

## **Research & Development Report No. RD 1072**

### **Study on Potential Boulder Laden Flows adjacent to Engineered Channels**

#### Executive Summary

A severe flash flood occurred in Sha Po Tsai Village in the upper Tai Po River on 22 July 2010 and resulted in one casualty and considerable property damages. An Independent Review was carried out and recommended to further study the behaviour of the boulder-laden debris flow and a literature study on the boulder-laden debris flow for upland rivers was therefore required. On 8 February 2013, AECOM Asia Co. Ltd. was commissioned by DSD to undertake a review of Drainage Master Plan in Tai Po to carry out a literature study on boulder-laden debris flow and to recommend an analysis approach for debris flow study.

AECOM and Prof. SHIEH Chjeng-Lun with his team in Taiwan formed a team to carry out a review on boulder-laden debris flow. The review analyses the characteristics of debris flow incident at upper Tai Po River. The review also covers the following issues in overseas, particularly in Taiwan.

- Methodology of debris flow hazard analysis
- Debris flow hazard management
- Debris flow hazard mitigation approaches
- Strategies for debris flow hazard management

Regarding the situation in HK, there are currently no established principles on the prediction of the occurrence of debris flow in river channel and estimation of its impact on drainage capacity. There are also no prevention measures for debris flow provided. The methodology for future debris flow hazard management in HK is therefore necessary and suggested as follows.

- 1) Review All River Channels in Hong Kong to Identify Risk of Debris Flow
- 2) Monitor River Reaches with Potential Boulder Movements to Verify Risk
- 3) Conduct Detailed Site Investigation and Modelling for High Risk Locations
- 4) Establish an Empirical Risk Identification Method Specifically for HK

However, it is considered that extensive resources are required to implement the methodology. It is also not appropriate to directly adopt overseas approach without validation. In the situation in HK with only one past case of debris flow incident, it is difficult to justify the cost-effectiveness to implement the above methodology for all river channels in HK.

As a practical implementation strategy, it is recommended to adopt a Keep-in-view Approach for the debris flow hazard management in HK. Firstly, regularly monitoring and review of some locations with possible debris flow hazard to verify the occurrence of debris flow should be carried out. In the case of further debris flow occurred at the selected locations, additional information could be collected through monitoring of such locations for validation of Taiwan's approach of identifying potential debris flow hazard. According to the catchment characteristics, five possible locations, namely Wong Chuk Yeung, Big Wave Bay, Sha Tin Tau, Sam Dip Tam and Lui Kung Tin, are selected and recommended for monitoring debris flow hazard by verifying the changes of morphological condition of the terrain, which could be achieved through survey by Unmanned Aerial Vehicle (UAV), review of aerial photos, as well as site inspection.