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Modelling and mapping groundwater flooding consistently across Great Britain

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The widespread problems encountered in the spring of 2014 highlighted the vulnerability of many areas of Great Britain (GB) to flooding from groundwater sources. Although principally associated with the Chalk aquifer, groundwater flooding can be associated with a wide range of bedrock and superficial aquifer types in GB. These events result from high groundwater levels, which typically occur due to enhanced aquifer recharge following prolonged wet periods, but can also be caused by a range of mechanisms including elevated river levels and post-abstraction groundwater rebound.
Protecting against groundwater flooding requires a different approach to conventional defences to protect against water creeping up through basements, cellars and floors. These interventions can be at a range of scales and complexities, such as the cutting of new drains, basement tanking, installation of borehole pumping arrays, and hydraulic cut-off walls. Tackling groundwater flooding also presents additional complexity due to the time scales involved, with flooding in some cases lasting for many weeks or months. The protracted duration can have many implications, impacting on transport and sewerage networks for example, as well as delaying access to properties to start clean up and repairs.
It is important that the market place (insurance, property search, housing and utilities) properly understands flood risks from groundwater. To meet this need, we have developed a consistent method for mapping groundwater flood risk across GB, for a range of event probabilities. This utilises a high resolution (5m) raster based model that includes the best available geological and topographical information from the British Geological Society (BGS) and Airbus Defence and Space (AD&S), respectively. The model determines the degree of water table rise based on the hydrogeological properties of the underlying strata, based on different flood recharge scenarios. This is used to identify areas where groundwater may start emerging at the surface or reach very shallow depths below the surface. Calibration to locally available data has provided confidence in the map outputs.