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Impacts of a severe flood event upon channel morphology in an upland stream

D J Milan (1), G L Heritage (2)

(1) Department of Natural & Social Sciences, University of Gloucestershire, FCH, Swindon Road, Cheltenham, GL50 4AZ, United Kingdom (dmilan@glos.ac.uk)

(2) Built and Human Environment Research Institute, School of Environment and Life Sciences, University of Salford, Peel Building, Manchester, M5 4WT, United Kingdom (g.l.heritage@salford.ac.uk)

This paper documents the geomorphic impacts of a severe flood that occurred on 17^{th} July 2007 in the Thinhope Burn, a tributary to the River South Tyne. An intense localised rainfall event was responsible for significant bedload movement and the loss of 30 plus stock from a local farm. High quality pre- and post-event data quantifying the geomorphic impacts of large floods in British rivers is quite rare. However a 500 m reach of the Thinhope Burn was surveyed in 2004 using RTK GPS thus providing a baseline survey of the channel and floodplain including terraces and paleo boulder berms. Resurvey of the same reach following the flood event revealed large vertical changes in the region of $\pm$3 m. Photographic evidence and survey data reveal erosion of sections of the second terrace above the present channel position. Many of the berms dated by other workers as being deposited since the 1700's were completely destroyed and reworked. Median grain sizes measured from freshly deposited berms, some of which were deposited on top of the floodplain, ranged from 30 to 698 mm. The largest grain size recorded that had been mobilsed had a b-axis of 955 mm. The channel morphology also changed from stable single thread to multithread wandering in places. The data were used to generate Digital Elevation Models (DEMs), and DEM differencing revealed 7000 m^3 of deposition and 3100 m^3 of scour over a valley area of 82833 m^2. Strandline data permitted a hydraulic reconstruction of the peak flow conditions responsible for the geomorphic changes, where a reach average stress

stress of 533 Nm^{-2} was estimated using the average depth along the thalweg and average water surface slope. The geomorphic impacts of this flood are placed in context with the historical record of large floods that exist for this stream.