CASE STUDY

NEW YORK STATE BEST MANAGEMENT PRACTICES FOR GOLF COURSES

Precision Water Management

Project Details

Golf Course Profile:

- Location: Port Washington, NY
- Annual rounds of golf: 17,500
- Staff: 15-20 during peak season
- Acreage: 110
- Public or Private: Private

BMP Implementation:

Handheld moisture meters and the installation and implementation of three in-ground moisture sensors.

Budget: $5,200 total

- Handheld Meters: $800 x 3
- Turf Guard sensors: $300 x 3
- Repeaters: $300 x 2
- Base station/software: $1,000

Overview

With a heightened concern for water availability and its scarcity around the country, proper water application and conservation on the golf course is of the utmost importance. Fairly or unfairly, golf courses are often scrutinized by the public for their water consumption, especially during times of drought, as has occurred in California and more recently in Greenwich, Connecticut.

With an objective to conserve and apply water as efficiently as possible, North Hempstead Country Club in Port Washington, New York, has implemented various technological advances over the last eight years to conserve and reduce water consumption on the golf course.

Handheld Moisture Meters

At North Hempstead Country Club, handheld moisture meters (Figure 1) were first put into use in 2009. The handheld moisture meters provide a way to quantify volumetric water content in the soil and correlate number readings to the amount of water in the soil.

Figure 1. Handheld moisture meters are used to evaluate water needs.

Threshold numbers for the watering needed to maintain turfgrass were established using these meters. The threshold numbers were defined as both the acceptable values where watering would not be needed and values where watering would be needed. Grounds crew were trained on the use of these meters to evaluate different areas of the golf course to determine watering needs and then water to meet these needs.

In the first two years of handheld moisture meters use, ~ 10% reduction in water use was achieved as compared to pre-2009 water use.

Inground Soil Moisture Meters

In 2012, three in-ground Toro Turf Guard moisture sensors (Figure 2) were installed — two into greens and one into a fairway. The sensors were placed in the ground by removing a cup-cutter-sized plug, inserting the meter into the hole, and covering the hole with soil and a capped plug (Figure 3). The sensors were installed in "hot spot" areas that serve as indicators for when the course is beginning to dry out.

Figure 2. One of three moisture sensors installed in 2012.

Figure 3. Meter placement on a green.

The in-ground soil sensors provide real-time data on soil moisture, temperature, and salinity values at a 2.5-inch depth and 6-inch depth. The sensors relay data to repeaters in an irrigation satellite, which then relays data back to a base station connected to an Ethernet port. The data is uploaded to a server and then to a computer, providing real-time moisture values and day-to-day graphs that display the fluctuation in soil moisture content, soil temperature, and salinity (Figure 4).

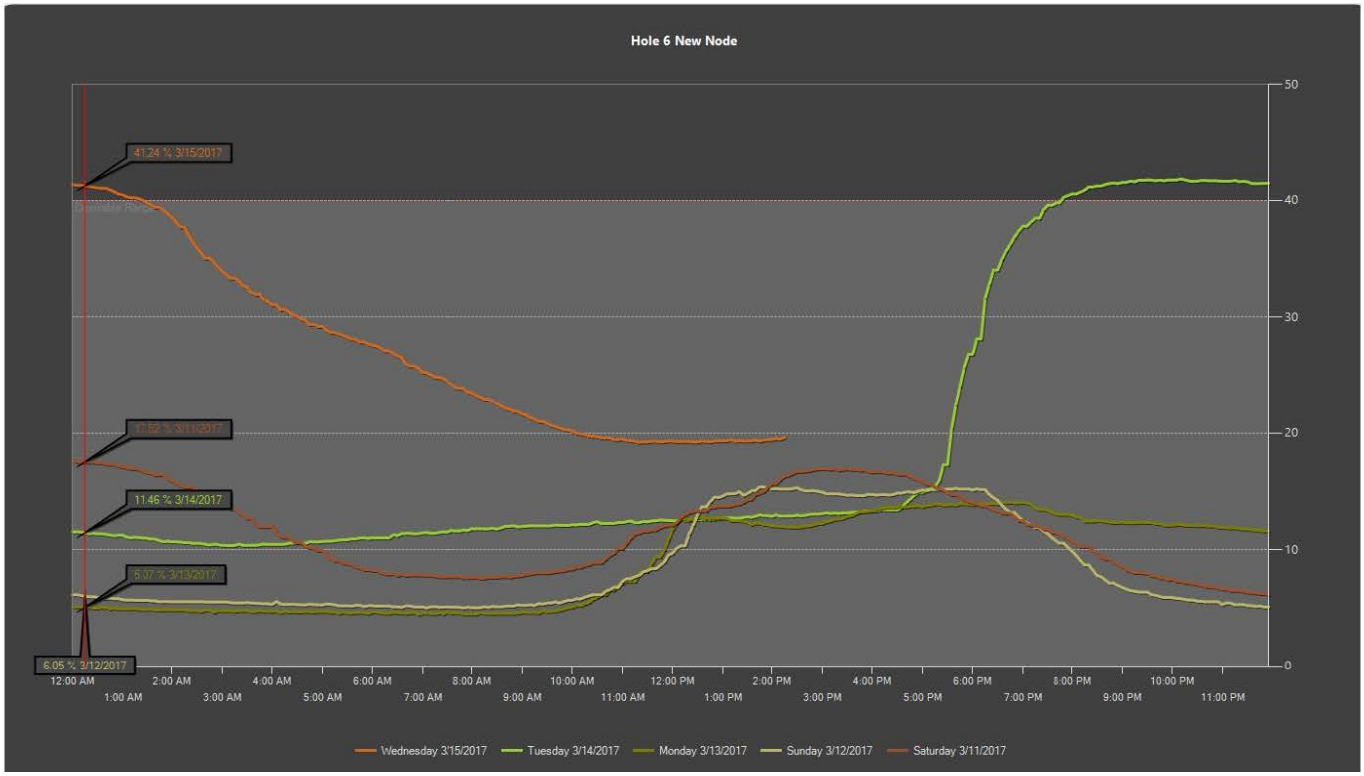

Figure 4. The lines on the graph represent daily fluctuations in water loss and application. The green line shows a significant rain event and the orange line shows the subsequent drying out of the soil the following day.

Soil Moisture

Soil moisture threshold values were established for the timing of watering, cultural practices, and for other management decision making. These threshold values, which vary seasonally, are used in a variety of ways:

- Scheduling irrigation: When the threshold values are reached, staff scout and monitor with the handheld moisture meters. If threshold numbers are within acceptable ranges, labor can be utilized for other tasks. As a result, a great deal of the physical labor and guesswork involved in scheduling irrigation has been eliminated. Likewise, if an irrigation or rainfall event did not provide enough water, staff can be tasked to check areas on the golf course before the onset of stress.
- Scheduling cultural practices: Threshold values were also established for when it may be too wet to cut and roll greens or cut fairway and therefore avoid stressing turf.
- Management-decision making: The sensors can also indicate when it may be too wet for cart use.

The sensors also allow for the staff to effectively evaluate watering practices. If irrigation cycles are above or below the threshold values, watering is adjusted accordingly.

Soil Temperature

The ability to monitor soil temperature (Figure 5) has also proven beneficial for correctly timing crabgrass, summer patch and fertilizer applications in the spring and fall. In addition, soil temperature information can be easily communicated using the sensor data. For example, if turf is stressed during periods of high soil temperatures, providing club members or owners with this data can be valuable communication tool.

Figure 5. Daily soil temperature fluctuations at 2.5" depth in July 2015.

Benefits

Implementation of sensors has been largely beneficial for North Hempstead Country Club, with efficient water application and conservation at the forefront. In addition the water savings achieve by using handheld sensors, use of the in-ground sensors has resulted in additional reductions in water consumption. In total, North Hempstead has reduced water consumption from approximately 30 million gallons of water to no more than 24.5 million gallons of water annually.