

Retrofitting Irrigation Systems/Landscape Water Use Efficiency

Applicability

This BMP is intended for use by water systems (“utility”) with a substantial percentage of customers using automated landscape irrigation systems and is targeted to customers who have automated irrigation systems. Each water system has the potential for substantial water savings with the implementation of this BMP. For the 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 runoff. 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. There are three approaches a water system can explore, water-use surveys, metering, and budgeting; landscape design; and minimum standards and upgrades. Successful implementation of this BMP will be accomplished by performing one or a combination of the approaches listed.

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 all of its accounts. 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 should be 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 conditions.

In an effort to increase water system efficiency and water use awareness North Carolina general statute 143-355.4 was passed in the 2009 session of the General Assembly.

It mandates that as of July 1, 2009 all local government water systems and large community water systems must require separate meters for new in-ground irrigation systems that are connected to their water system. Large community water systems are defined as those with at least 1,000 connections or serving at least 3,000 people. According to the League of Municipalities, the actions needed by the water system to achieve this mandate include:

- Determine whether to split existing taps, add additional taps, or a combination of the two.
- Adopt a local ordinance stating, at a minimum, the requirements of the state general statute.
- Decide whether a change in the rate structure and/or fee schedule is necessary.

Landscape Design

If the utility chooses the landscape design approach, the utility should provide information on climate-appropriate landscape design, as well as efficient irrigation equipment and management for new customers and change-of-service customer accounts. 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. Please refer to the BMP entitled, *Regionally Appropriate Landscaping*, for detailed information regarding the measures individual landowners and land managers can do to implement responsible water efficient practices on their landscape.

Minimum Standards and Upgrades

Irrigation system design, associated maintenance components, and even landscape design could be improved 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. Precipitation sensors, evapotranspiration (ET) estimation sensors, soil moisture sensors, irrigation controllers, and pipe specifications for zoning of irrigation systems are all potential elements of an irrigation systems ordinance. Size and scope of hydrozones, surface water buffer zone vegetation, and turfgrass species selection are 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 a 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, gardening show hosts, and newspaper columnists, as well as any other means of establishing communication with the public concerning 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.

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

- Customers with large landscapes, a list of landscape areas, measurements, plant types, irrigation system hydrozones and controllers.
- A list of existing irrigation policies or procedures, including maintenance and irrigation schedules.
- A distribution uniformity analysis on irrigated turf areas.
- A review of water bills with attention to the ratio of summer to winter use.
- An initial report summarizing the results of the evaluation.
- Ensure that landscape irrigation system specifications are coordinated with local building codes and contractor licensing requirements.

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, regular review of irrigation schedules and visual inspection of the irrigation system. When landscape management companies are used, contracts should include a required report showing regularly scheduled maintenance and seasonal adjustments to irrigation systems controllers. 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.

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.

When appropriate, the utility should consider offering:

- Training in efficiency-focused landscape maintenance and irrigation system design.

- Financial incentives, such as loans, rebates, and grants, to improve irrigation system efficiency and to purchase and/or install water efficient irrigation systems.
- Financial incentives to replace high-water use plants with low water use ones.
- Rebates and incentives to purchase rain sensors or soil-moisture sensors.
- Notices at the start and end of the irrigation season, alerting customers to check irrigation systems and to make repairs and adjustments as necessary.

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 North Carolina State University-Turf Management Cooperative Extension. For more information on these trainings, go to <http://www.turffiles.ncsu.edu>.

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 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 with the user.

Goals

- Realize the scope of this BMP within 10 years of the date implementation commences.
- Develop and implement a plan to target and market landscape water use surveys to all accounts by the end of the first year from the date implementation commences.
- Develop and implement a customer incentive program by the end of the first year from the date implementation commences.
- 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:

Landscape Irrigation System Management Programs

- Within one year of implementation date, develop and implement a plan to market water-use surveys to Industrial-Commercial-Institutional (ICI) accounts with mixed-use meters.
- Within one year of the implementation date, develop and implement a customer incentive program.
- Within 10 years, contact and offer landscape water-use surveys to all accounts with separate irrigation meters. A minimum response rate for the surveys should be 15 percent.

- Within 10 years, contact and offer landscape water-use surveys to all accounts with summertime monthly use of greater than four times the annual average. A minimum response rate for the surveys should be 15 percent.

Ordinance Approach

- In the first 12 months: Plan a program, including customer input 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 the ordinance. Implement the ordinance and tracking plan for the number of units retrofitted.
- In the second 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 number of dedicated irrigation meter accounts.
- The number of dedicated irrigation meter accounts for which water budgets have been developed.
- Aggregate water use for dedicated landscape accounts with budgets.
- Aggregate budgeted water use for dedicated landscape accounts with budgets.
- The number of mixed-use accounts.
- The number of surveys offered and number of surveys accepted and completed.
- The number, type and dollar value of incentives rebates and loans offered to and accepted by customers.
- The estimated water savings achieved through customer surveys.
- The estimated landscape area converted and water savings achieved through low water landscape design and conversion program.
- The cost of administering program.

Determination of Water Savings

Landscape surveys as described in this document should result in at least 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 on actual metered data.

For comments or questions regarding the Retrofitting Irrigation Systems/Landscape Water Use Efficiency BMP, please contact the water efficiency specialist of the Water Supply Planning Branch at 919-707-9005.

References

Texas Water Development Board Report 362, Water Conservation Best Management Practices Guide, November 2004.

Handbook of Water Use and Conservation, Amy Vickers, Waterplow Press, May. 2001.

Legislative Report – Recommendations for Water Efficiency Standards for In-ground Irrigation Systems, NCDENR, January 2009.

Case Study for an Outdoor Water Use Conservation Program

Cary, North Carolina

Background

Cary is a large town in west-central Wake County, North Carolina. The town's history is closely linked with the development of Raleigh and the Research Triangle Park.

The town population was 135,234 at the 2010 U.S. Census. According to the 2011 Local Water Supply Plan update, the town had a year-round service population of 159,898 people with 9,545 residential connections. The daily per capita water usage in 2011 was 61.4 gallons. Cary withdraws their water supply from Jordan Lake at the confluence of the Haw and New Hope rivers.

WaterWise Landscape Program

Cary began their WaterWise landscape programs in earnest in 1998 and this program has played a significant part in Cary's overall 20 percent per capita water reductions. Cary's outdoor landscape water efficiency and conservation program has three components: educational outreach initiatives, financial incentives, and regulations. WaterWise landscape practices are addressed by specific programs within each of those categories. Below are actions that have been incorporated into the utility's standard operating procedures.

Educational Outreach:

- Free WaterWise landscape workshops.
- Detailed information on the Town of Cary's website that covers fundamental landscape practices to reduce water use and maintain desired conditions.
- Beat the Peak campaign, which focuses on providing tips for WaterWise irrigation practices and landscapes during especially dry periods. Included in the Beat the Peak campaign is an online video game. To see the campaign visit, <https://www.townofcary.org/Departments/waterresources/waterconservation/Education.htm>

- Free irrigation audits, which may include free precision-spray nozzles.

Financial Incentives:

- Turf Buy Back Program. This program provides a one-time financial compensation to utility customers who agree to convert at least 1,000 square feet of historically irrigated turf to natural area or warm-season grass.
- Tiered water rates. Water budgets.
- Rain barrels for sale at cost throughout the year.

Regulations:

- Alternate day watering and other irrigation scheduling options. Separate irrigation meter requirements.
- Irrigation sensor and ordinances intended to discourage wasteful outdoor water use such as, the irrigation of impermeable surfaces.
- Irrigation system design standards as part of the Land Development Ordinance
- (LDO)/Appearance Standards.
- Drought-tolerant plant material requirement as part of the LDO. Use of reclaimed water for irrigation where it is readily available.

WaterWise Program Assessment

Assessments have been conducted on some of Cary's programs to estimate water use savings since their implementation. One of these is the Turf Buy Back (TBB) program, which involves incentivizing the replacement of cool season turfgrasses with warm season grasses or natural areas. It has been estimated that this initiative has saved approximately 722,678 gallons in the 2011 fiscal year. In fact, it was so well received by the public that the interest in participating exceeded the appropriated funds available. In addition to and in conjunction with the TBB, Cary has begun conducting free irrigation audits to homeowners that includes the retrofitting of more water-efficient spray nozzles. This program has only begun within the past year, so water savings totals are unavailable, but the potential water savings are substantial.

A 2011 survey conducted by CH2M Hill for Cary found that residents are generally supportive of the town's outdoor water conservation programs and efforts. The questions in the survey were based upon a nine-point scale, which examined the degree of satisfaction respondents had with the town's water conservation program. Some highlights from the 2011 Water Conservation survey include:

- The respondents were first asked about their satisfaction with how the town implements their water conservation programs. There was a relatively high level of satisfaction expressed by the respondents with a mean of 6.97 and 74.2 percent replying on the "satisfied" side of the scale, including 30.4 percent answering very satisfied.

- The respondents perceived that the most effective tool to encourage water conservation were regulations, such as alternative day watering. The mean was 7.46 with 81.4 percent of the responses falling on the “effective” side of the scale, including 45.3 percent answering it was very effective. There were only 6.1 percent of the responses for this subject on the “ineffective” side of the scale. Overall, this was believed to be the most effective of the tools examined by a significant margin.
- The respondents viewed tiered water rates, financial incentives, such as toilet rebates, and the towns’ website as the three next most effective tools. The mean response for tiered water rates, which ranked second was 6.46 with 67.4 percent of the responses on the “effective” side while 14.6 percent were on the “ineffective” side.
- The use of a financial incentive ranked third with a mean of 6.41 and with 61.3 percent of the respondents on the “effective” side, while 16.9 percent were on the “ineffective” side. Although the mean was slightly lower than tiered water rates, there was a higher percentage who felt it was very effective (32.6 percent versus 26.7 percent, respectively) indicating its importance to residents.

Cary has demonstrated that by undertaking these measures they are progressing towards a more efficient water system while maintaining desired landscape conditions. As Cary continues to incorporate additional water conservation measures and programs, it is expected they will continue to reduce their outdoor water use and maintain a stable water supply for continued growth.

For more information regarding the Cary’s WaterWise Landscape Program, please visit the town’s website at:

<https://www.townofcary.org/Departments/waterresources/waterconservation/Education.htm>