

## Wastewater Reuse in Golf Course Irrigation

### Case Study Overview

This case study highlights a golf course that is using reclaimed water in their irrigation system to reduce the amount of fresh water needed to maintain the course. There is an additional benefit of reducing the loading rate to the infiltration beds.

### Background and Problem Statement

Lake of Isles is a renowned New England golf course located in southeastern Connecticut in the town of North Stonington. The course is spread out on 900 acres of picturesque landscape with 36 playable holes and is adjacent to Foxwoods Resort and Casino. The golf course is owned by the Mashantucket Pequot Tribal Nation.

The Lake of Isles golf course is maintained to have very high quality greens, which contributes to the excellent reputation of the course. It also requires a lot of water. According to the [Alliance for Water Efficiency](#), a typical golf course requires 100,000 to 1 million gallons of water each week during the summer months to maintain the greens. While some watering is taken care of naturally by rainfall, the frequency and amount of precipitation is not predictable; golf courses in Connecticut also need to supplement with irrigation.

When the Tribal Nation decided to develop the golf course, it first considered two traditional options as the source for irrigation water, its own municipal potable water system and on-site use of Lake of Isles. While the tribe's municipal system had adequate capacity, it seemed senseless to use potable water to irrigate grass, and use of Lake of Isles water was cited as a concern of the town during the initial permitting phase for the project.

### Solution

The Mashantucket Pequot Tribal Nation found an environmentally proactive way to develop the golf course without the added impacts of using potable water or surface water from the Lake of

### KEY TERMS

**Reclaimed Water:** highly treated wastewater (sewage) using advanced treatment technologies to remove solids, nutrients, pathogens and impurities. It can be used in landscaping irrigation or to recharge groundwater aquifers.

**Effluent:** treated discharge from a wastewater treatment facility.

**Sequencing batch reactor technology:** a method of wastewater treatment in which all phases of treatment occur sequentially within the same tank. It operates on a cycle consisting of fill, react, settle, decant, and idle.

**Rapid Infiltration beds:** wastewater is applied to shallow basins constructed in deep and permeable deposits of highly porous soils. The soil ecosystem is used to treat wastewater.

Isles. The innovative solution was to utilize the highly treated effluent from the tribe's advanced wastewater treatment plant.

In addition to serving the tribal community, the Mashantucket Pequot Tribal Nation's Wastewater Treatment Plant services Foxwoods Resort and Casino, a 24/7 entertainment venue that has a high volume of wastewater production. The plant utilizes Sequencing Batch Reactor technology (SBR) followed by tertiary filtration and ultraviolet (U.V.) disinfection. The system was designed for the treated effluent to be discharged to rapid infiltration beds. By implementing the water reclamation option, the golf course substantially reduced the need for fresh water and also extended the life of the infiltration beds on the reservation.



*UV disinfection system*

In order to assure that the reclaimed water meets strict water quality discharge standards, the U.V. disinfection system was upgraded to provide a higher dosage and added redundancy. Chlorine is also added before the treated wastewater is pumped to an 800,000 gallon tank at the golf course. Purple is the designated color for pipes and fixtures that carry reclaimed water so it can be easily identified when repairing or expanding systems.

The Tribal Nation was issued a pretreatment permit from CT DEEP that laid out required conditions for use of the reclaimed water to irrigate the golf course. More recently, the Mashantucket's Pequot Wastewater Treatment Plant was upgraded to increase the hydraulic capacity of the plant and the original pretreatment permit was modified to allow additional reclaimed water for irrigation. Currently, the permit lists the average daily flow of treated wastewater discharge is 600,000 gpd with a maximum daily flow of 1,200,000 gpd.

The ability to use reclaimed water comes with many stringent conditions and daily monitoring requirements. For example, spray application can only take place from April to October and only during non-playing hours from 9 pm to 6 am unless it is being directly monitored by staff; it is not



permitted during rainfall or excessive wind. No irrigation is allowed on driveways or roads, near residential property, water supply wells, eating or bathing facilities.

During non-irrigation days or months when irrigation is not needed, the treated effluent is discharged to the rapid infiltration beds without additional chlorine disinfection.

Monthly re-use reports prepared by the Mashantucket WWTP for the period from April – October 2014 indicate that over 41.6 million gallons of water was treated and reused for irrigation rather than being discharged to the infiltration bed system. Data from 2014 is representative of other years, resulting in saving millions of gallons of fresh water from being consumed annually.

### **Conclusion**

The Mashantucket Pequot Tribal Nation reuses close to 1 million gallons of water per day during peak watering season by irrigating its world-class golf course with reclaimed water. During the past 5 years (2010 – 2015), approximately 228 million gallons of water has been reclaimed. Doing so provides a beneficial use for the WWTP effluent, reduces discharges to the rapid infiltration beds and eliminates the impacts of using potable water, which would also be much more costly.

While this was the first project of its kind in Connecticut, water recycling and reuse is more common in other states for landscape and golf course irrigation as well as other uses. The Environmental Institute for Golf in its publication [\*Golf Course Environmental Profile\*](#), noted that 12 percent of 18-hole courses were using recycled water for irrigation.