

The Use of Constructed Wetlands for Reclamation of Wash Water for the Turfgrass Industry

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Artificial or “constructed” wetlands have been utilized in both urban and agricultural settings as tools for improving water quality. Constructed wetlands for wastewater treatment are a sustainable, green technology that has been employed in Europe since the 1940’s. There are many types of wetland systems, but those systems originally built in the United States during the 1970s and 80s were free water surface systems. A free water surface wetland looks like a swamp, with areas of standing water and areas where the wetland plants are above the water surface. The other major category of wetlands is submerged bed systems. Submerged bed wetlands are constructed of sand, stone, pea stone and pipe much like a leach field. The top of the sand is dry at all times, and can be walked on without sinking into the sand.

Constructed wetland treatment systems simulate natural vegetated wetlands in its ability to assimilate and treat contaminants. These artificial wetlands differ from their natural counterparts in that they have some type of impervious barrier between the treatment area and the native soil to eliminate all possibility of contaminants short-circuiting the treatment system and to prevent entry directly into native soil and/or groundwater. When properly designed and sited, flow through the collection system as well as the treatment system is by gravity. Thus, the major advantage of this type of treatment system is the significant decrease in both energy and chemical use compared to conventional engineered systems. These systems have demonstrated removal of total suspended solids, petroleum residues, and pesticides.

There are relatively few examples on the use of constructed wetlands on golf courses or other managed turf systems, but results have been positive. In one example, a 4-year study was conducted at an 18-hole golf course at Purdue University. Several artificial wetlands were constructed to serve as both water hazards and water quality management tools. Overall, researchers reported that the wetlands were efficient in improving the quality of water originating during storm runoff and from golf course tile drainage. In North Carolina researchers also reported that a golf course using a constructed wetland had lower nutrient content in the outflow (nitrate, ammonium, and phosphorus) compared to water discharges from other area golf courses.

OBJECTIVES

There is increased pressure on the turfgrass industry to utilize more environmentally sustainable approaches in turfgrass management. To that end, constructed wetlands have the capacity to remove significant amounts of organic matter, nutrients, heavy metals, and pesticides through chemical, physical, and biological processes. We propose the construction of an artificial wetland

(approximately 200 sq. ft.) for the primary purpose of remediating wash water used on turf machinery. Because the surface of the constructed wetland is composed of sand (VSB), equipment such as mowers and sprayers will be washed down directly on the wetland area. This technology is capable of removing fertilizer, pesticide and hydrocarbon residues from wash water, thus allowing it to be reused or safely released back into the environment. Treatment wetlands have few if any electrical or mechanical parts and are either carbon neutral or have a “positive” carbon footprint since plants consume carbon dioxide and produce oxygen while treating the waste. This information will be used as part of a larger set of best management practices for minimizing the impact of pesticide and nutrient use on water and soil quality.