



BEAR MOUNTAIN GOLF OPERATION – BEST INDUSTRY PRACTICES FOR WATER MANAGEMENT

Background

Landscapes Unlimited, LLC engaged in an agronomic operations advisory role with The Westin Bear Mountain Golf Resort and Spa in January 2014. The primary purposes of the engagement are to improve the health of the turfgrass and golf course playability, support the grounds maintenance team with project management, and enhance the environmental responsibility of the maintenance department. Landscapes Unlimited, LLC performs golf course construction, renovation, and management services around the world. The 41 year old company has completed over 1700 golf course construction and renovation projects and has over 40 golf course management clients.

Recommendation

Growing medium:

All of the golf course turfgrass growing areas are capped with sand. Over time, an undesirable organic build-up (thatch) has developed on top of the sand. Thatch inhibits water infiltration into the sand. The combination of the shallow-rooting of the Annual Bluegrass (*Poa annua*) and the thatch build-up creates a very challenging growing situation. The thatch holds moisture and stays too moist in wet conditions, and it dries extremely hard in dry conditions. The thatch must be removed/diluted/managed while keeping the course open for play. **Bear Mountain has excessive thatch conditions, with 4" build-up on the Mountain Course, and 2" build-up on the Valley Course. It is inferred that no fairway aeration had ever occurred on either Bear Mountain course since their inception, in an environment (shorter Northern summers) that promotes high thatch build-up.**

Management Practices

The first remedial action is management of the thatch. The solution to thatch infestation is dilution - physical removal and soil amending. In an extreme situation like the condition at Bear Mountain, a multi-year program will be required to fix the problem. This program does not have an end. It must be continued every year during the lifespan of the golf course, or the thatch will continue to develop. The first strategy is to work on the thatch in two ways. First, core aeration is performed as a means of physical removal. Second, sand is applied to the surface and worked into the canopy as a means of amending the soil. The programs in 2015 were acceptable, but can be steadily improved as operational efficiencies increase every year so that all fairways can ideally be fully aerated twice a year (once in spring, and once in autumn). There are also many inputs required. Key inputs during this root zone remediation program are soil wetting agents. Wetting agents have a number of benefits. In the case at Bear Mountain, the primary needs are soil penetration to break the surface, followed by moisture holding enhancement in the root zone area.

To actualize a proper dethatching and aeration program, Bear Mountain procured additional equipment in spring 2015 and reorganized their operational team to prioritize the necessary work tasks. **It is estimated that it will take a minimum of 5 to 10 years to successfully break up and remove the built-up thatch such that optimum turfgrass growing conditions have been reinstated.**



Landscapes Unlimited identified the following 5 point plan in spring 2015, and are in process of indoctrinating the required elements into the Bear Mountain operating routines.

5 Point Water Management Plan for Westin Bear Mountain Golf Resort & Spa

1. Develop a written water management (conservation) plan

Establish a water allocation program based on prioritized allocation (greens as highest priority, tees, fairways and roughs as lowest)

Eliminate water applications in dry seasons (i.e. defer Driving Range irrigation)

Enhance the current record-keeping process

2. Add scientific variables (ET rates and moisture readings) to the irrigation decision making process

Weather station installation and operation

Perform daily moisture meter readings from April to September

Enhance the central controller programming operation with hand-held interfaces

Study potential new technology (permanent sensors with remote access, water treatment devices, etc.)

3. Irrigation system audit and programming documentation

Individual field satellite controller walk-through audit

Individual controller programming and inventory sheets

Immediate attention to system deficiencies (specific to individual head operation)

Study of water distribution with future head spacing adjustments and relocation changes

4. Study the pump station(s) and well flow meters for accuracy and reliability

Pump station flow tests and comparison to central programmer projected flows

Well flow tests

5. Introduction of turfgrass cultural practices to enhance overall plant health and the interface between the turfgrass and the soil

Solid tine and core aeration for compaction relief and thatch removal

Sand topdressing to dilute the thatch and create a firmer playing surface

Strategic applications of wetting agents and surfactants to improve water use efficiency

ECOASIS Golf Water Use Target & Trending Result

Pre: Landscapes Unlimited - 2014 Water Use Mountain & Valley Golf Courses: Metered - 61,600,000 USG / 233,000 cubic meter

Dethatching Program of all Fairways, plus the introduction of additional water management systems.
Ecoasis Targeted Water Use – Reduce over 10 years overall water use 20% to 50,000,000 USG / 189,000 cubic meters

2016 Water Use: 54,500,000 USG / 205,617 cubic meters

2017 Water Use : 51,900,000 USG / 195,849 cubic meters (Partial reduction due to a directive from PGA Champions Tour representatives requiring firm playing conditions for their event in September.)