

Analyzing the hydraulics and sediment transport of a vegetative swale using HEC-RAS

David Bassi, Jairo Diaz

Mississippi State University Department of Civil and Environmental Engineering

Hydraulic Engineering Center's River Analysis System (HEC-RAS) is a hydraulic model that was developed by the U.S. Army Corps of Engineers to execute 1-D hydraulic calculations. The software is made up of four 1-D river analysis tools that all use the same geometric data that is imputed by the user. It calculates steady flow water surface profile computations, unsteady flow simulation, movable boundary sediment transport computations, and water quality analysis. It comprises of a graphical user interface, data storage and management, and reporting functions. The purpose of this research was to use HEC-RAS to assess a vegetative swale by calculating the flows, roughness, sediment loads as well as evaluating a porous check dam located at the end of the swale. The vegetative swale is a Best Management Practice (BMP) that is located on the South Farm at Mississippi State University. The 50-m long swale contains a rip-rap check dam at the downstream end of the BMP followed by a fiberglass flume. The watershed for the BMP contained cattle pastures and is approximately 8.4 ha. Since summer 2011, flows from storm events were measured using a Son-Tec Flow Meter in the field and water levels were used to measure the gage heights during the events. Rating curves (stage vs. discharge) were developed for the upstream, middle, and downstream (flume) sections of the BMP. Thirteen cross sections of the channel were found using a total station and the geometric data was imputed into HEC-RAS. Water samples were also collected during storm events using an automatic water sampler located at the entrance, middle, and flume sections, and the samples were analyzed in the laboratory for total suspended solids as well as various nutrients. Currently, were setting up the model and planning to show model results at the conference.