

Groundwater flooding in fractured permeable aquifers

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Abstract : Current interest in groundwater flooding follows the events of 2000/01 when extreme long duration rainfall caused the water tables in Chalk catchments in South East England and Northern France to rise to unusually high levels. Individual rainfall events, and even monthly totals were unexceptional. By contrast, in July 2007, an extreme short-duration rainfall event (>90 mm in 12 hours) resulted in a rapid (<1 day) and marked rise in the water table. This behaviour is attributed to the dual permeability nature of the Chalk unsaturated zone (CUZ). The potential for individual extreme rainfall events to cause groundwater flooding is explored in this paper. Physical observations from the CUZ are combined with an analysis of the temporal water table response to rainfall. The rainfall characteristics (intensity and duration) appear to be a better predictor of rapid recharge than the activation of the fractures as determined by matric potential measurements.

Key words Chalk; groundwater flooding; groundwater recharge; unsaturated flow