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Geological Control on Stability of Excavated Rock Slope at Jeruklegi Claystone Quarry, Cilacap Regency, Central Java Province, Indonesia

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PT. Holcim Indonesia Tbk is a well-known company for cement production in Cilacap, Central Java, Indonesia. In cement manufacturing, certain raw materials such as limestone, claystone and other supplementary materials are required. In a mean time, the company is conducting claystone mining to support the cement industry. Currently, the exploitation has covered the area of approximately 103 ha. Due to the increment need of more claystone to achieve the expecting amount of cement production, the company plans to extend existing mining site up to 250 ha with maximum depth of +10m above the sea level. However, such development may eventually lead to major slope failures which essentially affect the sustainability and the safety of the mine.

Understanding that various negative impacts may appear during the mining operation, which possibly result in personal injury, potential life loss, property damage and other socio-economic consequences, it is crucial to assess slope stability conditions of the mining pit to ensure safety of the mine. The study is mainly focused on analysis of the rock mass behaviours under specific geological control and earthquake trigger through the application of finite element method.

Based on the assessment result, the zone where covered by discontinuous rock mass, absorbent lithology and steep slope geometry in combination with presence of groundwater, is estimated to be potential to slope movement in form of rock falls and/or rock slides which could be possibly predicted to occur as a consequence of heavy rainfall intensity, un-controlled slope excavation and ground vibration. And, the stable slope inclination is suggested not to be steeper than 60˚, with the maximum width of 3m and maximum height of 6m.