Modelling sand and gravel resources in a Late-Glacial delta system, Lough Neagh, Northern Ireland

Sam Roberson (1), Rhys Cooper (2), Meredith Scanlon (2), and Claire Mellett (2)

(1) British Geological Survey, Geological Survey of Northern Ireland, Belfast, United Kingdom (samrob@bgs.ac.uk), (2) British Geological Survey, Marine Geoscience, The Lyell Centre, Research Avenue South, Edinburgh, United Kingdom

Sediment from glacial outwash deposited across central Ulster during deglaciation represent a major resource for aggregate and construction industries in Northern Ireland. Lough Neagh, the largest water body in the UK, acted as an accumulation basin for sediment transported by meltwater during the Late Glacial. Very little is known about the volume or type of aggregate within the Lough, despite over a half a century of sand and gravel extraction. This study presents the results of a resource survey carried out across a 47 km2 area in the northwestern part of the Lough.

Multi beam echo sounding and seismic data were collected to constrain sub-bottom stratigraphy within the Lough. Bulk sediment samples from shallow boreholes and surface grabs were analysed for density and particle size to determine the type of sediment present. Volumetric data were combined with borehole logs to build a stratigraphic model of the NW corner of the Lough: lacustrine alluvium overlying a glaciolacustrine delta, underlain by glacial till.

This study applies principal component analysis to log-ratio transformed particle-size distributions sampled from within the delta. Principal component scores (PCs) were interpolated within a voxel grid using ordinary kriging to derive complete particle-size distributions throughout the delta deposit. These were combined with measurements of dry density to calculate bulk sediment tonnage for British Standard cement gradings (BS 800 and BS 1200). Uncertainty in sediment tonnage (± 1 sigma) was calculated by propagating kriged error variance through principal component score and log-ratio inversion.