

The use of recycled glass as a filter media for on-site wastewater treatment

Laurence Gill*, Colin Doran, David Misstear, Brendan Sheahan

*Department of Civil, Structural and Environmental Engineering, Trinity College, Dublin 2, Ireland
Tel. +353 18961047; Fax +353 16773072; email: gilll@tcd.ie*

Received 21 April 2008; Accepted in revised form 18 September 2008

ABSTRACT

In situations where gravity-fed septic tanks are not suitable — high water table, shallow depth of subsoil to bedrock or poor subsoil percolation or overlying particularly vulnerable groundwater resources — alternative approaches are required to improve the quality of the effluent before discharge to ground. Such options include the use of a sand filter or a raised mound soil percolation area, either as a secondary treatment unit or as a polishing filter. Investigations have been made into the use of recycled glass as an alternative media to sand in such filters and as a soil conditioner for mound systems. The phosphate removal capacity of six different indigenous types of sand and 3 grades of recycled glass were studied to determine their respective adsorption isotherms, finding the highest adsorption in calcareous sand but almost nothing for the recycled glass. Filters set up in parallel in the laboratory (one with a typical sand, the other with recycled glass) and dosed with wastewater found that the glass filter performed similarly (with the exception of phosphate) to the sand filter across a range of hydraulic loading rates (42–85 L/m².d) attaining removal efficiencies of 72–83% COD, 10–26% total nitrogen and 3.7–4 log removal of faecal coliforms. Both filters also performed better if the wastewater was applied in smaller-volume, more frequent doses. Finally, the addition of recycled glass into the matrix of a clay subsoil promoted a significant improvement in both the rate and uniformity of percolation, as measured both in the laboratory and out in the field demonstrating its potential for use in raised mound treatment systems.

Keywords: Onsite wastewater treatment; Recycled glass; Sand filters; Raised mound systems

* Corresponding author.