

5.2 Landscaping

Overview

Water applied to a landscape can account for a significant portion of a commercial or institutional property's overall water use. Studies show that average landscape water use in the commercial and institutional sector can range from 7 percent of total water use for hospitals, 22 percent for office buildings, and up to 30 percent for schools.¹⁰ Typically, a landscape is watered to supplement natural precipitation based



Reduction of turf area with plantings

on a plant's water needs. In some areas of the country, such as the arid Southwest, this gap in water needs and precipitation can be significant. Landscape design, soil conditions, plant choice, and maintenance all affect the amount of water a landscape needs. *Section 5.2: Landscaping* outlines best management practices that can guide a facility in making more water-efficient landscaping choices.

A well-designed landscape should be supported by healthy soils with appropriate grading, mulches, regionally appropriate plant choices, appropriately sized turf areas, and hydrozones. The following information should also be considered for a well-designed landscape:

- Healthy soils allow water to properly infiltrate and help healthy plant root systems to develop. Soil health can be maintained with a combination of aeration and applying compost or mulch to help the soil retain its nutrients while supporting plant growth.
- Appropriately graded sites with gentle slopes allow water to stay where it is applied and get delivered to the root zone of the plants, instead of leading to stormwater runoff.
- Mulches on landscaped beds can help keep soils cool and minimize evaporation. If organic mulches, such as wood chips or shredded leaves, are used, they can add nutrients to the soil as they decompose.
- An appropriate plant palette consisting of drought-tolerant, native, or regionally appropriate species lays a solid foundation for a water-efficient landscape, reducing water requirements, as well as the time and cost associated with maintaining the landscape.¹¹
- A smaller turf area can reduce resources and costs associated with watering, mowing, fertilizing, and removing debris.

¹⁰ U.S. Environmental Protection Agency (EPA's) WaterSense program. August 20, 2009. *Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program*. Pages 7-10. www.epa.gov/watersense/docs/ci_whitepaper.pdf.

¹¹ EPA's WaterSense program. December 2009. *Research Report on Turfgrass Allowance*. Page 6. www.epa.gov/WaterSense/docs/home_turfgrass-report508.pdf.

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- Hydrozoning, or grouping plants according to their water needs, will promote efficient irrigation in those zones that require supplemental water.

It is possible in many parts of the country to design a landscape that does not require any supplemental irrigation. If irrigation is used, the irrigation system efficiency is another important factor that affects landscape water use. For information on the efficient use of landscape irrigation systems, refer to *Section 5.3: Irrigation*.

If a water feature (e.g., pond or ornamental pool) is included in a landscape, it should provide a beneficial use, such as a wildlife habitat or stormwater management. In addition, the feature should recirculate water instead of serving as a single-pass device, which can waste significant amounts of water.

Many of the actions that can be taken to improve a landscape's water efficiency can have the co-benefit of reducing stormwater runoff. The U.S. Environmental Protection Agency's (EPA's) Green Infrastructure program focuses on solutions to reduce runoff, such as rain gardens and permeable pavements.¹² Local water utilities or municipal governments¹³ may also have green infrastructure practices to share or incentives to help improve landscapes to reduce stormwater runoff.



Non-turf landscape

Operation, Maintenance, and User Education

To optimize a landscape's water efficiency, hire a landscape professional with a demonstrated knowledge of water-efficient landscape design, maintain the soil quality and existing plants, and minimize water used for other purposes with respect to the overall landscape design.

Hiring a Landscape Professional

When selecting or employing a landscape professional, consider the following attributes and management strategies:

- Consider selecting landscape professionals trained and certified in water-efficient or climate-appropriate landscaping. Existing professionals can attend courses or seminars to learn water-efficient techniques.
- Periodically review all landscape service and maintenance agreements to incorporate water-, chemical-, and energy-efficiency requirements or performance standards.
- Encourage landscape professionals to report and/or fix irrigation system problems. Many landscape professionals not only install and maintain plants in your landscape, but also install and maintain the irrigation system. These professionals can identify and report leaks or other inefficiencies over time.

¹² EPA. Green Infrastructure. water.epa.gov/infrastructure/greeninfrastructure/index.cfm.

¹³ Portland Bureau of Environmental Services. Stormwater Solutions. www.portlandonline.com/bes/index.cfm?c=31870; Philadelphia Water Department. Businesses. www.phillywatersheds.org/whats_in_it_for_you/businesses.

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Maintaining Soil Quality

Consider the following maintenance tactics to ensure a healthy soil quality:

- Add mulch to plant beds to cover bare soil. Re-mulch areas annually to maintain soil coverage and prevent erosion.
- Maintain a sufficient quantity of good topsoil—four to six inches deep—to capture precipitation as it falls and release water back to plants over time, reducing irrigation requirements.
- Consider incorporating soil amendments into water-logged or fast-draining soils to attain proper soil water holding capacity. For soils with poor drainage (i.e., clay soils) or soils that drain too quickly (i.e., sandy soils), consider incorporating topsoil or compost to balance soil composition and restore nutrients.
- For areas that undergo regular foot or vehicular traffic, aerate the soil annually to alleviate compaction and improve water infiltration rates.

Maintaining Existing Plants

When maintaining your landscape's existing plant life, consider the following water-efficient tips:

- Keep the irrigated landscape free of weeds so that water is available for the decorative landscaping. Pull weeds manually instead of using herbicides, which can contaminate local water sources.
- Raise the blade on mowers to allow grass to grow longer. Longer grass promotes deeper root growth and more drought-resistant turf. Some species of turfgrass go dormant during dry periods. Consider letting the grass turn brown during these times. It will recover when rainfall returns.
- Encourage the inclusion of shaded areas in the overall landscape design, which decreases the water needs of surrounding plants. Consider planting additional trees and shrubbery to increase the amount of shaded area in the future.

Minimizing Water Used for Other Purposes

To minimize the amount of water used for other outdoor-related purposes, consider the following:

- Recirculate water in decorative fountains, ponds, and waterfalls. Shut off these features when possible to reduce evaporation losses. Check water recirculation systems annually for leaks and other damage. Consider using non-potable water in these systems (refer to *Section 8: Onsite Alternative Water Sources* for additional information).
- Do not use water to clean sidewalks, driveways, parking lots, tennis courts, pool decks, or other hardscapes. Sweep these areas instead.

Retrofit and Replacement Options

Many of the actions that might be undertaken to retrofit or replace a landscape are similar. The goal for either retrofitting or replacing landscaping should be to optimize water use and hold water in the soil rather than allowing it to run off site. Differences in practices and options are primarily those of scale. Because the replacement of a commercial or institutional landscape could carry a considerable cost, it is important to ensure that the landscape is properly designed from the start. Consider hiring a licensed landscape architect or a qualified site planner/designer to assist. Local botanical gardens may also have information on how to develop a landscape that is beautiful, functional, and water-efficient. For example, the Conservation Garden Park developed by the Jordan Valley Water Conservancy District in West Jordan, Utah,¹⁴ has a wealth of information and virtual tours demonstrating water-smart landscaping that can even be beneficial to people outside of the area.

Site Preparation

How the site is prepared has a significant impact on the ability for the landscape to retain moisture and limit the need for supplemental irrigation. Before retrofitting, replacing, or installing a new landscape, consider the following site preparation tips:

- To the extent feasible, limit the removal of native vegetation and soils.
- Minimize soil compaction in the construction phase by limiting areas for use of heavy equipment.
- Install temporary protective fencing around trees to protect their root zones.
- Reduce runoff from steep slopes in the landscape by either grading appropriately or terracing. If slopes cannot be avoided in landscape design, install plants with deeper root zones to provide stabilization and prevent erosion.
- Before the landscape is installed, ensure that the soil is properly amended, tilled, and contoured to hold water. Where turfgrass is used, the area should include at least six inches of well-amended soil capable of easily absorbing and holding water in the root zone.

Plant Selection

Plant selection can make all the difference in a water-efficient landscape. Consider the following when redesigning a landscape:

- Evaluate site conditions and plant appropriately. Areas of the same site may vary significantly in soil type or exposure to sun and wind, as well as evaporation rates and moisture levels. Be mindful of a site's exposure to the elements and choose plants that will thrive in the site's conditions.

¹⁴ Jordan Valley Conservation Gardens Foundation. Visit the Conservation Garden Park. conservationgardenpark.org/visit/.

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Climate-appropriate plants

- Select drought-tolerant or climate-appropriate turfgrass, trees, shrubs, and ground cover when replanting landscaped areas. Information about climate-appropriate plants may be available through your local extension office¹⁵ or on EPA's WaterSense® program website.¹⁶
- Incorporate shade trees into your landscape or plant near large shade trees. Shaded areas typically require less supplemental water than areas exposed to direct sun. Additionally, shade trees and other vegetation placed strategically to shade the south-facing wall of a building can eventually help to reduce energy costs.¹⁷

- Consider reducing the area of turfgrass in the landscape, as most turf generally requires more water than planted beds, especially if the plants are climate-appropriate and their surrounding soil is covered with mulch.¹⁸
- Avoid installing “strip grass,” such as small strips of grass between the sidewalk and street, because these areas are hard to maintain and difficult to water efficiently.
- Consider installing rain gardens throughout the landscape. These excavated, shallow depressions should include native plantings designed to capture rainwater runoff from roofs, driveways, and sidewalks. These gardens can keep water on the property and absorb up to 40 percent more runoff than typical lawns.¹⁹



Avoided strip grass

Irrigation

Although it is possible in many parts of the country to design a landscape that can live on rainfall alone, some irrigation may be needed to ensure landscape health. There are many factors that should be taken into account to ensure that an irrigation system is well designed, operated, and maintained. More detailed information about irrigation systems is available in *Section 5.3: Irrigation*, but following are a few tips:

- Use the technique of hydrozoning to group plants with similar irrigation needs together.
- Consider how the interplay between the types of plants and irrigation components can affect the volume of water needed to sustain the landscape. EPA's WaterSense Water Budget Tool,²⁰ developed to address residential landscapes in WaterSense labeled new homes, can be used as a guide to see how plant types

¹⁵ U.S. Department of Agriculture. Cooperative Extension System Offices. www.csrees.usda.gov/Extension/.

¹⁶ EPA's WaterSense program. What to Plant. www.epa.gov/WaterSense/outdoor/what_to_plant.html.

¹⁷ Sailor, David J. and Dietsch, Nikolaas. October 3, 2005. *The Urban Heat Island Mitigation Impact Screening Tool (MIST)*. Page 2.

¹⁸ EPA's WaterSense program. December 2009, *op. cit.*

¹⁹ EPA's WaterSense program. *Resource Manual for Building WaterSense Labeled New Homes*. www.epa.gov/watersense/docs/newhome_builder_resource_manual508.pdf.

²⁰ EPA's WaterSense program. The WaterSense Water Budget Tool. www.epa.gov/WaterSense/water_budget/.

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and irrigation methods affect the ability of a landscape to meet a water budget based on the local climate. The Water Budget Tool is not intended to estimate actual savings, but it is a tool to help evaluate the relative water savings that can be achieved with different plant palette and technology choices.

- Consider installing a separate meter to measure the volume of water applied to the landscape. Separately metering irrigation systems can reduce wastewater costs in some jurisdictions and can help to identify leaks more quickly.
- Consider where alternative water sources can be used as a substitute for potable water sources for irrigation. Information about rainwater harvesting and reuse can be found on the WaterSense website²¹ or see *Section 8: Onsite Alternative Water Sources* for more information.

Other Features

When planning hardscape retrofits, consider the following to enhance outdoor water efficiency:

- If replacing sidewalks or parking lot pavement, consider installing permeable surfaces (e.g., permeable pavement) rather than impermeable hardscape.
- Use bushes, mulch, rain gardens, permeable hardscape, or curb cuts in parking lot islands or in the areas between sidewalks and the roadway. These should be at a lower elevation than surrounding hardscape so that runoff flows into them.
- While water features are common in many landscapes, consider the annual water use of the specific feature before installing one. Ideally, these features should provide a beneficial use, such as a wildlife habitat, stormwater management, and/or noise reduction. Because water from these features is often lost to evaporation, use alternative water sources or look for a feature that recirculates water in order to reduce the amount of potable water used. Smaller pumps, lower pumping rates, and/or pressure-reducing valves can help reduce water flow.²²



Rain garden

Savings Potential

Landscape water use is largely dependent upon climate, plant type, and an irrigation system's efficiency. Soil health, grade, and maintenance also play a role. In order to evaluate landscape improvements and their associated savings, one must first know how much water is being applied to the landscape. Dedicated irrigation meters can be used to track irrigation water use and document savings from various measures.

Savings for converting high water-using landscapes to low water-using landscapes vary by plant type and climate. Keep in mind that calculations are property-specific. In general, various studies have reported savings ranging from 18 to 50 percent from

²¹ EPA's WaterSense program. Rainwater & Reuse. www.epa.gov/WaterSense/outdoor/rainwater_reuse.html.

²² EPA's WaterSense program, *op. cit.*, Page 41.

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converting landscape plants with high water requirements to those with lower water requirements.²³ A more water-efficient landscape can also provide ancillary benefits by reducing the need for maintenance, fertilizer application, and fuel use.²⁴

Additional Resources

American Society of Landscape Architects. www.asla.org.

Denver Water. Xeriscape Plans.
www.denverwater.org/Conservation/Xeriscape/XeriscapePlans/.

EPA. Green Infrastructure.
water.epa.gov/infrastructure/greeninfrastructure/index.cfm.

EPA. GreenScapes Program.
www.epa.gov/epawaste/conserve/rrr/greenscapes/index.htm.

EPA's WaterSense program. *Resource Manual for Building WaterSense Labeled New Homes*. www.epa.gov/WaterSense/docs/newhome_builder_resource_manual508.pdf.

EPA's WaterSense program. The WaterSense Water Budget Tool.
www.epa.gov/WaterSense/water_budget/.

EPA's WaterSense program. Water-Efficient Landscape Design.
www.epa.gov/watersense/outdoor/landscaping.html.

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Rushton, Betty, Ph.D. Southwest Florida Water Management District. May 2002. *Infiltration Opportunities in Parking Lot Designs Reduce Runoff and Pollution*.
www.p2pays.org/ref/41/40363.pdf.

Sailor, David J. and Dietsch, Nikolaas. October 3, 2005. *The Urban Heat Island Mitigation Impact Screening Tool (MIST)*. www.heatislandmitigationtool.com/Introduction.aspx.

²³ EPA's WaterSense program. December 2009, *op. cit.*

²⁴ Rosenberg, David E., et al. June 2011. *Value Landscape Engineering: Identifying Costs, Water Use, Labor, and Impacts to Support Landscape Choice*. *Journal of the American Water Resources Association* (JAWRA). 47(3):635-649.