Guidelines for Water Features: Pools, Spas, Ponds, and Fountains
What you need to know when designing a sustainable landscape in Santa Monica

The City’s Water Neutrality ordinance SMMC 7.16.050 caps water use for new developments and new or enlarged portions of pools, spas, water features & ponds by limiting the project to the historical use for that individual parcel. Santa Monica is committed to eliminating imported water to achieve water self-sufficiency by 2020. By implementing water neutrality and maximizing water conservation, local ground water supplies, and alternate water supplies (graywater, rain water, recycled water), all of the city’s water needs can be met.

* The total cumulative surface area of all water features (except pools, spas, ponds) on a site may not exceed 25 square feet unless the feature uses water from an approved alternative water source and delivery system. The total cumulative surface area of all water features includes both vertical & horizontal non-submerged surface areas of the water features.

* While the State’s Model Water-Efficient Landscape Ordinance already includes pools, spas, water features and ponds as part of the landscape water budget calculations for a new development project, the City’s Water Neutrality Ordinance sets a water budget, also known as a water use allocation, for the entire site that includes the total water demand for all pools, spas, water features, ponds, the landscape water demand AND the indoor water use. Use the Water Neutrality Calculator to determine the total water demand for a site.

* Pool, spa, water feature, and pond water demand is calculated with the following formula:

\[
\text{ft2 (surface area)} \times 0.021 \times 7.48052 \times 365 = \text{gallons per year}
\]

\[(\text{new or enlarged area}) \times (\text{depth in feet of evaporation}) \times (\text{cubic feet to gallons}) \times (\text{days/year}) = \text{gallons evaporated/year}\]

* For new pools, spas, water features, and ponds that are being installed on a site, or being enlarged, but the building(s) on site are not being significantly renovated, a permit must be pulled and the increased water use must be accounted for using the Water Neutrality Calculator. Any additional water demand must be offset either on site or through the City’s Direct Install Program or by the developer elsewhere in the City. Visit sustainablesm.org/water for more information.

Design Tips

* Since the size of high water using plants like turfgrass and larger pools, spas, and ponds directly increases the total water use on a site, consider using lawn alternatives or limiting the surface area of pools, spas and ponds. Covers are required for all new pools and spas.
Guidelines for Plant Material: Determining Plant Water Demand

What you need to know when designing a sustainable landscape in Santa Monica

SLIDE (Simplified Landscape Irrigation Demand Estimation) is a scientific method for estimating the water demand of established landscapes that provides a research-based set of plant factors for landscape plant materials and rules for assigning and applying them to estimate landscape water demand.

The City of Santa Monica no longer uses the Water Use Classification of Landscape Species (WUCOLS) to determine plant water demand but instead uses the American National Standards Institute (ANSI) and the American Society of Agricultural and Biological Engineers (ASABE) Standard S623.1 to determine the plant water demand or “plant factor” (PF) for landscape plant material. SLIDE serves as the basis for the ANSI/ASABE S623 Standard, Determining Landscape Plant Water Demands. For more information visit http://ucanr.edu/sites/UrbanHort/ Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/.

### Plant Factors for the following plant material categories as defined by ANSI/ASABE S623.1:

(H=High; M=Moderate/Medium; LVL=Low/Very Low; T=Turf; E=Edible)

<table>
<thead>
<tr>
<th>Plant Factor</th>
<th>Plant Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 M</td>
<td>Tree, Shrubs, Vines, Groundcovers (includes hedges and woody plants)</td>
</tr>
<tr>
<td>0.5 M</td>
<td>Herbaceous Perennials</td>
</tr>
<tr>
<td>0.3 LVL</td>
<td>Desert Adapted Plants (includes CA natives w/ reduced summer water needs)</td>
</tr>
<tr>
<td>0.8 H</td>
<td>Annual Flowers &amp; Bedding Plants</td>
</tr>
<tr>
<td>0.8 T</td>
<td>Cool-season Turfgrass (i.e. tall fescue, Ky. bluegrass, rye, bent)</td>
</tr>
<tr>
<td>0.6 T</td>
<td>Warm-season Turfgrass (i.e., bermuda, zoysia, St, Augustine, buffalo)</td>
</tr>
<tr>
<td>0.8 E</td>
<td>Deciduous Fruit Trees (i.e. peach, plum, nectarine)</td>
</tr>
<tr>
<td>1 E</td>
<td>Evergreen Fruit Trees (i.e., citrus)</td>
</tr>
<tr>
<td>1 E</td>
<td>Vegetables crops</td>
</tr>
</tbody>
</table>

* Desert Adapted Plants are physiologically adapted to desert like conditions of drought, heat and reduced summer watering. Many of these plant types can be found in ‘Landscape Plants for California Gardens’ by Bob Perry categorized under Irrigation Group 2.

* For single & multi-family unit landscapes, the total cumulative landscape area of all high and moderate water using plants (as defined by ANSI/ASABE S623.1), including existing plant material, shall not exceed 40% of the total landscape area. Edible plants and plants irrigated with an approved alternative water supply are not included in this calculation.

### Design Tips

* Some plants may fit multiple categories, i.e. Baileya multiradiata (Desert Marigold), a herbaceous perennial and desert adapted plant. The designer must choose only one category to place it in that is most applicable based on the hydrozone and water neutrality calculations.
Guidelines for Plant Material: Turfgrass
What you need to know when designing a sustainable landscape in Santa Monica

Images represent the variety of different plants used in a lawn like setting. Buchloe dactyloides (UC Verde Buffalograss) pictured far left, to Carex sp (Sedge) above and Dymondia left.

- Turfgrass, also called turf or lawn, is any plant material defined as turfgrass by the Water-Efficient Landscape and Irrigation Standards or Model Water Efficient Landscape Ordinance or listed as turf in the Water Use Classification for Landscape Species (WUCOLS) issued by the California Department of Water Resource (DWR) and in WUCOLS reference documents, or any ground cover surface of mowed grass.

- The total maximum area permitted for installation of turfgrass and high water need plants (as defined by ANSI/ASABE S623.1) for single and multi-family unit landscapes is 20% of the total landscaped area.

- Turfgrass and high water need plants are prohibited on commercial properties except in institutional and mixed-use development properties.

- For residential new developments, turfgrass, including existing plant material, is not allowed on any slopes greater than 25% (one foot of vertical elevation change for every four feet of horizontal length) where the toe of the slope is adjacent to an impermeable hardscape.

- For single & multi-family unit landscapes, the total cumulative landscape area of all high and moderate water using plants (as defined by ANSI/ASABE S623.1), including existing plant material, shall not exceed 40% of the total landscape area. Edible plants and plants irrigated with an approved alternative water supply are not included in this calculation.

- List all plant species within a grass seed mix product. The species with the highest plant factor or water requirement will determine the plant factor for the seed mix.

**Design Tips**

- **These grasses are prohibited in Santa Monica:** Mexican feathergrass (Stipa/Nassella tenuissima), Green fountain grass (Pennisetum setaceum), Pampas grass (Cortaderia selloana)

- In residential landscapes, if a new irrigation system will be used to water the grass it must be drip irrigation. **No spray irrigation is allowed to water turf.**
List of Plants Classified as Turfgrass in Santa Monica
Use the following plant list as a guide. The following are subject to change without notice and may not include all species.

Annual bluegrass  (Poa annua)
Kentucky bluegrass  (Poa pratensis)
Perennial ryegrass  (Lolium perenne)
St. Augustinegrass  (Stenotaphrum secundatum)
Creeping red fescue  (Festuca rubra)
Tall fescue  (Festuca arundinacea)
Colonial bentgrass  (Agrostis capillaris)
Creeping bentgrass  (Agrostis stolonifera)
Hard fescue  (Festuca longifolia)
Highland bentgrass  (Agrostis castellana)
Meadow fescue  (Festuca pratensis)
Rough-stalked bluegrass  (Poa trivialis)
Hybrid bermudagrass  (Cynodon spp. and cvs.)
Common bermudagrass  (Cynodon dactylon)
Kikuyugrass  (Pennisetum clandestinum)
Seashore paspalum (Paspalum vaginatum)
Zoysiagrass (Zoysia spp.)
Buffalograss  (Buchloe dactyloides)

Consider using low water using lawn alternatives not considered turfgrass, pictured top to bottom: Kurapia (Lippia hybrid), Yarrow (Achillea millefolium), Silver Carpet (Dymondia margaretae).
Guidelines for Plant Material: Hedges
What you need to know when designing a sustainable landscape in Santa Monica

Cypress pictured left, Sweet Bay pictured above, and Hopbush pictured far left, use less water over time than most hedges and help designers meet the City’s Water Self-Sufficiency Goals.

- A hedge is a boundary or barrier of plant material formed by a row or series of shrubs, bushes, trees, or other similar vegetation that enclose, divide, or protect an area or that prevent a person from passing between any combination of individual shrubs, bushes, trees, or other similar vegetation.
- As stated in SMMC 9.21.050, the maximum allowed height of new hedges within front setbacks, considered to be the area between the front or street side parcel line and the nearest building wall or setback line, whichever is the shorter distance, shall be 42 inches in height. The maximum allowed height of new hedges within side and rear setbacks shall be 12 feet, except that there is no height limit for hedges adjacent to and located within 10 feet of an alley, measured perpendicularly from the side or rear property line that is adjacent to the alley.
- Hedges are considered trees or large shrubs and thus moderate water using plants by ANSI/ASABE S623.1. For new single and multi-family landscapes, the total cumulative landscape area of all high and moderate water using plants, as defined for Region 3 in the Water Use Classification for Landscape Species (WUCOLS) issued by the California Department of Water Resource (DWR), including existing plant material, shall not exceed 40% of the total landscape area. Edible hedges are not included in this calculation.

Design Tips
- In residential landscapes, if a new irrigation system will be used to water hedges it must be drip irrigation. No spray irrigation is allowed to water hedges.
- To save water over the life of a hedge, consider using hedge material like Italian cypress (Cupressus sempervirens), Hopseed bush (Dodonaea viscosa), California bay (Umbellularia californica), Sweet bay (Laurus nobilis) or Catalina cherry (Prunus ilicifolia lyonii).
- Ficus, Privets, Bamboo and Podacarpus hedges, like most hedges, take a large amount of water to establish but these in particular take a great deal of work to maintain with their significant leaf and berry drop.
Guidelines for Amendments and Mulch: Compost & Mulch
What you need to know when designing a sustainable landscape in Santa Monica

Images represent the variety of different mulches used in landscape from wood chips to gravel to decomposed granite.

- Compost defined as “the safe and stable product of controlled biologic decomposition of organic materials that is beneficial to plant growth,” must be added at a rate of a minimum of four cubic yards per one thousand square feet of permeable area incorporated to a depth of six inches into the soil.

- Soils with greater than 6% organic matter in the top six inches of soil are exempt from adding compost and tilling. A post-installation soil test, provided at the time of the final landscape inspection, must show a 6% organic matter content or greater. Only landscapes contained entirely in planters, defined as “permanently installed planting structures with an impermeable bottom and drain,” are exempt from this soil test requirement.

- A minimum 3 inch layer of mulch defined as “any organic material such as leaves, bark, wood chips, straw, compost, or inorganic mineral materials such as rocks, gravel, and 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,” shall be applied on all exposed soil surfaces of planting areas except in turf areas, over creeping or rooting groundcovers, or in direct seeding applications where mulch is not appropriate. 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 clearly identified on the construction or landscape plan.

Design Tips

- Shredded hardwood mulch or wood chips help retain soil moisture, prevents soil compaction, controls weeds, controls erosion. Wood mulch also provides soil conditioning and promote microorganism activity within the soil.

- Gravel used as mulch gives a finished look to planted areas, but is difficult to move once installed and may contribute to urban heat island effect.

- Decomposed granite is finer and more stable than gravel, so less migration of the particles will occur. It can be used as a mulch around plant material or as a patio or walkway.
Guidelines for Irrigation Systems: Controllers and Timers
What you need to know when designing a sustainable landscape in Santa Monica

SMMC 8.108 requires all new development landscapes in Santa Monica to comply with sections 4.304.1 and 5.304.3.1 of Title 24, Part 11, California Green Building Code (Cal Green). These sections state that automatic irrigation system controllers installed at the time of final inspection shall comply with one of the following conditions:

- Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants’ needs as weather conditions change.
- Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.

Design Tips

- The Smart Water Application Technologies, or SWAT, is a national partnership initiative of water purveyors and irrigation industry representatives created to promote landscape water-use efficiency through the application of state-of-the-art irrigation technologies. SWAT develops performance testing plans for different categories of irrigation products, including weather-based irrigation controllers, soil moisture sensors, and rain sensors.
- WaterSense, a partnership program by the U.S. Environmental Protection Agency, seeks to help consumers save water. To earn the WaterSense label, landscape irrigation controllers must be able to adequately meet the watering needs of a landscape without overwatering. As with all other WaterSense labeled products, WaterSense labeled controllers are third party certified to ensure that they meet the WaterSense criteria for efficiency and performance.
- The City recommends using either SWAT tested or WaterSense labeled products. For a list of WaterSense labeled weather-based irrigation controller products, visit www.epa.gov/watersense. For SWAT tested weather-based controllers, rain and soils moisture sensors visit http://www.irrigation.org/swat2014/.
Cross-connection control or backflow prevention, is required on all irrigation systems in Santa Monica, per Santa Monica Municipal Code (SMMC) 7.12.370 and local county public health codes. An irrigation system must have one of the following devices installed to prevent contamination of the City water supply:

**Reduced Pressure Principle Assembly Backflow (RP)**
*Requirements:*
- At least 12 inches above grade.
- In a horizontal position with the relief valve discharging downward.
- Readily accessible for in line service and test.
- Used upstream of in-line valves.
- Requires yearly inspection.

**Pressure Vacuum Breaker (PVB)**
*Requirements:*
- At least 12 inches above all downstream piping and water use.
- Not subjected to any backpressure.
- Readily accessible for inline service and test.
- Used upstream of in-line valves.
- Requires yearly inspection.

**Anti-Siphon Valve with Atmospheric Vacuum Breaker**
*Requirements:*
- At least 6 inches above all downstream piping and water use.
- Not subjected to backpressure.
- Not under more than 12 hours of continuous flow.
- Required for each zone.

**Design Tips**
* In-line valves (the valves buried in boxes under grade) can only be used with an RP or PVB device installed upstream of the valves. Anti-siphon valves are the most common devices specified for residential projects and do not require a yearly inspection like RPs and PVBs.
Guidelines for Irrigation Systems: Drip Irrigation
What you need to know when designing a sustainable landscape in Santa Monica

- Drip irrigation is defined as the method of micro irrigation wherein water is applied to the soil surface as drops or small streams through emitters on or within polyethylene tubing at a rate of two (2) gallons per hour or less. A drip irrigation system is defined as all the equipment required to convey water to a drip irrigation zone including but not limited to the backflow prevention assembly, valve, filter, pressure regulator, pipe, lateral line, tubing, emitters, stakes and flushing mechanism.

- If installing new irrigation zones or systems, drip irrigation is required for all plant material except trees but including new residential turfgrass.

- Each drip irrigation zone and must include:
  - Low flow anti-siphon valve, if a master backflow protection device and in-line valve is not specified. **Anti-siphon valves are the minimum backflow protection requirement for residential irrigation systems.**
  - Pressure regulator, if a master pressure regulator for the entire irrigation system is not specified;
  - Filter with a one hundred-fifty to two hundred (150 – 200) mesh, wye or tee filter, if a master filter for the entire irrigation system is not specified;
  - A flushing mechanism for each drip irrigation zone is required.
  - For sub-surface drip irrigation zones, an operational indicator is required.

**Design Tips**

- A drip grid layout is typically used for installing drip tubing underneath groundcovers or lawn. It is important to follow the installation depth recommendations made by the irrigation manufacturer to have a successful installation and to prevent lawn maintenance damage by aeration tools. Some drip tubing is even sleeved in capillary mats to improve distribution of water through the soil profile.

- Only container plantings, defined as pots or containers, not permanently installed, containing soil for growing plants, or raised beds or edible plant areas irrigated with micro-spray, may use one quarter inch (1/4") or one-eighth inch (1/8") solid tubing (also referred to as “spaghetti tubing”). Multi-outlet emitters are prohibited.
Guidelines for Irrigation Systems: Irrigating Natives
What you need to know when designing a sustainable landscape in Santa Monica

Drip irrigation has been used to irrigate California native plants in the City’s demonstration gardens for over 25 years. Airport demo garden pictured to the far left, since 2011, garden/garden demo garden pictured above, since 2004, and City Hall demo garden, pictured to the left, since 1991.

- The total cumulative landscape area of all low and very low water using plants, or Desert Adapted Plants, as defined by ANSI/ASABE S623.1, including existing plant material, must be at least sixty percent (60%) of the total plantable landscape area, excluding edibles & areas watered with an approved alternate water supply. Many California natives are physiologically adapted to desert like conditions of drought, heat and reduced summer watering.
- California natives can usually be classified as low to very low water using plants. Using them on LEED v4 and Sustainable Sites projects also helps gain points and certification.
- In residential landscapes, if a new irrigation system will be used to water native plants it must be drip irrigation. No spray irrigation is allowed to water natives.

Design Tips
- Hydrozone natives on their own separate valve from other plant material. This will maximize control of summer irrigation to promote extensive root systems with deep infrequent irrigations. As plants become established the intervals between watering should increase as well as the run times. Fungal pathogens will develop in the soil if it is continually saturated, especially during warm weather, and result in excessive plant growth, increased pruning and more pests.
- Specify point source/on-line drip irrigation so it applies water to at least 60% of the root ball. Add a maintenance note to move the emitters to the plant’s drip line or canopy edge as the plant matures.
- Specifying drip irrigation in a grid configuration ensures water is applied uniformly throughout the soil. This allows water to be applied to the root ball of the new plant as well as the surrounding soil, which will encourage growth outside the planting hole. Soil composition with help determine the drip flow rate, row and emitter spacing. Add a detail showing row and emitter spacing.
- Add an installation note that no drip emitters should be placed directly on the crown of plants.
- Planting in the fall will minimize the amount of supplemental irrigation necessary to establish the plants. Supplemental irrigation may be necessary for plant establishment for 1-3 years depending on rainfall, plant species and climatic conditions; for example making up for rainfall in a dry winter.
Guidelines for Irrigation Systems: Tree Irrigation

What you need to know when designing a sustainable landscape in Santa Monica

* Per SMMC 8.108 Green Building Ordinance Water-Efficient Landscape and Irrigations Standards the following regulations apply to all trees, existing or new, that are part of a new development:
  ⇒ No mulch shall be applied within six inches (6”) of the base of trees.
  ⇒ No plant material shall be installed within twenty-four (24”) inches of the base of a tree.
* Trees shall be irrigated on a separate valve unless the tree is located in a planter or permanently installed planting structures with an impermeable bottom and drain, excluding green roofs.

Design Tips

* For tree irrigation, only drip irrigation, stream bubblers attached to pop up heads, or sub-surface tree bubblers systems are approved for new irrigation system installations.
* Drip irrigation systems for trees may require higher emitter flow rates but they cannot exceed 2 gallons per hour per emitter. Rings of drip irrigation are a common installation specification.
* Tree bubblers emitting half a gallon per minute (0.5 gpm) or less may be used for trees of a installed at twenty-four inch box or larger. Bubblers must have fixed emission outputs and cannot be variable or adjustable.
* A combination of a surface drip irrigation system bubbler to water the feeder roots of the tree in the upper inches of the soil profile and a sub-surface bubbler system for deep watering that promotes stronger tap roots, while allowing oxygen access to root zone, may be an effective strategy for certain types of trees.
* Use separate irrigation valves for the tree bubblers. Multiple trees all on bubblers, however, may be grouped on a single valve, if the bubblers have the same application rates.
* When calculating landscape area for new trees, use the container size (i.e., 24” or 36”) to determine square footage.
What you need to know when designing a sustainable landscape in Santa Monica

**Guidelines for Irrigation Systems: Leak Detection/Control**

Per SMMC 8.108 Green Building Ordinance Water-Efficient Landscape and Irrigations Standards the following regulations apply to all new irrigation systems:

- A master shut-off valve is required for all automatic irrigation systems except in systems that make use of technologies that allow for leak detection and control.
- A flow sensor that detects high flow conditions created by system damage or malfunction is required for all automatic irrigation systems except in systems that make use of technologies that allow for leak detection and control.
- Hose-bibbs shall be equipped with cross-connection control.

**Design Tips**

- Some irrigation controllers can shut off individual zones when high flow is detected by the flow sensor.
- The master valve should be specified upstream of the flow sensor. For most flow sensors, the distance between the master valve and flow sensor should be a minimum of **10 times** the pipe diameter. The piping behind the flow sensor should be straight and unobstructed for a minimum of **5 times** the pipe diameter. For example, if using 1 inch PVC schedule 40 pipe the distance between the master valve and flow sensor should be a minimum of (1 inch times 10 = 10 inches) and the distance behind the flow sensor of unobstructed run should be (1 inch times 5 = 5 inches).

- If specifying hose-bibb outlets or quick couplers downstream of a normally-closed master valve and flow sensor the irrigation controller should have both a sensor bypass switch and an ability to open the master valve. One alternative is to specify the hose-bibb and/or quick coupler piping to branch off the mainline upstream of the master valve. If there is a master backflow prevention device upstream of the hose-bibb then tag the hose-bibb as ‘non-potable’, otherwise install a hose-bibb pressure vacuum breaker. Another alternative is to specify hose-bibbs with cross connection control that stem directly from the building’s internal plumbing.