

Exploring the potential use of a risk-based approach to assessing the geotechnical well-being of the slopes of old embankment dams

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SYNOPSIS. Historically many aspects of geotechnical design have tended in favour of the deterministic methods of analysis based on the concept of Factors of Safety over probabilistic methods. This is particularly the case when considering the slope stability of dams. In recent years, with the introduction of Eurocode 7, the geotechnical community in the UK has been coming to terms with the use of the Limit State approach to geotechnical design which defines the relationship between design parameters and performance criteria. This generally involves factoring up loads and factoring down calculated soil parameters such as shear strength. The factors are statistically calculated to produce a design that has an acceptably low probability of failure although the approach gives no indication of what the value might actually be.

Using statistical methods to determine the characteristic values may only be performed effectively when data comes from sufficiently homogenous identified populations or when sufficient data is available. It is rarely possible and relevant to adopt statistics particularly when investigating old embankment dams where it is sometimes suggested that the actual process of undertaking major intrusive investigations with boreholes could have a detrimental effect on the performance of the dam and where internal erosion could have an influence on overall slope stability.

The paper explores the potential application of a risk based approach, assisted by the use of quantified risk profiles used in flood risk management, to better understand the current performance of the slopes of old embankment dams.