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Multidisciplinary Quaternary Studies Applied to Flood Alleviation in Scotland

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Abstract

Understanding flood risk in Morayshire has required multidisciplinary investigation of a complex Quaternary land system by an integrated scientific team. A variety of techniques were used and the results applied to flood risk management within the Lower Findhorn Catchment in Morayshire, N. E. Scotland. The results from detailed field investigation of the catchment by Quaternary, engineering geology and hydrogeology specialists were integrated into a 3D model of the Glacial, Post Glacial, and Anthropocene succession, calibrated by borehole drilling and trial pitting. 3D modelling enabled division of the Quaternary sequence, into some 43 units, and enabled enhanced visualisation of their complex geometrical relationships. The model was subsequently reattributed with measured in situ permeability values and indicative engineering properties, based on pumping test results and geotechnical analyses. The resulting more generalised models provided a major set of parameters for ZOOM groundwater modelling, which was used together with outputs from hydrological models, to model groundwater flow directions and to establish the baseline groundwater component of river flooding in the catchment. The models were then used to inform the design of flood alleviation measures, protecting the urban area without causing unintended groundwater flooding in other parts of the catchment. Outputs from the Quaternary model are now also being applied to investigate land use and civil engineering issues associated with potential infrastructure developments.

3D model of the Quaternary of Forres and the Lower Findhorn Valley

