ABSTRACT

The technique of quantitative risk assessment (QRA) has been applied to evaluate landslide risk arising from sizeable man-made slopes (both old and new) registered in the New Catalogue of Slopes. The hazard includes potential landslides from man-made slopes affecting developments as well as those affecting registered squatter structures. The study quantifies the landslide risk arising from these registered man-made slopes in years 2000, 2004 and 2010, viz. before, during and after the implementation of the 10-year (2000-2010) Landslip Preventive Measures (LPM) Project. The objective of this study is to:

(a) examine the progress made in respect of the landslide risk reduction target through the 10-year LPM Project and the enhanced maintenance programme; and

(b) facilitate the formulation of future landslide prevention and mitigation programme.

This study deals with risk to life only. Other types of risk such as economic risk and social impact have not been considered. In addition, the landslide risk attributed to natural hillsides, boulders, and disturbed terrain features has not been included in this study.

The global landslide risk assessment adopted in this study includes the determination of the landslide frequency of different slope types and analysis of the corresponding potential consequences in terms of fatalities. Specific frequency models were derived from landslide records for each group of slopes (viz. old and new slopes affecting developments as well as those affecting registered squatter structures). Within each group of features, further subdivision is carried out in respect of their nature, i.e. soil cut slopes, rock cut slopes, retaining walls, and fill slopes. The failure frequency of individual slopes has been determined on the basis of slope area rather than the number of slopes. The consequence analysis gives due consideration to the characteristics of the slope features, the proximity of the affected facilities to the slope features, the size of failure and the vulnerability of the affected facilities.

The risk assessment results indicate that the existing slope safety system, in particular the 10-year LPM Project, has been effective in reducing landslide risk associated with man-made slopes in Hong Kong. Upon completion of the Project in 2010, it is estimated that the landslide risk arising from old man-made slopes will be reduced to below 25% of the level in 1977. However, given the uncertainties of the risk estimation arising from the assumptions made, a separate risk assessment should be conducted at a later stage to ascertain the risk level of old slopes in year 2010. An estimate of the risk proportion associated with different groups of slopes in 2010 has also been made.