Information Note 04/2025 **August 2025**

The Landslip Prevention and Mitigation Programme

Key Messages: The Geotechnical Engineering Office (GEO) has been implementing the Landslip Prevention and Mitigation Programme (LPMitP) to systematically deal with the landslide risk of man-made slopes and natural hillsides since 2010. To cope with the increasing landslide risk due to population growth, slope degradation and more frequent extreme weather events, the Government needs to adopt a more pre-emptive and strategic approach. Therefore, the annual output targets of the LPMitP will be progressively increased starting from 2025: (i) to carry out upgrading works for substandard government man-made slopes from 150 to 200; (ii) to conduct safety-screening studies for private man-made slopes from 100 to 130; and (iii) to implement risk mitigation works for vulnerable natural hillside catchments from 30 to 40, to continuously contain landslide risks to within an "As Low As Reasonably Practicable" (ALARP) level[1].

Introduction

The government's concerted effort in the past 40 years has brought about substantial improvement in slope safety and a significant reduction in the number of landslide fatalities in the past couple of decades. Under the Landslip Preventive Measures Programme (LPMP), which was completed in 2010, about 4 600 government man-made slopes were upgraded. Safety-screening studies for about 5 200 private man-made slopes were conducted and among them, Dangerous Hillside (DH) Orders for about 2 600 potentially substandard slopes were issued to request private owners to investigate those slopes and carry out the necessary upgrading works. All the substandard pre-1977 man-made slopes affecting multi-storey buildings and major roads, which posed the highest risk to life and hence deserved the highest priority for action, were already upgraded under the LPMP. The overall landslide risk in Hong Kong has been substantially reduced to less than one-fourth of the risk level in 1977, reaching an ALARP level that is commensurate with the international best practice in risk management. The strategies for reducing landslide risk from man-made slopes in Hong Kong are outlined in Annex A.

However, upon completion of the LPMP in 2010, there were still remaining landslide risks of man-made slopes and natural hillsides that posed a hazard to the community. If the investment in slope safety was not maintained, landslide risk would progressively increase with time due to population growth, slope degradation, and more frequent extreme weather events arising from climate change. In addition to risk-to-life, this would cause significant economic losses and social disruption as a result of a building evacuation, road blockages or even blockages of sole vehicular access to residential areas that will significantly affect the daily life of the public due to landslides, thereby compromising public safety and sustainable development of the society and affect the Hong Kong's image as a modern smart city and tourist hub.

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[1] The landslide risk cannot be completely eliminated, and the government needs to strike a balance between the level of risk and the cost. The "As Low As Reasonably Practicable" (ALARP) level means that the risk should be reduced as much as possible until the cost of any further risk mitigation measures is grossly disproportionate to the benefit gained based on the cost-benefit analysis.

The LPMitP, which has received support from the Legislative Council, was launched in 2010. Subject to financial and manpower resources, the annual output targets of the LPMitP will be progressively increased starting from 2025: (i) to carry out upgrading works for substandard government man-made slopes from 150 to 200; (ii) to conduct safety-screening studies for private man-made slopes from 100 to 130; and (iii) to implement risk mitigation works for vulnerable natural hillside catchments from 30 to 40, to contain landslide risks in Hong Kong to within an "ALARP" level in the long term. The annual outputs of slope upgrading works for government man-made slopes, safety screening studies for private man-made slopes and risk mitigation works for natural hillside catchments from 2011 to 2024 under the implementation of LPMitP are shown in Annex B.

Man-made Slopes

There are about 61 000 registered man-made slopes in Hong Kong, of which about 45 000 are government man-made slopes and about 16 000 are private man-made slopes. Among all government man-made slopes, there are about 17 000 slopes with relatively low potential impacts (e.g. locating near lightly used access roads, remote places and country parks); there are about 15 000 slopes with relatively high potential impacts (e.g. locating near residential buildings, hospitals and schools) and moderate potential impacts (e.g. locating near major infrastructures, heavily used roads and footpaths) that have been upgraded or checked up to standard in the past years. Under the LPMitP, the GEO will deal with about 13 000 remaining man-made slopes with moderate potential impacts. At present, GEO has completed safety-screening studies for about 6 500 private man-made slopes.

Government Slopes

All substandard government slopes will be systematically upgraded to the current safety standards under the LPMitP. The GEO identifies potentially problematic man-made slopes, such as those at a more advanced state of degradation with signs of distress or past instabilities, for follow-up action according to a risk-based priority ranking system. Besides slope safety, the GEO also accords high priority to slope aesthetics. The GEO has pledged to landscape every slope to be upgraded under the LPMitP, with specialist input from landscape architects. Vegetation cover is used whenever possible in slope upgrading works. In general, hard surface cover, such as shotcrete, is only used as a last resort when other techniques have been thoroughly explored and found not practical. Even when the use of a hardcover is unavoidable on slope safety grounds, measures will be implemented to improve the appearance of slopes, e.g. use of planters, stone pitching, graphic design and colouring.

Private Slopes

Under the LPMitP, private man-made slopes are selected for safety-screening studies. Where prima facie evidence is established that a private slope is dangerous or liable to become dangerous, a statutory DH Order will be served by the Buildings Department on the slope owners upon the recommendation of the GEO. The Order requires the owners to carry out an investigation and the necessary upgrading works to the slope. A DH Order may also be issued following a landslide or as a result of other stability concerns (e.g. observation of significant signs of distress) brought to the attention of the GEO.

Natural Hillside Catchments

The GEO identified about 3300 vulnerable natural hillside catchments with a known history of failure and close to existing buildings and important transport corridors from the interpretation of historical low-altitude aerial photographs. These called for expanded efforts under the LPMitP to systematically combat the risk pursuant to the "react-to-known-hazard" approach.

A risk-based priority ranking system has been developed to select the most deserving natural hillside catchments for natural terrain hazard studies. Mitigation measures will be implemented to those hillside catchments confirmed to be posing known hazards to existing developments. However, unlike man-made slopes, it is often impractical, costly and environmentally undesirable to carry out extensive slope stabilisation works on natural hillsides. Instead, natural terrain landslide risk can be mitigated in a more cost-effective manner through mitigation measures such as rigid and flexible debris barriers, which are commonly adopted in other countries.

Landslide Studies

Systematic studies of landslides by the GEO improves the understanding of slope failures in Hong Kong, provides new ideas for reducing landslide risk and innovative design of slopes, and assists in the LPMitP by identifying areas for improved practice in slope design, construction and maintenance. Further information about systematic landslide studies by the GEO can be found in GEO Information Note 02/2025 on Landslides Studies by the Geotechnical Engineering Office.

Progress

The number of man-made slopes upgraded and hillside catchments with landslip prevention and mitigation works completed under the LPMitP can be found in the report on Landslip Prevention and Mitigation Studies and Works Carried out by the Geotechnical Engineering Office, which is posted on the Civil Engineering and Development Department website (https://www.cedd.gov.hk/eng/our-projects/landslip/index.html). Information on individual man-made slopes and hillside catchments can be found on the Hong Kong Slope Safety website (https://hkss.cedd.gov.hk).

Geotechnical Engineering Office
Civil Engineering and Development Department
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Annex A

Strategies of Reducing Landslide Risk from Man-Made Slopes in Hong Kong

Background

Before the establishment of the GEO in 1977, geotechnical input on site formation works was very limited. The rapid development of Hong Kong in the 1960s and early 1970s has brought about a large stock of potentially substandard man-made slopes. After the GEO was established, the Government made concerted efforts to deal with those existing substandard man-made slopes that pose a high risk-to-life to the community under the LPM Programme, which was launched in 1977 and completed in 2010. The overall landslide risk in Hong Kong has been substantially reduced to less than one-fourth of the risk level in 1977. After that, the Government launched the LPMitP to contain landslide risk to within an "As Low As Reasonably Practicable" level in the long term.

Reduction of Landslide Risk from Man-made Slopes

The following strategies have been adopted to reduce landslide risk from man-made slopes:

(i) Upgrading Substandard Government Slopes and Safety-screening of Private Slopes under the LPM/LPMit Programme

Under the LPMP / LPMitP, substandard government slopes are systematically upgraded or assessed as being up to the prevailing safety standards. Private slopes are subjected to safety-screening studies, and the Buildings Department is recommended to issue a Dangerous Hillside Order under the Buildings Ordinance based on the Study findings. The responsible private owners are required to undertake investigations and necessary upgrading works.

A risk-based priority ranking system has been developed by the GEO to prioritise and select the most deserving man-made slopes for studies and implementation of necessary upgrading works. The existing system primarily gives priority to substandard man-made slopes with high consequences to life in the event of landslides, which will be further enhanced to strategically deal with the landslide risk arising from substandard man-made slopes of potentially high social impact (e.g. slopes abutting sole vehicular access to residential areas).

(ii) Preventive Maintenance of Government Slopes

Regular and proper maintenance reduces the rate of deterioration of slopes. In addition to regular maintenance, the responsible slope maintenance departments also carry out routine Engineer Inspections and preventive maintenance works to improve the stability of existing slopes effectively. The GEO provides assistance to the maintenance departments in setting priorities in their preventive maintenance works.

(iii) Upgrading Existing Substandard Government Slopes as Part of New Public Works Projects

Government departments adopt an integrated approach to government projects, road projects in

particular, to ensure that existing substandard slopes affecting or affected by these projects are upgraded as part of the projects.

(iv) Geotechnical Control of New Man-made Slopes

The GEO exercises geotechnical control on new development works and checks the designs of all new slopes and retaining walls to ensure that they meet current safety standards.

(v) Publicity and Education Campaigns

The GEO holds publicity and education campaigns to promote a better understanding of the slope safety problems, to remind the public of precautionary measures during Landslip Warning, and to urge private owners to maintain their slopes. The Community Advisory & Education Section of the GEO also provides advisory services to assist private owners in fulfilling their duties in maintaining their slopes properly and in the discharge of DH Orders.

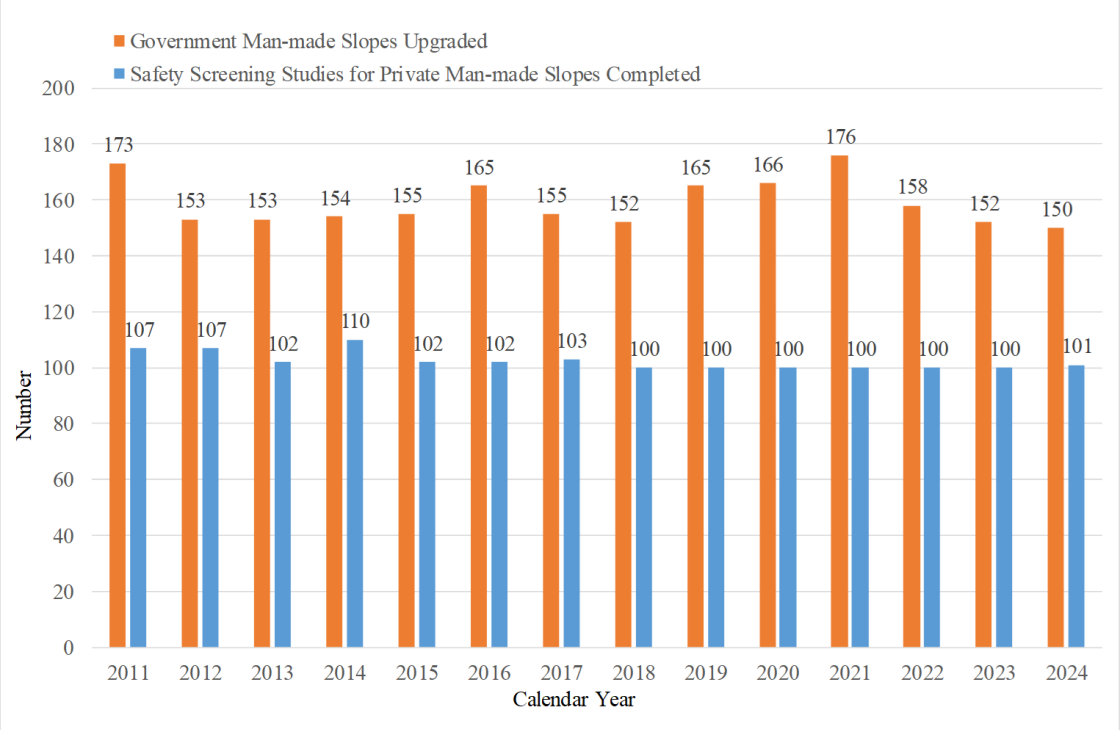

Figure 1 – Annual Outputs of Upgrading Works for Government Man-made Slopes and Safety-screening Studies for Private Man-made Slopes under the LPMitP from 2011 to 2024

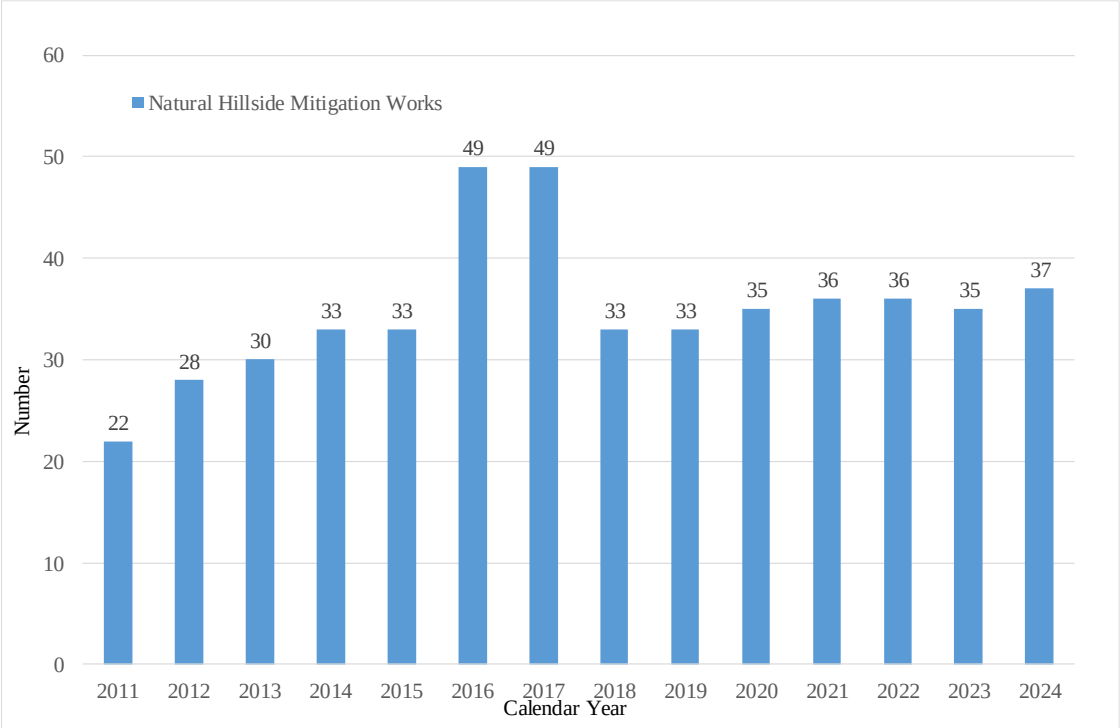

Figure 2 – Annual Outputs of Natural Hillside Mitigation Works under the LPMitP from 2011 to 2024