Reductions up to 90% in Equipment Cleaning Water Use Identified Using Nozzle Alternatives and Filtration

In New York State, 30 out of 933 golf courses have achieved certification by Audubon International as Cooperative Sanctuaries, a program for golf courses that demonstrate their commitment to the environment by meeting standards for protecting water quality, conserving natural resources, and providing wildlife habitats. Of these 30, Locust Hill Country Club, located in Pittsford, NY, stands out as a sustainability leader.

As a member of New York Environmental Leader (NYEL), Locust Hill Country Club has decreased the amount of water used for irrigation by 2 million gallons a year, restored 3.5 acres of land to a natural state to filter storm water, decreased the amount of fertilizer and pesticides used by 400 lbs a year, and continued their internship program to train future leaders in golf course sustainability. Locust Hill is constantly searching for areas in their operations that can become more environmentally efficient.

**CHALLENGE**

One of the gaps identified by Audubon International in Locust Hill’s operations is the lawn mower washing, in which wastewater from the washing is sent through an underground tank and discharged into a town-approved wooded area nearby. This overflow sometimes creates undesirable odor problems. It has been determined that at peak times approximately 1,200 gal/day of wash water is discharged into the underground tank and to the nearby wooded areas. Even though the discharge is in compliance, Locust Hill would like to mitigate the odor issues and reduce or eliminate discharge to the woods to benefit the environment and surrounding community.

**SOLUTION**

NYSP2I worked with Locust Hill to evaluate opportunities to reduce water use and recycle water from the mower cleaning operations. The work performed included a baseline determination of water use and wastewater quality, spray nozzle alternative trials to reduce water use, filtration testing for potential reuse, ultraviolet disinfection testing to reduce bacterial growth for water reuse, and an economic analysis of these alternatives. Additionally, NYSP2I collaborated with Rochester Institute of Technology’s (RIT) School of Chemistry and Material Science to run the ultraviolet disinfection tests.

**RESULTS**

- If water is reduced by 50% using flow restrictors and different nozzles, approximately 700 gal/day of water maximum would be discharged. Then, if 90% of the water can be filtered and reused, only 70 gal/day of water would end up as actual discharge, reducing overall discharge by up to 90%
- A short payback was determined for installing flow restrictors and using optimum flow nozzle designs
- Ultraviolet water disinfection tests were performed at RIT and showed significant reduction in bacteria growth
RESULTS
NYSP2I identified a number of options to help Locust Hill reduce the amount of wastewater discharge. Low cost water use reduction techniques, such as using flow restrictors and lower flow nozzles for mower washing should be implemented first as a simple but significant water reduction solution, while water filtration and reuse systems would need further pilot-testing prior to implementation. Some of the key results are as follows:

- NYSP2I identified in-line flow restrictors and 3 alternative nozzles that would reduce the water flow by 50% without significantly impacting cleaning time and quality.

- If water is reduced by 50% using flow restrictors and different nozzles, approximately 700 gal/day of water maximum would be discharged. Then, if 90% of the water can be filtered and reused, approximately only 70 gal/day of water would end up as actual discharge, reducing overall discharge by over 90%.

- Recycling the water used in this operation requires some type of filtration, but completely pure water would not be necessary for the cleaning of the equipment, eliminating the need for highly sophisticated filtration systems. NYSP2I’s tests demonstrated that more coarse types of filtration performed well in reducing the amount of grass particles and improving quality.

- Ultraviolet water disinfection tests were performed at RIT and showed significant reduction in bacteria growth.

- A short payback was determined for installing flow restrictors and using optimum flow nozzle designs.

Since the completion of this project, Locust Hill has implemented the flow restrictors and uses air to blow off all equipment prior to washing. More work would be needed to confirm feasibility of different filtration/disinfection scenarios identified as viable options for water recycling.

Locust Hill has benefited significantly from this project and has shared this information with other golf courses to spread the use and knowledge of such sustainable practices. Locust Hill is considering a follow-up project with NYSP2I to focus on the implementation of a water reuse system and provide further analysis to determine the most viable option. Choosing the optimal setup could provide a very high percentage of reduction in wastewater discharge with an overall payback of less than 3 years.

"After working with NYSP2I, we have a number of options to choose from to successfully reach our sustainability goals. Our employees were able to test possible nozzles first hand, so we know we won’t have to sacrifice quality or efficiency in order to save water. Beyond reducing our use of water, NYSP2I was able to identify further water saving opportunities like water filtration and reuse, which allows us the potential to drastically reduce water discharge. We plan to implement the use of new nozzles, as well as engage in a follow-up project with NYSP2I to determine how we can move forward with water reuse. Thanks to the economic analysis, we know these implementations, in addition to the environmental benefit, will save us money in the long run."

– Locust Hill Country Club

NYSP2I PARTNERS

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