Geological-Hydrogeological Condition and Multi-Tank Model of M1

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Date: 2022/04/15

Abstract

Due to heavy rainfall, interbedded sandstone and shale of dip slopes with slightly to moderately weathered conditions are mainly prone to landslides. This research mainly discusses how geological and hydro-geotechnical uncertainty influences the failure probability of a dip slope, especially at National Yang Ming Chiao Tung University (NYCU). Geological aspects are essential in determining hydraulic conductivity and indirectly influence pore water pressure distribution. For the rock slope, groundwater mostly flows within joints. As a result, the identification of pore water pressure in rock slopes is more complex, especially for slope stability cases. On the other hand, predicting the increase in groundwater level, causing increased pore water pressure, induced by rainfall is still challenging. Proposing a verified geological model will help reduce the uncertainty of hydraulic conductivity and pore water pressure distribution. In addition, using the multi-tank method will help to predict the groundwater fluctuation, controlling the pore water pressure, more effectively. Geological investigation results show that the orientation of the bedding plane in the blue and yellow zone is relatively the same. Some offsets in boreholes also found and may be evidence of rock-mass movement below the main campus of NYCU. Besides that, the trend of simulated groundwater level shows a corresponding good relation to the factual groundwater level. Bottom outlet plays important role for increasing and decreasing the groundwater level in the below and above tank, respectively. Finally, the future work will focus on finding the mass movement evidence in the field. Also, calibrating the simulated groundwater level to the different time periods in the M1 and proposing the equation to control the maximum groundwater rise-up.

Keywords: Dip slope, Geological and hydro-geotechnical uncertainty, Multi-tank model