

Wastewater Reuse at Coastal Resort Case Study

Case Study Overview

This case study highlights a facility that uses two separate alternative wastewater treatment systems to recycle water for beneficial uses. This reduces discharge to leaching fields and saves thousands of gallons of water per year.

Background and Problem Statement

Water's Edge is a resort and spa located on Long Island Sound in Westbrook, CT. Nestled on 20 acres of waterfront, it currently consists of 101 guestrooms and suites as well as 68 villas.

A few years ago the owner decided to expand and renovate the facility and proposed construction of a "New Villas by the Sea" development. This project involved a single building with 20 timeshare villas to replace an older structure known as the Beach House which was previously used to support the summer pool and beach activities.

The Subsurface Sewage Disposal Systems (SSDSs) then in place at the facility consisted of grease traps, septic tanks and pump chambers, followed by leaching systems.

The subsurface disposal system serving the Beach House had the capacity to discharge 1,100 gallons per day (gpd) of treated wastewater. However, construction of the proposed additional units would increase the design flow from 1,100 gpd to 4,143 gpd causing the facility to exceed their permitted discharge limits.

The increase in design flow triggered the need for the resort to modify their existing water discharge permit so that a total of 36,473 gpd could be discharged to their leaching system, compared to the permitted discharge of 33,900 gpd.

Unfortunately, the site had constraints due to its proximity to Long Island Sound that did not allow for the increased volume of wastewater discharge. This needed to be addressed in order to go ahead with the proposed development and motivated the resort to consider alternative wastewater treatment and reuse options.

KEY TERMS

Leaching Fields: a structure, excavation or other facility designed to allow effluent from a septic tank to percolate into the underlying soil without overflow and to mix with the groundwater. Leaching systems usually contain leaching galleries which are hollow structures with an open bottom and with perforated walls surrounded by stone and covered with soil.

Subsurface Sewage Disposal System: a system consisting of a building sewer, a septic tank followed by a leaching system, any necessary pumps or siphons, and any groundwater control system on which the operation of the leaching system is dependent.

Water Reuse and Recycling: using treated wastewater from one application for another application i.e. toilets, urinals, and laundry.

Solution

Water's Edge Resort and Spa limited its wastewater discharge and reduced its use of potable water with two alternative treatment and water recycling systems in addition to their conventional Subsurface Sewage Disposal System.

Both alternative treatment systems (Zenon Municipal Systems) consist of biological treatment processes, membrane filtration, and ultraviolet disinfection. The treated wastewater is then stored and reused in one of the following practices:

1. Treated wastewater from one of the alternative treatment systems is reused/recycled as toilet flush water in the main resort. It is dyed blue, to ensure no cross contamination between the potable water and treated water.

This water reuse/recycling practice has reduced the resort's water usage by over one million gallons (1,053,797) annually according to 2014 Monthly Discharge Monitoring Reports, saving the hotel money and eliminating potable water from being used in toilets.



recycled water dyed blue being used for toilet flush

2. The resort uses a unique approach to reusing treated wastewater in its laundry operations—a dedicated, closed loop water treatment and recycling process. The process begins with the removal of lint and grease. The wastewater then goes through membrane filtration and ultraviolet disinfection and then is stored and reused for future loads of laundry.

This closed loop system allows for the continued use of the same treated water within the laundry cycle and immensely reduces the total gallons of water consumed by the laundry. According to the resorts 2014 Monthly Discharge Monitoring Reports, the implementation of this closed loop laundry system has reduced their water consumption by 1,686,620 gallons annually. This has drastically reduced the amount of water being discharged to the leaching system on a day-to-day basis. The resort is not only conserving water but also saving money by having on-site laundry facilities that utilize a closed loop water treatment and recycling system.



membrane filtration alternative treatment system

Conclusion

Due to lot limitations and the proximity to the Sound, it was necessary for Water's Edge Resort and Spa to limit their wastewater discharge in order to build additional units. Water's Edge Resort and Spa was able to solve its water discharge dilemma with clever engineering and the practices of water reuse / recycling. By applying reuse of wastewater in toilets and closed-loop recycling of water for doing laundry the resort saved approximately 2,740,417 gallons of water in 2014.

The implementation of these treatment and recycling systems has allowed the resort to function at full capacity without a surface failure while reducing the overall demand for potable water. Water's Edge has also installed low-flow fixtures in sinks and showerheads as a way to further reduce water use.