

ABSTRACT

Ground movement occurred in March and November 2017 was marked by the cracks in the hills and paddy fields in the Jeruk Sub-village, Gerbosari Village, Samigaluh District, Kulon Progo Regency, Yogyakarta Special Region. The landslide destroyed two houses and village road. In general, the morphology of the research area was gentle to steep hillsides and located in heavy rainfall area. Moreover, the high precipitation was one of triggering factors of landslide occurrence. Therefore, landslide hazard mechanism is vital for disaster management and for planning development activities in the hazard areas.

In this research, implementation of mechanism of landslide at Jeruk Sub-village was made using visco-plastic model and tank model simulation. To achieve the objectives of the research, it required the geological, geotechnical data and landslide displacement and its correlation to the triggering factor such as rainfall and hydrological condition. The above data were required to simulate the velocity of the landslide movement by using the visco-plastic model. Continuous daily rainfall and actual groundwater level data were useful to predict the groundwater level fluctuations using the tank model simulation. The results of the research could prove the mechanism of Jeruk landslide.

The results of geological investigation consisted of geological structures such as cracks and lithology (andesite breccia). As geotechnical parameters, internal friction $\phi = 18.5^\circ$ and cohesion $c = 23.50$ kPa from calibration process of consolidated drained direct shear test were properly used in the visco-plastic simulation. Then, the depth of slip surface and critical groundwater from ground surface assumed from site investigation were 7.30 m and 0.36 m, respectively. Additionally, based on the USCS classification, the soil type was low plasticity silt. Thus, the combined simulation concluded that the velocity of landslide mass ranged from 1.31×10^{-4} to 2.04×10^{-3} mm/sec. As the result, in simulating the groundwater level fluctuation using rainfall data, the tank model provided good correlation to the actual groundwater data recorded from field monitoring and its result could conduct the previous velocity of landslide triggered by rainfall.

Keywords: rainfall data, groundwater level fluctuation, tank model simulation, visco-plastic model, velocity of landslide.