

8ICEG Invited Lecture



Prof. William Powrie

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Invited Lecture Title

Climate and vegetation impacts on infrastructure cuttings and embankments

[09:30 - 10:00 , Tuesday 30th Oct. 2018]

Biography

William Powrie is Professor of Geotechnical Engineering in the Department of Civil, Maritime and Environmental Engineering at the University of Southampton. His main technical areas of expertise are in geotechnical aspects of transport infrastructure, and sustainable waste and resource management. He was elected Fellow of the Royal Academy of Engineering in recognition of his work in these areas in 2009.

William's work on geotechnical aspects of transport infrastructure encompasses groundwater control, in-ground construction to reduce environmental impacts in urban and other sensitive areas, understanding and mitigating vegetation and climate change effects, and fundamental soil behavior.

Abstract

A mature transport infrastructure such as that in the UK is often intensively used, but has key elements that were built without the benefit of a modern understanding of soil mechanics and geotechnical design. Operation of any transport infrastructure network is critically dependent on the performance of such elements, in particular cutting and embankment slopes. In a temperate European climate, seasonal winter wetting and summer drying impose potentially onerous cycles of loading that can precipitate both ultimate and serviceability failures, especially in vegetated slopes. Seasonal shrinkage and swelling of clay fill railway embankments can directly disturb railway track geometry, resulting in train speed restrictions that disrupt normal operations. Very wet winter periods can cause result in slope failures requiring closure of the line for repair and in some cases potentially serious train derailments. As part of an ongoing long-term research programme, observations from field instrumentation are being used to understand how weather and vegetation drive changes in water content and pore water pressure in the earthworks, in turn leading to ground movements. The field observations have also been used to develop and calibrate numerical models able to replicate weather-driven pore water pressure changes and slope failure. The lecture will

summarise recent progress, and show how historical and current weather event sequences have been applied using the models developed to understand and assess slope deterioration processes under future climate scenarios up to and including the 2080s.