



A geophysical investigation into the peat failures on Dooncarton Mountain, County Mayo, Ireland

S. Murphy(1,2)

(1)School of Earth & Environment, University of Leeds, Leeds, UK

(2)Now at the Dipartimento di Scienze Fisiche, Università degli Studi di Napoli Federico II, Napoli, Italy (shane.murphy@na.infn.it)

A georadar survey was performed during July 2004 around one of the 40 peat slides that occurred on Dooncarton Mountain, Co. Mayo, Ireland in September 2003. Three survey lines were recorded parallel to the peat slide (80 to 100m in length) while the other three lines (100m long) ran above the failure surface and were perpendicular to the first three. A Sensors and Software Pulse EKKO 100 ground penetrating radar was used with antennae frequencies of 100 and 200MHz. The processed radargrams imaged the peat:weathered layer boundary as a strong continuous reflector whose depth varies from 2 to 0.5m. The weathered layer could be identified by the presence of multiple diffraction curves. Natural pipes in the peat and sub-terrain tension cracks produced ambiguous diffraction hyperbolae that required truthing or prior knowledge to be interpreted.

Using three cross sections constructed from the GPR survey and a density of $0.92 \pm 0.02 \text{ g/cm}^3$ for peat, a simple two layer model with peat overlying bedrock was back-analysed to determine strength parameters of the peat. It was found that the water table needed to be at the surface with the peat having a cohesion of 8kPA and an internal angle of friction between 30° and 40° in order to cause the peat to fail. However, we believe that this computation delivers an underestimate of the strength of the peat, because the stability modelling did not account for the weathered layer.

GPR as a tool for peat failure investigation proved successful in determining characteristics that are critical in controlling stability of peat layers. The GPR and engineering analysis combined to provide information on the possible conditions of the peat when failure occurred.