

Wave surcharge on long narrow reservoirs- a reality check

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SYNOPSIS. Safety reviews carried out for Scottish and Southern Energy had initially identified five hydroelectric dams where the wave surcharge allowance required was significantly greater than the wave freeboard available. These initial reviews suggested that significant dam heightening, of up to 3 m in one case, would be required to provide adequate wave freeboard.

The dams in question impound long narrow lochs, up to 26 km in length. Basic wave generation formulae suggest that the full length of the loch is available for wave generation resulting in very large significant wave heights. A reality check on this simplified approach was required. Wave analysis methods from the maritime sector were used to model wave generation on the reservoirs. To reduce survey costs old and new technologies were combined by turning 100 year old bathymetric survey into a digital bathymetric model of the loch beds. The modelling output confirmed that significant engineering judgement is required to assess the influence of loch shape on wave generation to determine an appropriate fetch length.