

Technical Visit to Natural Terrain Hazard Mitigation Works at Sham Tseng San Tsuen

By Ms Celia Choy

AGS(HK) organized a technical site visit to a natural terrain site behind Sham Tseng San Tsuen on 1 March 2014.

Based on the GEO historical database, there are a number of recorded landslide incidents and natural terrain landslides in the vicinity of the area. A fatal natural terrain landslide occurred on 23 August 1999 at this area. The potential for further natural terrain landslides pose an ongoing hazard to the village at the toe of the catchment area.

Ove Arup & Partners Hong Kong Ltd was commissioned by the Geotechnical Engineering Office of Civil Engineering and Development Department under the extended LPMitP Agreement No. CE17/2008(GE) to conduct natural terrain hazard review of eight study areas for selection of Risk Mitigation Study Areas and Risk Assessment Study Areas. The conclusions of the study recommended that prevention and mitigation works for the natural hillsides were necessary at Sham Tseng San Tsuen, Hong Lok Yuen and Wu Uk. The Construction contract was commenced in October 2011 by Marshall-Karson Construction and Engineers Limited under Works Contract No. GE/2010/23.



Group photo of AGS(HK) attendees during the natural terrain hazard mitigation site visit

The AGS(HK) visitors were extremely grateful to Stuart Millis of Arup for leading the visit and sharing his extensive knowledge and experience in NTHM works. Stuart provided attendees with in depth explanations of the ground investigation planning, geological and geomorphological mapping, analysis methods for rockfall and debris mobility, and the pros and cons of different NTHM design solutions. Based on the natural terrain hazard study, Open Hillside Landslides (OHL) with high susceptibility were identified in seven catchments with boulders or rockfalls susceptible on all of the terrain units. The design landslide volume for Channelised Debris Flows (CDF) were determined to be 1300m³ based on historical landslide data. The proposed mitigation works proposed included rigid concrete baffles and check dams to protect against CDF, flexible barriers to protect against OHL and CDF, soil nailing and concrete buttresses for localized stabilization works, and landscaping works to blend the mitigation works with the surrounding environment.

Stuart also pointed to GEO's new technical guidance note (TGN 36) which gives guidance on estimating the credible failure volume for the design life of the mitigation structure. The design failure volume may adopt a reduced return period of 100 years with compatible rheological runout parameters instead of adopting a Worst Credible Event of 1 in 1000 years based on the previous criterion in GEO Report No. 138. The resulting mitigation measures are less bulky and the structures would inevitably create less visual impact to the natural environment.

The attendees were able to view the ongoing construction of circular concrete baffles, soil nailing works, concrete check dam and flexible barrier fences on site. Furthermore, construction planning and good site management are particularly important in order to overcome site constraints particular to NTHM such as remoteness of the site, and limitation of space in carrying out the works on the steep hilly terrain.

AGS(HK) would like express sincere gratitude to Stuart Millis and Ove Arup & Partners for arranging this interesting site visit to this project.



Construction of concrete baffle, concrete check dam and flexible barrier fence at steep terrain



Installation of soil nails instead of mini piles to resolve the site constraint with limited space