Announcing the Final Examination of Jessica Cormier for the degree of Master of Science

Time & Location: June 27, 2018 at 9:30 AM in Research I 103
Title: COMPARISON AND ASSESSMENT OF A MODIFIED RAPID INFILTRATION BASIN FOR TREATMENT AND CONTROL OF NUTRIENTS IN WASTEWATER EFFLUENT

Rapid infiltration basins (RIB) have been historically used in Florida for groundwater recharge, effluent disposal, or a combination of both. However, this technique has proven ineffective in providing nitrogen control unless the RIB is modified in some manner. In this study, a traditional RIB is compared with a modified RIB that was constructed with manufactured biosorptive activated material (BAM) to evaluate nitrate removal from reclaimed water supplied by the City of DeLand’s Wiley M. Nash Water Reclamation Facility. The RIBs are used by the City for reclaimed and excess storm water disposal when not used for irrigation. Few, if any, studies have been published where BAM-modified RIBs have been used for this purpose.

In this work, a mixture of clay, tire crumb, and sand was selected to serve as the BAM material (Bold and Gold® CTS media). Each RIB was constructed with 2 feet of either sand or BAM, each covering more than 43,600 square feet of surface area. The BAM-modified RIB had an initial 90 lb per cubic-foot in-place density, and the density of the control RIB approximated about 94 pounds per cubic-foot. The depth of reclaimed water infiltrated in the BAM RIB before the density testing was about 10 feet.

Over an eight-month period, the cumulative volume of water from the reclaimed water ponds used for evaluating the BAM RIB was 4.4 million gallons per acre whereas the volume supplied to the control (traditional) RIB approximated 4.1 MG per acre. Water samples, collected from lysimeters installed below the 2-foot of sand or BAM materials, were gathered monthly during 2017 (with the exception of September and October due to the impacts of hurricane Irma); these samples were analyzed for water quality to determine nitrate removal. Additionally, soil moisture and weather data was also collected over the study period.

This study demonstrated the nitrate removal effectiveness of a field-scale BAM-modified RIB as compared to a traditional field-scale sand-based RIB. Results suggest that BAM removed nitrates to below detection levels greater than 70% of the time under the conditions of the study, and at a removal percentage greater than sand.

Major: Environmental Engineering

Educational Career:
Bachelor’s of Biology, BA, 2012, Saint Catherine University

Committee in Charge:
Steven J. Duranceau, Chair, CECE
Dingbao Wang, CECE
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Approved for distribution by Steven J. Duranceau, Committee Chair, on May 31, 2018.

The public is welcome to attend.