regular Landscape Areas^e (circle one): In Compliance Not In Compliance

Special Landscape Area

SLA-1									
SLA-2									
SLA-3									
SLA-4									
SLA-5									

Totals

Total Landscape Area
Site wide ETAF

ETWU Total
Maximum Allowed Water Allowance (MAWA)^f

WORKSHEET INFORMATION & EQUATIONS

^a Local monthly evapotranspiration rates are listed in Appendix D.

^b The following table can be used for common plant factors:

Plant Factor	PF
Very low water use plant	0.1
Low water use plant	0.2
Medium water use plant	0.5
High water use plant	0.8
Lawn	0.8
Pool, spa, or other water feature	1.0

^c *Irrigation efficiency* is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum allowable *irrigation efficiency* for purposes of these *Guidelines* is 0.71. The following *irrigation efficiency* may be achieved by the listed irrigation heads where controlled with an *Irrigation Management Efficiency* of 90%:

Irrigation Method	IE
Spray nozzles	71%
High efficiency spray nozzles	73%
Multi stream/Multi trajectory rotary (MSMT) nozzles	76%
Stream rotor nozzle	73%
Microspray	76%
Bubblers	77%
Drip emitter	81%
Subsurface drip	81%

^d Estimated Total Water Use (ETWU) is the annual gallons required

$$ETWU = (ETo) \times (0.62) \times (ETAF \times \text{Area})$$

where, ETo = annual evapotranspiration rate in inches per year

0.62 = factor used to convert inches per year to gallons per square foot

ETAF = plant factor ÷ irrigation efficiency

^e Average ETAF for Regular Landscape Areas must be 0.55 or below for residential areas, and 0.45 or below for nonresidential areas.

^f Maximum Allowed Water Allowance (MAWA) is the annual gallons allowed

$$MAWA = (ETo) \times (0.62) \times [(ETAF \times LA) + ((1-ETAF) \times SLA)]$$

where, ETo = annual evapotranspiration rate in inches per year

0.62 = factor used to convert inches per year to gallons per square foot

ETAF = plant factor ÷ irrigation efficiency

LA = total (site wide) landscape area in square feet

SLA = total special landscape area

Appendix D

REFERENCE EVAPOTRANSPIRATION (ETO) TABLE

Appendix D - Reference Evapotranspiration (ETO) Table*													
County and City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
Orange													
Laguna Niguel	2.6	2.5	3.5	4.3	5.1	4.9	5.5	5.5	4.7	3.4	2.5	2.0	46.5
Irvine	2.2	2.5	3.7	4.7	5.2	5.9	6.3	6.2	4.6	3.7	2.6	2.3	49.6
Laguna Beach	2.2	2.7	3.4	3.8	4.6	4.6	4.9	4.9	4.4	3.4	2.4	2.0	43.2
Santa Ana	2.2	2.7	3.7	4.5	4.6	5.4	6.2	6.1	4.7	3.7	2.5	2.0	48.2

* The values in this table were derived from: 1) California Irrigation Management Information System (CIMIS) 2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999, 3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

Appendix E

LANDSCAPE INSTALLATION CERTIFICATE OF COMPLETION

I hereby certify that:

- (1) I am a professional appropriately licensed in the State of California to provide professional landscape design services for _____(project name, mailing address and telephone/email).
- (2) The landscape project for the property located at _____ (provide street address or parcel number(s)) was installed by me or under my supervision.
- (3) The landscaping for the identified property has been installed in substantial conformance with the approved Landscape Documentation Package and complies with the requirements of the City of Laguna Niguel Water Efficient Landscaping Regulations (Municipal Code Sections 6-5-40 through 6-5-47) and the Guidelines for Implementation of the City of Laguna Niguel Water Efficient Landscaping Regulations for the efficient use of water in the landscape.
- (4) The following elements are attached hereto:
 - a. Irrigation scheduling parameters used to set the controller;
 - b. Landscape and irrigation maintenance schedule;
 - c. Irrigation audit report; and,
 - d. Soil analysis report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of the soil report recommendations.
- (5) The information I have provided in this Landscape Installation Certificate of Completion is true and correct and is hereby submitted in compliance with the Guidelines for Implementation of the City of Laguna Niguel Water Efficient Landscape Ordinance.

Print Name

Date

Signature

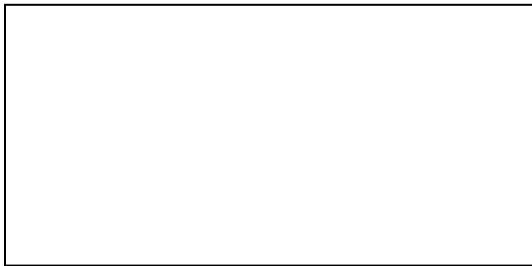
License Number

Address

Telephone

E-mail Address

Landscape Design Professional's Stamp
(If Appropriate)



Appendix F

DEFINITIONS

The terms used in these *Guidelines* have the meaning set forth below:

“*Aggregate landscape area*” pertains to production home neighborhoods, *common interest developments*, or other situations where multiple parcels are undergoing landscape development as one project, but may eventually be individually owned or maintained.

“*Backflow prevention device*” means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

“*Conversion factor*” means the number that converts acre-inches per acre per year to gallons per square foot per year.

“*Check valve*” or “*anti-drain valve*” means a valve located under a *sprinkler head*, or other location in the irrigation system, to hold water in the system to prevent drainage from *sprinkler heads* when the sprinkler is off.

“*Certification of Design*” means the certification included as Exhibit E of these Guidelines that must be included in the *Landscape Documentation Package* pursuant to Section 2.1 of these Guidelines.

“*City*” means the City of Laguna Niguel or its authorized designee.

“*Common interest developments*” means community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351

“*Distribution Uniformity*” or “*DU*” is a measure of how uniformly an irrigation head applies water to a specific target area and theoretically ranges from zero to 100 percent.

“*Drip irrigation*” means any non-spray *low volume irrigation* system utilizing emission devices with a *flow rate* measured in gallons per hour. *Low volume irrigation* systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

“*Emitter*” means a *drip irrigation* emission device that delivers water slowly from the system to the soil.

“*Estimated Applied Water Use*” or “*EAWU*” means the annual total amount of water estimated to keep plants in a healthy state. It is based on factors such as reference *evapotranspiration rate*, the size of the *landscaped area*, *plant water use factors*, and the *irrigation efficiency* within each hydrozone.

“*Evapotranspiration adjustment factor*” or “*ET Adjustment Factor*” or “*ETAF*” is equal to the Plant Factor divided by the Irrigation Efficiency Factor for a landscape project. The ETAF is

calculated in the context of local *reference evapotranspiration*, using site-specific *plant factors* and *irrigation efficiency factors* that influence the amount of water that needs to be applied to the specific landscaped area. A combined plant mix with a site-wide average plant factor of 0.39 (indicating a low to moderate water need) and average irrigation efficiency of 0.71 produces an *ET adjustment factor* of $(0.55) = (0.39/0.71)$, which is the standard of water use efficiency generally required by this Water Efficient Landscape Ordinance and the Guidelines for residential landscapes. A site-wide average plant factor of 0.39 (indicating a low to moderate water need) and average irrigation efficiency of 0.71 produces an *ET adjustment factor* of $(0.45) = (0.32/0.71)$ for non-residential landscapes. The *ETAF* for a *special landscape area* shall not exceed 1.0. The *ETAF* for existing non-rehabilitated landscapes is 0.8.

“*Evapotranspiration rate*” means the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

“*Flow rate*” means the rate at which water flows through pipes, *valves* and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.

“*Hardscapes*” means any durable material or feature (*pervious* and *non-pervious*) installed around or through a *landscaped area*, such as pavements or walls. Pools and other water features are considered part of the *landscaped area* and not considered *hardscapes* for purposes of these Guidelines.

“*Hydrozone*” means a portion of the *landscaped area* having plants with similar water needs and typically irrigated by one *valve/controller* station. A *hydrozone* may be irrigated or non-irrigated.

“*Graywater*” means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthy processing, manufacturing, or operating wastes. *Graywater* includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines. And laundry tubs, but does not include wastewater from kitchen sinks or dishwashers as per the Health and Safety Code (Section 17922.12). *Graywater* systems promote the efficient use of water and are encouraged to assist in on-site landscape irrigation. All *graywater* systems shall conform to the California Plumbing Code (Title 24, Part 5, Chapter 16) and any applicable local ordinance standards.

“*Infiltration rate*” means the rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

“*Invasive plants species*” or “*noxious*” means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. *Invasive plant species* may be regulated by county agricultural agencies as *noxious species*.

“*Irrigation audit*” means an in-depth evaluation of the performance of an irrigation system conducted by a *Certified Landscape Irrigation Auditor*. An *irrigation audit* includes, but is not limited to: inspection, system tune-up, system test with *distribution uniformity* or emission

uniformity, reporting *overspray* or *runoff* that causes overland flow, and preparation of an irrigation schedule.

“*Irrigation Management Efficiency*” or “*IME*” means the measurement used to calculate the *irrigation efficiency* of the irrigation system for a landscaped project. A 90% IME is assumed to be achieved by using evapotranspiration controllers, soil moisture sensors, and other methods, such as tiered water rate pricing, that will adjust irrigation run times to meet plant water needs and site factors.

“*Irrigation efficiency*” or “*IE*” means the measurement of the amount of water beneficially used divided by the amount of water applied to a *landscaped area*. *Irrigation efficiency* is derived from measurements and estimates of irrigation system characteristics and management practices. The *irrigation efficiency* for purposes of these *Guidelines* is 0.75 for overhead spray devices and 0.81 for drip systems. Greater *irrigation efficiency* can be expected from well designed and maintained systems. The following *irrigation efficiency* may be assumed for the listed irrigation heads where an assumed IME of 90%.

Irrigation Method	DU _{LQ}	DU _{LH} *	EU	IE**
Spray nozzles	65%	79%		71%
High efficiency spray nozzles	75%	85%		76%
Multi stream/Multi trajectory rotary (MSMT) nozzles	75%	85%		76%
Stream rotor nozzle	75%	85%		76%
Microspray	75%	85%		76%
Bubbler			85%	77%
Drip emitter			90%	81%
Subsurface drip			90%	81%

*DU_{LH} = .386 + (.614)(DU_{LQ})

** IE (spray) = (DU_{LH})(IME)

** IE (drip) = Emission uniformity (EU)(IME)

“*Landscape coefficient*” (K_L) is the product of a *plant factor* multiplied by a density factor and a *microclimate* factor. A *landscape coefficient* may be derived and used in lieu of the plant factor to more accurately estimate the ET Factor for an irrigated *landscaped areas* and *special landscaped areas*, at the discretion of the applicant or as directed by the City.

“*Landscape Documentation Package*” means the package of documents that a *project applicant* is required to submit to the *City* pursuant to Section 2.1 of these *Guidelines*.

“*Landscape Installation Certificate of Completion*” means the certificate included as Exhibit F of these *Guidelines* that must be submitted to the *City* pursuant to Section 2.7(a)(1) of hereof.

“*Landscape professional*” means a licensed *landscape architect*, licensed landscape contractor, or any other *person* authorized to design a landscape pursuant to Sections 5500.1, 5615, 5641, 5641.1, 5641.2, 5641.3, 5641.4, 5641.5, 5641.6, 6701, 7027.5 of the California Business and

Professions Code, Section 832.27 of Title 16 of the California Code of Regulations, and Section 6721 of the California Food and Agriculture Code.

“*Landscaped area*” means all the planting areas, *turf* areas, and *water features* in a landscape design plan subject to the *Maximum Applied Water Allowance* and *Estimated Applied Water Use* calculations. The *landscaped area* does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other *pervious* or *non-pervious hardscapes*, and other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

“*Lateral line*” means the water delivery pipeline that supplies water to the *emitters* or sprinklers from the *valve*.

“*Low volume irrigation*” means the application of irrigation water at low pressure through a system of tubing or *lateral lines* and low-volume *emitters* such as drip, drip lines, and bubblers. *Low volume irrigation* systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

“*Low volume overhead irrigation*” means aboveground irrigation heads with an upper flow limit of 0.5 GPM.

“*Main line*” means the pressurized pipeline that delivers water from the water source to the *valve* or outlet.

“*Manual Isolation Valve*” means a valve such as a gate valve, ball valve, or butterfly valve installed downstream of the point of connection of the water supply to shutdown water flow through mainline piping for routine maintenance and emergency repair.

“*Master Shut-off Valve*” an electronic valve such as a solenoid valve installed as close as possible to the point of connection and is used in conjunction with a flow sensor and flow monitoring controller technology to automatically shut down system wide water flow in the event of high flow conditions such as mainline pipe break.

“*Maximum Applied Water Allowance*” or “*MAWA*” means the upper design limit of annual applied water for the established *landscaped area*, as specified in Section 2.2 of these *Guidelines*. It is based upon the area’s *reference evapotranspiration*, the *ETAF*, and the size of the *landscaped area*. The *Estimated Applied Water Use* shall not exceed the *Maximum Applied Water Allowance*.

“*Microclimate*” means the climate of a small, specific area that may contrast with the climate of the overall landscaped area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.

“*Mulch*” means any organic material such as leaves, bark, straw or compost, or inorganic mineral materials such as rocks, gravel, or decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.

“*Non-pervious*” means any surface or natural material that does not allow for the passage of water through the material and into the underlying soil.

“*Operating pressure*” means the pressure at which the parts of an irrigation system of sprinklers are designed to operate at by the manufacturer

“*Overspray*” means the irrigation water which is delivered beyond the target area.

“*Person*” means any natural person, firm, joint venture, joint stock company, partnership, public or private association, club, company, corporation, business trust, organization, public or private agency, government agency or institution, school district, college, university, any other user of water provided by the *City* or the *local water purveyor*, or the manager, lessee, agent, servant, officer, or employee of any of them or any other entity which is recognized by law as the subject of rights or duties.

“*Pervious*” means any surface or material that allows the passage of water through the material and into the underlying soil.

“*Plant factor*” or “*plant water use factor*” is a factor, when multiplied by *ETo*, that estimates the amount of water needed by plants. For purposes of this *Water Efficient Landscape Ordinance*, the *plant factor* range for very low is 0 to 0.1; low water use plants is 0.1 to 0.3; the *plant factor* range for moderate water use plants is 0.4 to 0.6; and the *plant factor* range for high water use plants is 0.7 to 1.0. *Plant factors* cited in these *Guidelines* are derived from the Department of Water Resources 2000 publication “Water Use Classification of Landscape Species.”

“*Precipitation rate*” means the rate of application of water measured in inches per hour.

“*Project applicant*” means the person submitting a *Landscape Documentation Package* required under Section 2.1 to request a permit, plan check, or design review from the local agency. A *project applicant* may be the property owner or his or her designee.

“*Property owner*” or “*owner*” means the record owner of real property as shown on the most recently issued equalized assessment roll.

“*Reference evapotranspiration*” or “*ETo*” means a standard measurement of environmental parameters which affect the water use of plants. *ETo* is given expressed in inches per day, month, or year as represented in Appendix C of these Guidelines, and is an estimate of the evapotranspiration of a large field of four to seven-inch tall, cool-season grass that is well watered. *Reference evapotranspiration* is used as the basis of determining the *Maximum Applied Water Allowances*.

“*Recycled water*” or “*reclaimed water*” means treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and *water features*. This water is not intended for human consumption.

“*Rehabilitated landscape*” means any re-landscaping project that meets the applicability criteria where the modified aggregate landscape area is equal to or greater than 2,500 square feet.

“*Runoff*” means water which is not absorbed by the soil or landscape to which it is applied and flows from the landscaped area. For example, *runoff* may result from water that is applied at too great a rate (application rate exceeds *infiltration rate*) or when there is a slope.

“*Special Landscaped Areas*” or “*SLA*” means an area of the landscape dedicated solely to edible plants such as orchards and vegetable gardens, areas irrigated with *recycled water*, *water features* using *recycled water*, and areas dedicated to active play such as parks, sports fields, golf courses, swimming pools, and where *turf* provides a playing surface.

“*Sprinkler head*” means a device which delivers water through a nozzle.

“*Static water pressure*” means the pipeline or municipal water supply pressure when water is not flowing.

“*Station*” means an area served by one *valve* or by a set of *valves* that operate simultaneously.

“*Swing joint*” means an irrigation component that provides a leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.

“*Turf*” means a ground cover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are warm-season grasses.

“*Valve*” means a device used to control the flow of water in an irrigation system

“*Water Efficient Landscaping Regulations*” means Section 6-5-40 through 6-5-47 of the regulations codified in the Municipal Code in Article 3 of Division 5 (Water Conservation) in Title 6 (Health and Sanitation).

“*Water Efficient Landscape Worksheets*” means the worksheets required to be completed pursuant to Section 2.2 of these *Guidelines* and which are included in Appendix C hereof.

“*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 (where water is artificially supplied). The surface area of *water features* is included in the high water use *hydrozone* of the *landscaped area* and is assigned a *Plant Factor* of 1.0 and an *Irrigation Efficiency Factor* of 1.0. Naturally-occurring streams or ponds, or constructed wetlands used for on-site wastewater treatment, habitat protection, or storm water best management practices that are not irrigated and used solely for water treatment or storm water retention, are not defined as *water features* and, therefore, are not subject to the water budget calculation.

“*Watering window*” means the time of day irrigation is allowed.

“WUCOLS” means the Water Use Classification of Landscape published by the University of California Cooperative Extension, the Department of Water Resources, and the Bureau of Reclamation, 2000. www.owue.water.ca.gov/docs/wucols00

APPENDIX G

SAMPLE PLANT LIST

(a) This plant list has been compiled from the following sources which may be referred to for specific plant characteristics:

- (1) WUCOLS Project: Water Use Classification of Landscape Species, L.R. Costello and K.S. Jones, University of California Cooperative Extension and California Department of Water Resources
- (2) Plants for California Landscapes, A Catalog of drought Tolerant Plants, California Department of Water Resources, February, 1981.
- (3) Orange County Environmental Management Agency Drought Tolerant Plant List.
- (4) County of Orange Fire Department Fuel Modification and Water Tolerant Plant List

(b) The following list is of commonly available plants, emphasizing drought-tolerant species, that are suitable for the climate in the city. This is just a representative species list and is not intended to limit plant selection. It is designed to provide guidance to landscape professionals in selecting and maintaining plants based on their Plant Water Use Factor Range. Plant Factor Ranges are derived from WUCOLS Species Evaluation List for South Coastal Region 3. The Plant Factor Range is considered “Low” for plants with Plant Water Use Factors from 0.1 to 0.3, “Moderate” for plants with Plant Factors from 0.4 to 0.6, and “High” for plants with Plant Factors from 0.7 to 1.0. The Plant Water Use Factors shown represent average microclimatic conditions and may be adjusted for localized site conditions, such as shade, wind, slope exposure or reflected heat that can shift the Plant Factor by up to plus or minus 0.1 to 0.4.

Botanical Name	Common Name	Plant Water Use Factor
<i>TURFGRASSES</i>		
<i>Cynodon dactylon</i>	Bermuda Grass	0.6
<i>Paspalum vaginatum</i>	Seashore Paspalum	0.6
<i>Zoysia spp.</i>	Zoysia Grass	0.6
<i>Buchloe dactyloides</i>	Buffalo Grass	0.6
<i>Stenotaphrum secundatum</i>	St. Augustine Grass	0.6
<i>Poa annua</i>	Annual Bluegrass	0.8
<i>Poa pratensis</i>	Kentucky Bluegrass	0.8
<i>Lolium perenne</i>	Perennial Ryegrass	0.8
<i>Festuca rubra</i>	Red Fescue	0.8
<i>Festuca elatior</i>	Tall Fescue	0.8
<i>TREES</i>		
<i>Acacia baileyana</i>	Bailey Acacia	0.2
<i>Acacia longifolia</i>	Sydney Golden Wattle	0.2
<i>Acacia melanoxylon</i>	Blackwood Acacia	0.2
<i>Albizia julibrissin</i>	Silk Tree	0.4
<i>Cedrus atlantica</i>	Atlas Cedar	0.3
<i>Ceratonia siliqua</i>	Carob	0.2
<i>Cercidium spp.</i>	Palo Verde species	0.1
<i>Cordyline australis</i>	New Zealand Cabbage Tree	0.3
<i>Cupaniopsis anacardioides</i>	Carrotwood	0.5
<i>Eucalyptus spp.</i>	Eucalyptus species	0.3
<i>Feijoa sellowiana</i>	Pineapple Guava	0.3
<i>Geijera parviflora</i>	Australian Willow	0.3
<i>Gleditsia triacanthos</i>	Honey Locust	0.4
<i>Grevillea robusta</i>	Silk Oak	0.3
<i>Jacaranda mimosifolia</i>	Jacaranda	0.5
<i>Juglans californica</i>	So. California Black Walnut	0.2
<i>Juniperus californica</i>	California Juniper	0.2
<i>Leptospermum laevigatum</i>	Australian Tea Tree	0.2
<i>Lophostemon confertus</i>	Brisbane Box	0.5
<i>Lyonothamnus floribundus</i>	Catalina Ironwood	0.1
<i>Melaleuca linarifolia</i>	Flaxleaf Paperbark	0.2
<i>Melaleuca nesophila</i>	Pink Melaleuca	0.2
<i>Melia azedarach</i>	Chinaberry	0.1
<i>Olea europaea</i>	Olive	0.2
<i>Parkinsonia aculeate</i>	Jerusalem Thorn	0.1
<i>Phoenix canariensis</i>	Canary Island Date Palm	0.2
<i>Phoenix dactylifera</i>	Date Palm	0.2
<i>Pinus canariensis</i>	Canary Island Pine	0.3

<i>Pinus coulteri</i>	Coulter Pine	0.2
<i>Pinus halepensis</i>	Aleppo Pine	0.2
<i>Pinus pinaster</i>	Cluster Pine	0.3
<i>Pinus pinea</i>	Italian Stone Pine	0.2
<i>Pinus torreyana</i>	Torrey Pine	0.2
<i>Platanus acerifolia</i>	London Plane	0.5
<i>Platanus racemosa</i>	California Sycamore	0.5
<i>Podocarpus gracilior</i>	African Fern Pine	0.5
<i>Quercus agrifolia</i>	Coast Live Oak	0.1
<i>Quercus douglasii</i>	Blue Oak	0.1
<i>Quercus ilex</i>	Holly Oak	0.2
<i>Quercus suber</i>	Cork Oak	0.2
<i>Rhus lancea</i>	African Sumac	0.2
<i>Robinia pseudoacacia</i>	Black Locust	0.2
<i>Schinus molle</i>	California Pepper	0.1
<i>Ulmus pumila</i>	Siberian Elm	0.2
<i>Washingtonia filifera</i>	California Fan Palm	0.2
<i>Washingtonia robusta</i>	Mexican Fan Palm	0.2
<i>Zizyphus jujuba</i>	Chinese Jujube	0.3
SHRUBS		
<i>Agapanthus africanus</i>	Lily of the Nile	0.5
<i>Agave spp.</i>	Agave	0.2
<i>Aloe spp.</i>	Aloe	0.2
<i>Arctostaphylos spp.</i>	Manzanita	0.2
<i>Artemisia spp.</i>	Sage/Wormwood	0.2
<i>Atriplex spp.</i>	Saltbush	0.1
<i>Baccharis pilularis 'consanguinea'</i>	Coyote Bush	0.2
<i>Buxus microphylla japonica</i>	Japanese Boxwood	0.5
<i>Carpenteria californica</i>	Bush Anemone	0.2
<i>Cassia spp.</i>	Cassia species	0.3
<i>Cassia artemisioides</i>	Feather Cassia	0.2
<i>Ceanothus spp.</i>	California Lilac	0.1
<i>Cistus spp.</i>	Rockrose	0.2
<i>Convolvulus cneorum</i>	Bush Morning Glory	0.2
<i>Dendromecon spp.</i>	Bush Poppy	0.1
<i>Dodonaea viscosa</i>	Hopseed Bush	0.3
<i>Echium fastuosum</i>	Pride of Madeira	0.2
<i>Elaeagnus pungens</i>	Silver Berry	0.2
<i>Fremontodendron spp.</i>	Flannel Bush	0.1
<i>Grevillea spp.</i>	Grevillea species	0.2
<i>Hakea laurina</i>	Sea Urchin Tree	0.2
<i>Hakea suaveolens</i>	Sweet Hakea	0.2
<i>Heteromeles arbutifolia</i>	Toyon	0.2
<i>Juniperus spp.</i>	Juniper	0.3

<i>Lavandula</i>	Lavendar	0.2
<i>Leptospermum laevigatum</i>	Australian Tea Tree	0.2
<i>Leucophyllum frutescens</i>	Texas Ranger	0.2
<i>Lupinus arboreus</i>	Tree Lupine	0.2
<i>Lysiloma thornberi</i>	Feather Bush	0.2
<i>Myrtus communis</i>	True Myrtle	0.3
<i>Nerium oleander</i>	Oleander	0.2
<i>Phormium tenax</i>	New Zealand Flax	0.3
<i>Portulacaria afra</i>	Elephant's Food	0.2
<i>Prunus caroliniana</i>	Carolina Laurel Cherry	0.4
<i>Pyracantha spp.</i>	Firethorn	0.3
<i>Rhaphiolepis indica</i>	India Hawthorne	0.4
<i>Rhamnus californica</i>	California Coffeeberry	0.1
<i>Rhus laurina</i>	Laurel Sumac	0.1
<i>Rhus ovata</i>	Sugar Bush	0.1
<i>Ribes speciosum</i>	Fuschsia Flowering Gooseberry	0.3
<i>Rosa hybrids</i>	Hybrid Roses	0.5
<i>Rosmarinus officinalis</i>	Rosemary	0.2
<i>Simmondsia chinensis</i>	Jojoba	0.1
<i>Teucrium fruticans</i>	Bush Germander	0.2
GROUNDCOVERS		
<i>Acacia redolens</i>	Prostrate Acacia	0.2
<i>Arctostaphylos spp.</i>	Manzanita	0.2
<i>Ceanothus spp.</i>	California Lilac	0.1
<i>Cistus spp.</i>	Rockrose	0.2
<i>Gazania spp.</i>	Gazania	0.5
<i>Helianthemum nummularium</i>	Sunrose	0.2
<i>Lonicera japonica 'halliana'</i>	Hall's Honeysuckle	0.3
<i>Myoporum 'Pacificum'</i>	Pacifica Saltbush	0.3
<i>Myoporum parvifolium</i>	Myoporum	0.2
<i>Phyla nodiflora</i>	Lippia	0.3
<i>Santolina spp.</i>	Lavendar Cotton	0.2
<i>Teucrium chamaedrys</i>	Germander	0.2
<i>Verbena peruviana</i>	Peruvian Verbena	0.2
<i>Vinca minor</i>	Periwinkle	0.5
<i>Zauschneria californica</i>	California Fuschia	0.1
PERENNIALS, FERNS, GRASSES AND BULBS		
<i>Aloe spp.</i>	Aloe	0.2
<i>Amaryllis belladonna</i>	Naked Lady	0.1
<i>Begonia 'Richmondensis'</i>	Richmond Begonia	0.5
<i>Coreopsis spp.</i>	Coreopsis	0.2
<i>Echium fastuosum</i>	Pride of Madeira	0.2

<i>Impatiens uguensis</i>	Impatiens	0.8
<i>Kniphofia uvaria</i>	Red-Hot Poker	0.3
<i>Limonium perezi</i>	Statice	0.2
<i>Oenothera berlandieri</i>	Mexican Evening Primrose	0.2
<i>Romneya coulteri</i>	Matilija Poppy	0.1
<i>Senecio cineraria</i>	Dusty Miller	0.2
 FIRE RETARDANT PLANTS - TREES		
<i>Ceratonia siliqua</i>	Carob	0.2
<i>Rhus lancea</i>	African Sumac	0.2
<i>Schinus molle</i>	California Pepper	0.1
<i>Umbellularia californica</i>	California Bay Tree	0.5
<i>Washingtonia spp.</i>	Fan Palm	0.2
 FIRE RETARDANT PLANTS - SHRUBS		
<i>Acacia redolens 'Low Boy'</i>	'Low Boy' Acacia	0.2
<i>Artemisia caucasica</i>	Caucasian Artemisia	0.2
<i>Atriplex cuneata</i>	Saltbush	0.1
<i>Atriplex gardneri</i>	Gardner's Saltbush	0.1
<i>Atriplex semibaccata</i>	Creeping Australian Saltbush	0.1
<i>Callistemon citrinus</i>	Lemon Bottlebrush	0.2
<i>Callistemon viminalis</i>	Weeping Bottlebrush	0.4
<i>Cistus yellosus</i>	Rockrose	0.2
<i>Heteromeles arbutifolia</i>	Toyon	0.2
<i>Nerium oleander</i>	Oleander	0.2
<i>Prunus lyonii</i>	Catalina Cherry	0.2
<i>Rhamnus alaternus</i>	Italian Buckthorn	0.3
<i>Rhus integrifolia</i>	Lemonade Berry	0.1
<i>Rosmarinus officinalis 'prostratus'</i>	Prostrate Rosemary	0.2
 FIRE RETARDANT PLANTS – HERBACEOUS PLANTS		
<i>Achillea tomentosa</i>	Yarrow	0.2
<i>Agave Americana</i>	Century Plant	0.2
<i>Aloe spp.</i>	Aloe	0.2
<i>Arctotheca calendula</i>	Cape Weed	0.5
<i>Campsis radicans</i>	Trumpet Vine	0.4
<i>Carbobrotus edulis</i>	Hottentot Fig	0.1
<i>Ceratostium tomentosum</i>	Snow in Summer	0.5
<i>Crassula spp.</i>	Crassula	0.2
<i>Delosperma 'alba'</i>	White Trailing Iceplant	0.2
<i>Gazania uniflora</i>	Trailing Gazania	0.5
<i>Lampranthus spp.</i>	Iceplant	0.2

<i>Potentilla verna</i>	Spring Cinquefoil	0.5
<i>Santolina chamaecyparissus</i>	Lavendar Cotton	0.2
<i>Satureja Montana</i>	Winter Savory	0.5
<i>Solanum jasminoides</i>	Potato Vine	0.5
<i>Tecomaria capensis</i>	Cape Honeysuckle	0.5
<i>Verbena peruviana</i>	Peruvian Verbena	0.2
<i>Vinca spp.</i>	Periwinkle	0.5
<i>Wisteria spp.</i>	Wisteria	0.5
<i>EROSION CONTROL PLANTS - TREES</i>		
<i>Acacia longifolia</i>	Sydney Golden Wattle	0.2
<i>EROSION CONTROL PLANTS - SHRUBS</i>		
<i>Ceanothus spp.</i>	California Lilac	0.1
<i>Cistus spp.</i>	Rockrose	0.2
<i>Coprosma kirkii</i>	Coprosma	0.5
<i>Cotoneaster spp.</i>	Cotoneaster species	0.4
<i>Echium fastuosum</i>	Pride of Madeira	0.2
<i>Eriogonum fasciculatum</i>	Buckwheat	0.1
<i>Rhamnus croceus ilicifolia</i>	Redberry	0.1
<i>Rhus aromatica</i>	Fragrant Sumac	0.3
<i>Rhus trilobata</i>	Squawbush	0.2
<i>Ribes viburnifolium</i>	Evergreen Currant	0.3
<i>Rosmarinus officinalis</i>	Rosemary	0.2
<i>Santolina chamaecyparissus</i>	Lavendar Cotton	0.2
<i>Symporicarpus orbiculatus</i>	Indian Currant	0.5
<i>EROSION CONTROL PLANTS – VINES AND GROUNDCOVERS</i>		
<i>Arctostaphylos uva-ursi</i>	Bearberry	0.2
<i>Arctotheca calendula</i>	Cape Weed	0.5
<i>Baccharis pilularis</i>	Coyote Brush	0.2
<i>Bougainvillea spp.</i>	Bougainvillea	0.2
<i>Carpobrotus edulis</i>	Ice Plant	0.1
<i>Delosperma ‘alba’</i>	White Trailing Iceplant	0.2
<i>Drosanthemum spp.</i>	Iceplant	0.2
<i>Gazania spp.</i>	Gazania	0.5
<i>Hedera spp.</i>	Ivy species	0.5
<i>Hypericum calycinum</i>	Creeping St. John’s Wort	0.5
<i>Juniperus spp.</i>	Juniper species	0.3
<i>Lampranthus spp.</i>	Ice Plant	0.2
<i>Lonicera japonica</i>	Honeysuckle	0.3
<i>Maleophora crocea</i>	Iceplant	0.2

<i>Vinca spp.</i>	Periwinkle	0.5
<i>EROSION CONTROL PLANTS – ANNUALS/PERENNIALS</i>		
<i>Achillea tomentosa</i>	Wooly Yarrow	0.2
<i>Ajuga reptans</i>	Carpet Bugle	0.6
<i>Arctotis grandis</i>	African Daisy	0.3
<i>Helianthemum nummularium</i>	Sunrose	0.2
<i>Myosotis sylvatica</i>	Forget-me-not	0.5
<i>Pelargonium Peltatum</i>	Ivy Geranium	0.5
<i>AIR POLLUTION TOLERANT PLANTS - TREES</i>		
<i>Aesculus californica</i>	California Buckeye	0.1
<i>Ailanthus altissima</i>	Tree-of-Heaven	0.2
<i>Broussonetia papyrifera</i>	Paper Mulberry	0.4
<i>AIR POLLUTION TOLERANT PLANTS – SHRUBS</i>		
<i>Forsythia spp.</i>	Forsythia species	0.4
<i>Hamamelis spp.</i>	Witch Hazel species	0.5
<i>Nerium oleander</i>	Oleander	0.2