

ABSTRACT

A Natural Terrain Hazard Study (NTHS) has been undertaken for the hillside above Nos. 92 to 94 Ta Shek Wu Kiu Tau, near Pat Heung, Yuen Long. This report presents the findings of the NTHS. The Study Area has a history of natural terrain landsliding. The NTHS identified eleven recent landslides and seven relict landslides within the Study Area. Nine of the landslides are open hillslope landslides and nine channelised debris flows. No deep-seated slides, rock falls or boulder falls were identified in the Study Area.

The landslides within the Study Area are relatively shallow and generally seem to have been initiated as a result of the development of perched groundwater conditions in a thin (on average about 1.5 m thick) surface layer of colluvium. The susceptibility of the natural terrain to landslides is related to three main attributes: slope angle, slope aspect in relation to the orientation of adversely orientated joints and regolith type. The NTHS has indicated a higher density of natural terrain landslides in the east part of the Study Area. The higher relative susceptibility of this area of the natural hillside is possibly due to adverse geological and hydrogeological conditions resulting from the presence of geological faults.

The NTHS has identified design landslide volumes of 400 m³ for open hillslope landslides and 550 m³ for channelised debris flows. These design volumes relate to the 'worst credible' event.

A range of mitigation methods has been considered. These include passive measures, such as signage and land resumption and active measures in the form of soil nails, deflection walls, barrier walls and check dams. The approximate costs of these various methods have been assessed and their relative merits compared.

A Quantitative Risk Assessment (QRA) has been carried out as part of the NTHS. The QRA has shown that the risk of fatalities in some of the dwellings along the toe of the hillside is unacceptable and that the risk to pedestrians and vehicle users is relatively low. The overall societal risk in terms of an F-N curve has been shown to be unacceptable. The QRA has indicated that mitigation measures are required for the dwellings at the toe of the hillside. It has been demonstrated that if measures are put in place to protect the dwellings, then the risk is reduced significantly.

It is recommended that soil nails be installed in the hillslopes above the dwellings in order to mitigate the open hillslope landslide hazard. Deflection walls should be constructed on the east and west sides of Nos. 93 and 94 Ta Shek Wu Kiu Tau, respectively to mitigate the channelised debris flow hazard in these areas. It is recommended that consideration be given to installing landslip-warning signs on the road and footpath at the toe of the hillside. A cost-benefit analysis carried out as part of this study indicates that the recommended risk mitigation measures are cost effective.