

2.12 Golf Course Conservation

A. Applicability

This BMP is intended for all Municipal Water User Groups (“utility”) that serve a golf course customer. Golf courses often involve a visible use of water, which comes under scrutiny by the public and water resource managers both because of large water demand to maintain the course, and because of the perception that the water use may be excessive. Golf courses are often good candidates for reuse water or other alternative sources of water. The specific measures listed as part of this BMP can be implemented individually or as a group. Utilities may already be implementing one or more of the elements of this BMP and they may want to adopt additional elements outlined below.

Once a utility decides to adopt this BMP, the utility should follow the BMP closely in order to achieve the maximum water efficiency benefit from this BMP.

B. Description

Golf course conservation is an effective method of reducing water demands. Under this BMP, the utility requires each golf course to develop a conservation plan that includes the elements described in this section. The golf course manager conducts a landscape and irrigation survey to determine water needed to efficiently irrigate the course. A water budget should be developed using reference evapotranspiration (“ET_o”). The manager implements a watering regimen that uses only the amount of water necessary to maintain the viability of the course. In addition to commercially available information from irrigation controller equipment companies, the Texas Evapotranspiration Network (<http://texaset.tamu.edu/>) has information to assist golf course managers and utility planners with proper management of large turf areas. Golf course managers should be encouraged to limit their water use to areas essential to the use of the golf course. An example of a use that has been eliminated on some golf courses is irrigation of the roughs.

The golf course plan utilizes methods of achieving enhanced water conservation such as a Computer Controlled Irrigation Systems (“CCIS”) or similar technology. In order to achieve maximum efficiency a CCIS should include at least the following components: computer controller (“digital operating system”), software, interface modules, satellite field controller, soil sensors, and weather station. A CCIS should be designed so as to prevent overwatering, flooding, pooling, evaporation, and run-off of water and should prevent sprinkler heads from applying water at an intake rate exceeding the soil holding capacity. The golf course plan provides an analysis of the cost-effectiveness of utilizing a CCIS.

If potable water is used and if non-potable water is available, the golf course converts to use of non-potable water as soon as is practicable. The golf course plan should include projected implementation dates to convert to alternative water supplies. Use of reclaimed, reused, and/or recycled water by golf courses must meet TCEQ water quality standards for treated effluent and human contact.

Soil improvement is an effective method for reducing irrigation water usage while maintaining healthy soils. Soil improvement programs on high visibility areas such as golf courses can demonstrate to the public the effectiveness of this method. For golf courses compost applications of 1/4 to 1/2 inch annually on turf areas and one inch annually on flower beds are recommended. Compost is most beneficial when applied in the fall.

C. *Implementation*

The utility should consider stakeholder information meetings. Working with stakeholder groups will be important to achieving “buy in” from golf course businesses. Also a number of voluntary environmental management programs exist in which golf courses may already be participating. There are two approaches to be considered to implement the golf course conservation plan described in Section B: an incentive or voluntary approach and an ordinance or other enforceable requirement approach.

1) Incentive or Voluntary Compliance Approach

The utility may provide staff or contract with a third party to provide a water audit of the golf course. The water-use surveys should, at a minimum, include measurement of the irrigated turf areas; measurement of the greens, tee boxes and fairways; determination whether hydrozones within the irrigation system are proper for the type of turf present; irrigation system checks and distribution uniformity analysis; review or development of irrigation schedules; and provision of a customer survey report and information packet.

If indicated by survey results and if cost-effective, the utility may offer incentives to the golf course user for upgrading irrigation systems, installing or upgrading controllers, changing hydrozones to eliminate irrigation of rough, or reducing the amount of fairway watering.

When cost-effective, the utility should offer golf course management and staff workshops by trained professionals on pesticide and nutrient management for optimal water-use efficiency. An advantage to working with programs like the Audubon Cooperative Sanctuary Program (“ACSP”) for Golf program is that the third party can assist in implementation at no cost to the utility. To ensure that water-savings goals are met, the utility should be explicit about the efficiency expectations of voluntary programs.

2) Ordinance or Enforceable Requirements Approach

a. For utilities with ordinance-making powers, in the first twelve (12) months plan, develop, and pass an ordinance that requires development and implementation of the golf course conservation plan, including stakeholder meetings as needed. Develop a plan for educating customers, especially those directly affected by the requirements of the ordinance. Plan customer follow-up compliance and education after ordinance passage. Implement ordinance and tracking plan for violations, compliance notifications, and enforcement.

In the second year and on (after ordinance passage): Continue implementation and outreach programs for customers. Continue compliance education and initiate enforcement programs. Enforcement can include citations with fines and service interruption for repeat offenders.

- b. For utilities that lack ordinance-making powers, in the first twelve (12) months plan a program including stakeholder meetings as needed. Develop a plan for educating customers, especially those directly affected, about the requirements of a golf course conservation plan. Develop follow-up compliance and education program. Implement water conservation program and tracking plan for violations and compliance notifications. Consider passing excess-use rates as a disincentive to golf courses that do not stay within a budgeted amount of water (*See Conservation Pricing BMP*).

D. Schedule

- 1) The utility should adopt an incentive program or an ordinance or rules within twelve (12) months of commencing this BMP.
- 2) The utility implements the incentive plan or commences enforcement upon adoption of the ordinance or rule.

E. Scope

To accomplish this BMP, the utility adopts golf course conservation policies, programs or ordinances consistent with the provisions for this BMP specified in Section C.

F. Documentation

To track the progress of this BMP, the utility should gather and have available the following documentation:

- 1) Copy of incentive plan or golf course conservation ordinances or rules enacted in the service area;
- 2) Copy of compliance or enforcement procedures implemented by utility, if applicable;
- 3) Records of enforcement actions including public complaints of violations and utility responses, if applicable;
- 4) Water savings from implemented changes; and
- 5) Number of customers completing the incentive plan.

G. Determination of Water Savings

Estimating total water savings for this BMP may be difficult, however, water savings can be estimated from each water-wasting measure eliminated through the actions taken under this BMP. For an irrigation survey, water savings can be expected in the range of 15 percent to 25 percent for courses without a CCIS that choose to implement the efficiency measures recommended by the results of the survey. There will be additional savings from the education of customers about golf course watering efficiency, which will be difficult to calculate but will encourage public goodwill toward the golf course water user and the utility. Switching to reuse or other non-potable alternatives can save up to 100 percent of the potable water supply used in irrigation. These savings are determined by measuring water use before and after the conversion to the new water supply.

H. Cost-Effectiveness Considerations

The one-time labor costs for producing golf course conservation plan guidelines and meeting with golf course stakeholders are dependent upon the level of staffing, the number of meetings, and time allotted to the planning process. Costs for annual review of golf course water use and conservation plan updates should be less than \$100 per plan.

Marketing and outreach costs range from \$5 to \$15 per plan. Administrative and overhead costs are approximately 10 to 25 percent of labor costs. The costs to the golf course facility for an irrigation system survey and CCIS or other systems upgrades or switching to reuse water are highly variable. Costs are dependent upon the efficiency in scheduling the surveys, the size of the course, and the scope of the survey. Surveys can be performed by golf course staff or by contractors.

I. References for Additional Information

- 1) *Audubon Cooperative Sanctuary Program (ACSP) for Golf*.
<http://www.audubonintl.org/programs/acss/golf.htm>
- 2) *Environmental Principles for Golf Courses in the United States*, United States Golf Association, 1996.
http://www.usga.org/green/download/current_issues/print/environmental-principles.html
- 3) *Golf Course Irrigation: Environmental Design and Management Practices*, James Barrett, et al., Wiley & Sons Publishers, 2003.
- 4) *Irrigation Information Packet*, Golf Course Superintendents Association of America. <http://www.gcsaa.org/resource/infopacks/pdfs/irrigation.pdf>
- 5) *Turf Management for Golf Courses, 2nd Edition*, James B. Beard, United States Golf Association, 2002.
- 6) *U.S. Air Force Golf Course Environmental Management Program*, Air Force Center for Environmental Excellence, San Antonio, Texas.
<http://www.afcee.brooks.af.mil/ec/golf/default.asp>
- 7) *Wastewater Reuse for Golf Course Irrigation*, edited by James T. Snow, United States Golf Association, 1994.