

5.3 Landscape Irrigation Conservation and Incentives

Applicability

This BMP is intended for use by a municipal water user group (“utility”) with a substantial percentage of customers using automated landscape irrigation systems and is targeted to customers who have automated irrigation systems. If data on the number of customers with irrigation systems are lacking or absent, the summer peak/winter average ratio can be used as an evaluation tool to determine whether to proceed with this BMP. A ratio of 1.6 or greater indicates the potential for substantial water savings with implementation of this BMP. For maximum water-use efficiency benefit, the utility should adhere closely to the measures described below.

Description

Landscape irrigation conservation practices are an effective method of accounting for and reducing outdoor water usage while maintaining healthy landscapes and avoiding run-off. Using this BMP, the utility provides non-residential and residential customers with customer support, education, incentives, and assistance in improving their landscape water-use efficiency. Incentives include rebates for purchase and installation of water-efficient equipment. Four approaches are outlined below. Successful implementation of this BMP will be accomplished by performing one or a combination of the approaches listed.

1) ETo-Based Water Budgets

If the utility chooses the water budget approach, the utility also develops reference evapotranspiration (“ETo”)-based water-use budgets equal to no more than 80 percent of ETo per square foot of irrigated landscape area for customers participating in its Landscape Irrigation Conservation Program. More aggressive landscape conservation programs can utilize stress coefficients lower than 80 percent.

Evapotranspiration is the combined amount of the water transpired by plants and the water evaporated from the soil. ETo is defined as the estimate of evapotranspiration that occurs from a standardized reference crop of well-watered, clipped, cool-season grass. The amount of supplemental irrigation water needed is the shortfall between plant water need (which is a fraction of ETo) and precipitation.

The statewide Texas Evapotranspiration Network (<http://texaset.tamu.edu/>) should be consulted for historical evapotranspiration data, historical precipitation, and methodology for calculating reference evapotranspiration and allowable stress. (Communities located in the North Plains areas may find local historical data on potential evapotranspiration at: <http://amarillo2.tamu.edu/nppet/whatpet.htm>.)

2) Water-Use Surveys, Metering, and Budgeted Water Use

If the utility chooses the survey approach, the utility develops and implements a plan to promote landscape water-use surveys to industrial/commercial/institutional (“ICI”) and residential accounts with mixed-use meters. The water-use surveys, at a minimum, include: measurement of the landscape area; measurement of the total irrigable area; irrigation system checks and distribution uniformity analysis; review of irrigation schedules or development of schedules as appropriate; and provision of a customer survey report and information packet. When cost-effective, the utility should offer the following: landscape water-use analyses and surveys; voluntary water-use budgets; installation of dedicated landscape meters; acceptance of site conservation plans; and follow-up to water-use analyses and surveys.

At the start and end of the irrigation season, irrigation systems should be checked, and repairs and adjustments made as necessary. Notices should be included in bills to remind customers of seasonal maintenance needs. For accounts with water-use budgets, the utility should provide notices with each billing cycle showing the relationship between budgeted water usage and actual consumption. When soil conditions allow, and landscape managers are familiar with the use and maintenance of soil moisture sensors, water budgets can be allocated based upon soil moisture status, thereby providing a closer estimate of actual evapotranspiration.³

Many utilities require dedicated irrigation meters for all commercial and/or industrial accounts with automatic irrigation systems or if the lot is above a minimum size. For municipalities with ordinance-making powers, this can be accomplished by ordinance. Otherwise, dedicated meters may be implemented as a new customer policy.

3) Landscape Design

If the utility chooses the landscape design approach, the utility provides information on climate-appropriate landscape design and efficient irrigation equipment and management for new customers and change-of-service customer accounts (See the Landscape Design and Conversion Programs BMP for more detail). To serve as a model, the utility should install climate-appropriate, water-efficient landscaping at water agency facilities and landscape meters where appropriate. Municipalities with ordinance-making powers should consider adopting ordinances that require all new apartment complexes and commercial buildings to install a water conserving landscape. This can often be accomplished by amending an existing commercial landscape ordinance.

4) Minimum Standards and Upgrades

If the utility chooses the landscape standards approach, the utility should require new commercial and industrial customers to install separate irrigation meters and consider retrofitting current commercial and industrial customers with irrigation meters. The utility should consider this requirement for new residential customers installing automatic irrigation systems. For municipalities with ordinance-making powers, this can be accomplished by ordinance. Otherwise, this may be implemented as a new customer policy.

Irrigation system design and maintenance components and landscape design may be systematically upgraded through use of municipal ordinance-making powers where possible. Minimum water efficient design features can be mandated for new construction, while existing systems or landscapes are offered incentives to upgrade. Rainwater sensors, soil moisture sensors, irrigation controllers, pipe specifications, and hydrozone specifications are all potential elements of an irrigation systems ordinance. Total turf grass areas, buffer zone plant material, and hydrozones are all potential elements of landscape design ordinances. Buffer or median areas represent additional savings when all landscaped areas less than five feet in any dimension are restricted to drip or other surface or subsurface (non-spray) irrigation system or no irrigation system.

Implementation

The utility should consider offering the Landscape Irrigation Program to customers with large landscapes first as a means of rapidly increasing cost-effectiveness and water savings. Marketing the Program to the customer via bill inserts will allow the utility to target the largest summer peak users first. The utility should consider also approaching local weather announcers, radio gardening show hosts, and newspaper columnists for assistance in notifying the public about the program. Public/private partnerships with non-profits such as gardening clubs, Cooperative Extension offices and/or with green industry businesses such as landscape and irrigation maintenance companies are potential avenues to market the program and leverage resources.

Incentives can include rebates for irrigation audits and systems upgrades, recognition for water-efficient landscapes through signage and award programs, and certification of trained landscape company employees and volunteer representatives who can promote the Program. Utility staff can also be trained to provide irrigation audits which can include resetting irrigation controllers with an efficient schedule.

Approximately one year after conducting an irrigation audit, the utility should consider conducting a customer-satisfaction survey. The objective of the customer-satisfaction survey is to determine the implementation rate of recommended modifications and to gauge customer satisfaction with the program.

The initial step in assisting customers with landscape irrigation systems is a thorough evaluation of the existing landscape area and irrigation systems. This includes:

- 1) A list of landscape areas, measurements, plant types, irrigation system hydrozones, and controller(s);
- 2) A list of existing irrigation policies or procedures including maintenance and irrigation schedules;
- 3) A distribution uniformity analysis on irrigated turf areas;
- 4) A review of water bills with attention to the ratio of summer to winter use; and
- 5) An initial report summarizing the results of the evaluation.

The water customer who participates in this program needs to maintain and operate its irrigation systems in a water-efficient manner. Maintenance programs include pre-irrigation system checks, adjustment of irrigation timers when necessary, installation of rain sensors, and regular review of irrigation schedules and visual inspection of the irrigation system. When landscape management companies are utilized, contracts should include a required report showing regularly scheduled maintenance and seasonal adjustments to irrigation systems controllers. A more advanced form of contracting would be to build into the contract a dollar amount based on 80 percent of ET and require the contractor to pay for any water use above that amount. The utility should consider implementing a notification program to remind customers of the need for maintenance and adjustments in irrigation schedules as the seasons change.

When appropriate, the utility should consider offering the following services:

- 1) Training in efficiency-focused landscape maintenance and irrigation system design;
- 2) Financial incentives (such as loans, rebates, and grants) to improve irrigation system efficiency and to purchase and/or install water efficient irrigation systems;
- 3) Financial incentives to replace high-water use plants with low water use ones;
- 4) Rebates and incentives to purchase rain sensors or soil-moisture sensors; and
- 5) Notices at the start and end of the irrigation season alerting customers to check irrigation systems and to make repairs and adjustments as necessary.

The utility should need to ensure that landscape irrigation system specifications are coordinated with local building codes.

Evaluations and/or rebate processing could be done by the utility staff or be outsourced. If a utility chooses to perform the evaluations using in-house staff, they may take advantage of irrigation evaluation training programs provided by the Texas A&M School of Irrigation or the Irrigation Association.

An outsourcing option for the non-residential sector is to use or recommend a water-based performance contractor. Performance contracting is a financing technique that uses cost savings from reduced utility (water and sewer) consumption to repay the cost of installing

water conservation measures. This technique allows for the development of a water-savings program without significant up-front capital expenses on the part of the customer. Instead, the costs of water-efficiency improvements are borne by either the contractor or a third party lender who recoups cost and shares water savings profits with the user.

Schedule

- 1) Realize the Scope of this BMP within ten years of the date implementation commences.
- 2) Develop ETo-based water-use budgets for all accounts with dedicated irrigation meters by the end of the second year from the date implementation commences.
- 3) Develop and implement a plan to target and market landscape water use surveys to ICI accounts with mixed-use meters by the end of the first year from the date implementation commences.
- 4) Develop and implement a customer incentive program by the end of the first year from the date implementation commences.
- 5) Follow up with the participating customer approximately one year after a water use survey has been conducted and/or a rebate processed.

Scope

To accomplish the goals for this BMP, the utility should do the following:

- 1) Landscape Irrigation System Management Programs
 - a. Within one year of implementation date, develop and implement a plan to market water-use surveys to ICI accounts with mixed-use meters;
 - b. Within one year of implementation date, develop and implement a customer incentive program;
 - c. Within two years of implementation date, develop ETo-based water-use budgets for 90 percent of ICI accounts with dedicated irrigation meters;
 - d. Within ten years contact and offer landscape water-use surveys to 100 percent of ICI accounts with mixed-use meters;
 - e. Within ten years complete landscape water-use surveys for at least 15 percent of ICI accounts with mixed-use meters.
 - f. Within ten years contact and offer landscape water-use surveys to 100 percent of residential accounts with summertime monthly use of greater than four times annual average; and
 - g. Within ten years complete landscape water-use surveys for at least 15 percent of residential accounts with summer monthly use of greater than four times annual average.
- 2) Ordinance Approach
In the first twelve (12) months: Plan a program, including stakeholder meetings as needed. Consider offering rebates for all or a portion of the time this program

is in place. For example, offer rebates for only the first five years to encourage customers to take advantage of rebates and retrofit early in the program. Develop a plan for educating real estate agents, landscape companies, and irrigation installers about this requirement. Plan a follow-up inspection program after retrofit. Develop and pass ordinance. Implement ordinance and tracking plan for number of units retrofitted.

In the 2nd year and all subsequent years: Continue implementation; continue outreach program for real estate agents, landscape companies, and irrigation system installers; and continue verification inspections.

Documentation

To track this BMP, the utility should gather the following documentation:

- 1) Number of dedicated irrigation meter accounts;
- 2) Number of dedicated irrigation meter accounts for which water budgets have been developed;
- 3) Aggregate water use for dedicated landscape accounts with budgets;
- 4) Aggregate budgeted water use for dedicated landscape accounts with budgets;
- 5) Number of mixed-use accounts;
- 6) Number of surveys offered and number of surveys accepted and completed;
- 7) Number, type, and dollar value of incentives, rebates, and loans offered to and accepted by customers;
- 8) Estimated water savings achieved through customer surveys; and
- 9) Estimated landscape area converted and water savings achieved through low water landscape design and conversion program.

Determination of Water Savings

Landscape surveys as described in this document are assumed to result in a 15 percent reduction in water demand for landscape uses by surveyed accounts. The utility should provide estimates of water savings from landscape irrigation survey programs based upon actual metered data. The water budget calculation is as follows:

80 percent ETo calculation: $I = (E_{To} \times K_c \times AS)$ where I is the irrigation amount to be applied for a given period (daily, twice weekly, weekly, etc.), in inches or centimeters

ETo is the measured reference evapotranspiration over the irrigation period

Kc is a turf coefficient for turf grasses, and can be found at <http://texaset.tamu.edu/>

AS is allowable stress of 0.8 (or less if the landscape manager wishes)

For those wishing to convert inches of irrigation to gallons, multiply landscape area by 0.62. Irrigation Volume (gals.) = I (in.) x LA (sq ft) x 0.62

When applying irrigation, the equation should be modified to gain greater water savings by accounting for precipitation: $I = (ET_o \times K_c \times AS) - P_e$ where P is precipitation in inches or cm. In calculating an irrigation amount, it is important to consider effective precipitation (P_e). Effective precipitation is less than natural precipitation since some rainfall runs off or percolates below the root zone. The amount of effective precipitation will vary with region and rainfall trends. Each rainfall event will have a unique characteristic, and a good source for estimating P_e is the county office of the Texas Cooperative Extension Service.

Cost Effectiveness Considerations

Surveys can be performed by utility staff or by contractors. The labor costs range from \$50 to \$100 for a SF irrigation survey and start around \$100 and go up from there for an ICI irrigation survey, depending on the efficiency in scheduling the surveys, the size of the landscape, and the scope of the survey.

There may be other one-time costs such as purchase of leak detection equipment and meters. Marketing and outreach costs range from \$5 to \$15 per survey. Administrative and overhead costs range from 10 to 20 percent of labor costs.

References for Additional Information

- 1) *Landscape Irrigation Scheduling and Water Management*. Water Management Committee of the Irrigation Association, September 2003.
http://www.irrigation.org/PDF/IA_LIS_AND_WM_SEPT_2003_DRAFT.pdf
- 2) *Turf and Landscape Irrigation Best Management Practices*, Water Management Committee of the Irrigation Association, September 2003.
http://www.irrigation.org/PDF/IA_BMP_SEPT_2003_DRAFT.pdf
- 3) *Waste Not, Want Not: The Potential for Urban Water Conservation in California*, Pacific Institute, November 2003.
http://www.pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf
- 4) *Handbook of Water Use and Conservation*, Amy Vickers, Waterplow Press, May 2001.
- 5) *ET and Weather Based Controllers CUWCC Web Page*.
http://www.cuwcc.org/Irrigation_Controllers.lasso
- 6) *Smart Water Technology Initiative Web Page*.
<http://www.irrigation.org/swat1.asp>
- 7) *Soil moisture instrumentation: Sensors & strategies for the 21st century*, Richard Mead, in *Irrigation Journal*, Sept/Oct 1998.
- 8) *San Antonio Water System Conservation Program*.
<http://www.saws.org/conservation/>
- 9) *WaterWise Council of Texas*. <http://www.waterwisetexas.org/>
- 10) *Texas Evapotranspiration Network*. <http://texaset.tamu.edu/>
- 11) North Plains areas of Texas may find local historical data on potential evapotranspiration at: <http://amarillo2.tamu.edu/nppet/whatpet.htm>.