

Subaqueous landslides associated with shoreline infrastructure in steep glaciated terrain, Loch Lomond, western Scotland

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Shorelines in steep glaciated terrain are focal points for development and can provide important natural corridors for transport (e.g., road, rail). However, the steep subaqueous slopes at nearshore sites present challenging ground conditions, and it is only in recent decades that acquisition of continuous high-resolution bathymetric datasets has become available to inform investigations. This work investigates a site in Loch Lomond, Scotland, where a reported displacement of 15,000 m³ of rock fill occurred during the construction of a shoreline embankment as part of improvement work on a strategic road in the 1980s. We revisit the area using recently collected multibeam swath bathymetry, shallow sub-bottom seismic data and geomorphological mapping, as well borehole logs from the original ground investigation. These data suggest that the displacement of rockfill initiated a sequence of subaqueous landslides incorporating a total volume of up to 95,000m³. The bathymetric and seismic data also provide strong evidence for older subaqueous landslide activity across the area, suggesting a pre-existing susceptibility. The research demonstrates the value of nearshore geophysical datasets in steep glaciated terrain, both for understanding geomorphological response to past shoreline modifications and as part of investigations where future developments (e.g., transport, energy infrastructure) are planned.