World Academy of Science, Engineering and Technology
International Journal of Geotechnical and Geological Engineering
Vol:15, No:12, 2021

Influence of Geologic and Geotechnical Dataset Resolution on Regional Liquefaction Assessment of the Lower Wairau Plains

Authors : Omer Altaf, Liam Wotherspoon, Rolando Orense

Abstract : The Wairau Plains are located in the northeast of the South Island of New Zealand, with alluvial deposits of fine-grained silts and sands combined with low-lying topography suggesting the presence of liquefiable deposits over significant portions of the region. Liquefaction manifestations were observed in past earthquakes, including the 1848 Marlborough and 1855 Wairarapa earthquakes, and more recently during the 2013 Lake Grassmere and 2016 Kaikōura earthquakes. Therefore, a good understanding of the deposits that may be susceptible to liquefaction is important for land use planning in the region and to allow developers and asset owners to appropriately address their risk. For this purpose, multiple approaches have been employed to develop regional-scale maps showing the liquefaction vulnerability categories for the region. After applying semi-qualitative criteria linked to geologic age and deposit type, the higher resolution surface mapping of geomorphologic characteristics encompassing the Wairau River and the Opaoa River was used for screening. A detailed basin geologic model developed for groundwater modelling was analysed to provide a higher level of resolution than the surface-geology based classification. This is used to identify the thickness of near-surface gravel deposits, providing an improved understanding of the presence or lack of potentially non-liquefiable crust deposits. This paper describes the methodology adopted for this project and focuses on the influence of geomorphic characteristics and analysis of the detailed geologic basin model on the liquefaction classification of the Lower Wairau Plains.

Keywords : liquefaction, earthquake, cone penetration test, mapping, liquefaction-induced damage
Conference Title : ICGEASPP 2021 : International Conference on Geotechnical Engineering Analysis, Site Planning and Preparation
Conference Location : Auckland, New Zealand
Conference Dates : December 01-02, 2021