Field Performance of a Low-cost, “Green” Filter Media: Metals, Sediments, and Hydrocarbons Removal

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Stormwater runoff is a cocktail of many potential pollutants, including metals, and hydrocarbons that have serious effects on the environment, human health, and economy. Various best management practices (BMPs) have been prescribed to mitigate stormwater runoff quantity issues, primarily to prevent flooding. However, very few of them are capable of addressing water quality issues, such as metals, sediments, and hydrocarbon contamination. To address this problem, a “green” and inexpensive filter media was developed for use in geotextile bag catch basin inserts (CBIs) in stormwater drains. The media was tested in laboratory conditions followed by a field study where its effectiveness in removing TPH, sediments (measured as turbidity) and dissolved Cu, Pb, and Zn was assessed. Aluminum-based drinking water treatment residuals (Al-WTRs) were utilized as the primary component of the filter media that also had sand and granular carbon materials for permeability improvement to prevent potential ponding. In addition to its easy availability (2 megatons of WTRs are generated in the US on a daily basis) and zero procurement cost (WTRs are currently disposed of in landfills), the potential of Al-WTRs as effective sorbents of metals has been widely demonstrated due to its high specific surface and abundant reactive sorption sites. CBIs with filter media were emplaced in a busy parking lot in Brick Township, NJ in the Barnegat Bay watershed. During the 4-month study, representative influent and effluent samples were collected for 8 storm events, and analyzed for TPH, turbidity, and dissolved Cu, Pb, and Zn. CBIs with filter media removed significant amount of metals, turbidity, and TPH from the stormwater runoff. Further development of the media is currently undergoing, aiming to generate granulated Al-WTR, which can increase pollutant removal performance and negate the use of additional materials such as sand or granular carbon for permeability improvement.

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