



Malaysian Geotechnical Society

## REPRISE OF 60<sup>TH</sup> RANKINE LECTURE

(via Zoom platform)

### The Unusual and the Unexpected in Geotechnical Engineering Observation – Analogy – Experiment

By Professor Stephan Jefferis

26<sup>th</sup> October 2022 (Wednesday) 4.00 p.m. to 6.00 p.m. (MYT)

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#### Synopsis

In this reprise of the 60<sup>th</sup> Rankine lecture, Professor Jefferis will explore a wide range of processes which have substantial consequences in geotechnical engineering and yet have received little formal attention.

He will first examine the behaviour of support fluids used in piling, diaphragm walling, tunnelling and horizontal directional drilling – processes which have been strongly influenced by analogies with oil well drilling operations. However, the role of the support fluid in each of these applications is different and it would be a mistake to assume that the key properties are the same for all of them. For example, for decades it was assumed that an excavation support fluid must form a filter cake and should be markedly denser than the surrounding groundwater. The advent of polymer support fluids, which may function without a filter cake and have near water densities, has shown these assumptions to be simplistic.

From support fluids, the next step is to consider slurry trench cut-off walls and then the impact of geotechnical activities on soils more generally. On careful analysis, one finds that many of the natural processes that occur in soils are mediated by micro-organisms. This adds new dimensions of complexity as there can be multiple outcomes. Construction processes that influence microbiological activity include heating/cooling, tunnelling, dewatering, flooding, sealing with liners, grouting and introduction of other chemicals. These are processes that we regularly undertake without a second thought for their potential microbiological consequences. Fortunately, these usually pass unnoticed and innocuously but occasionally, as will be shown, the effects are at the least unexpected! If we are to exploit biological processes to manipulate soil properties, we must first recognise natural processes.

#### About The Speaker



Professor Stephan Jefferis is a director of Environmental Geotechnics Ltd, a company he established in 1982 anticipating developments in this area. He is a Visiting Fellow in the Department of Engineering Science at the University of Oxford. He is a former Chairman of the British Geotechnical Association and was a founder director of WJ Groundwater.

Professor Jefferis has worked on major projects across the world including dams, tunnels, shafts and deep foundations. He has over 45 years' experience in the investigation and resolution of unusual and unexpected geotechnical problems, often associated with natural chemical and microbiological processes. He has worked on geotechnical processes including fluid supported excavation for decades and is co-author of the book Polymer Support Fluids in Civil Engineering.



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