

Field characterisation and mapping of pumiceous deposits in central North Island, NZ

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ABSTRACT

Pumice materials are frequently encountered in many engineering projects in the central part of the North Island, New Zealand. Because of their lightweight, highly crushable and compressible nature, existing empirical correlations developed for hard-grained (quartz) sands are not applicable, and therefore they are problematic from an engineering and construction viewpoint. Because of NZ's tectonic location, a clear understanding of the properties of these soils under earthquake loading is necessary; for example, the 1987 Edgumbe Earthquake showed widespread liquefaction of sands of volcanic origin. With the engineering developments currently going on in the region, a better understanding of the characteristics and locations of these pumiceous layers has become necessary. This paper attempts to identify the field characteristics of pumice deposits based on conventional geotechnical methods and to map the extent of pumiceous layers across the Bay of Plenty and Waikato regions. For this purpose, existing geotechnical data within the target regions, including cone penetration tests (CPT), seismic CPTs, seismic dilatometers (sDMT), machine boreholes and associated laboratory testing, were compiled. In addition, pumice deposits were identified within the existing data as well as the extent of the stratigraphic unit(s) and typical trends within the data set and correlations across various test types were analysed. Finally, pumice deposits across the regions are mapped, including depths and extent of pumiceous layers, possible mode of deposition (air fall, water-borne, etc.) and approximate pumice contents. It is envisioned that the outputs presented in the paper will be beneficial to researchers, practicing geotechnical engineers, roading authorities and council planners in terms of providing better engineering understanding of these problematic soils.

Keywords: pumice, mapping, geotechnical database, field characterisation, empirical correlations

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