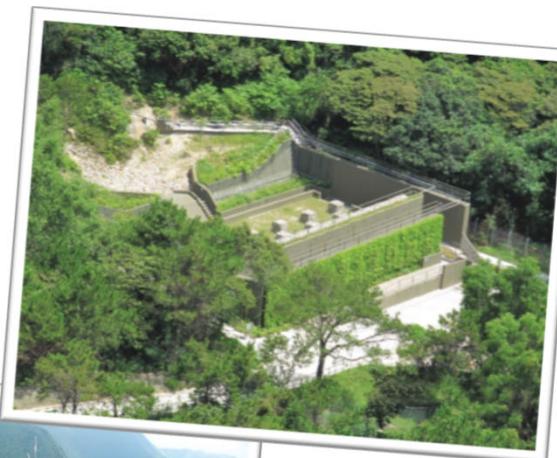


**Senior Secondary Enriching Knowledge for the Geography Curriculum: (5) Dynamic Earth Series –
Geology of Hong Kong and Slope Safety System**

高中地理課程知識增益：(5) 動態的地球系列 – 香港地質及斜坡安全系統

Slope Safety System of Hong Kong 香港斜坡安全系統



土木工程拓展署

土力工程處

Geotechnical Engineering Office

Civil Engineering and Development Department

**Speaker: Ms Irene Yu
(Geotechnical Engineer)**

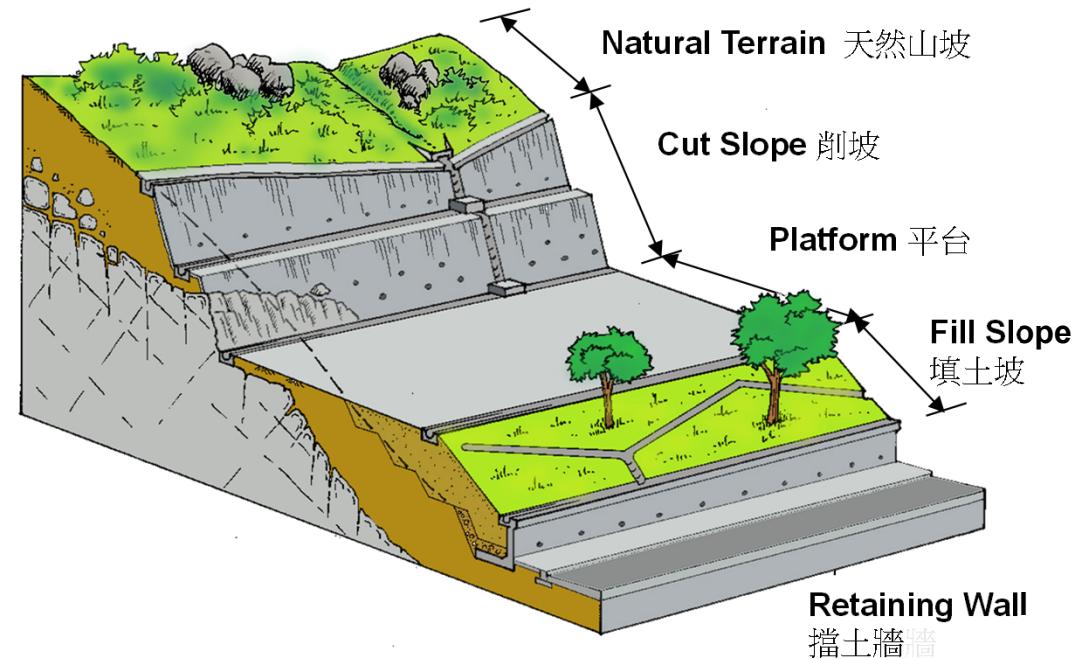
講者: 余珍瑩女士 (土力工程師)

Contents 內容

- History of Landslides 山泥傾瀉的歷史
- Common Types of Landslides 山泥傾瀉的類型
- Common Causes of Landslides 山泥傾瀉的成因
- Hong Kong Slope Safety System 香港斜坡安全系統

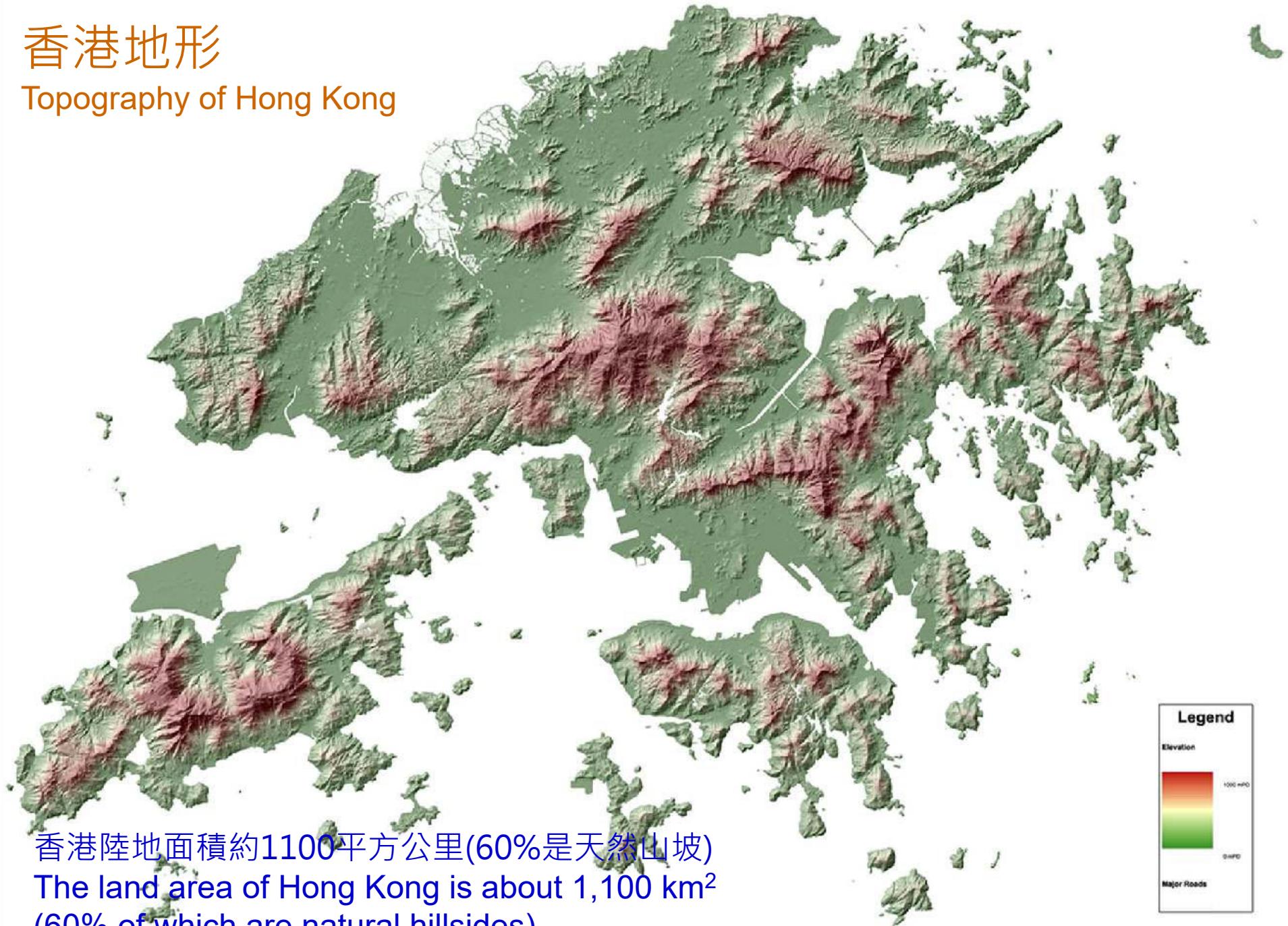
天然山坡 / 人造斜坡

Natural Hillside / Man-made Slope



香港地形

Topography of Hong Kong

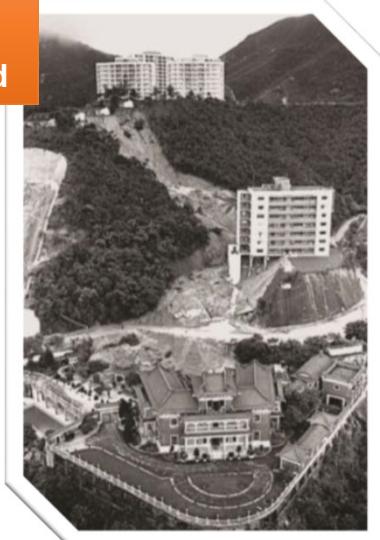




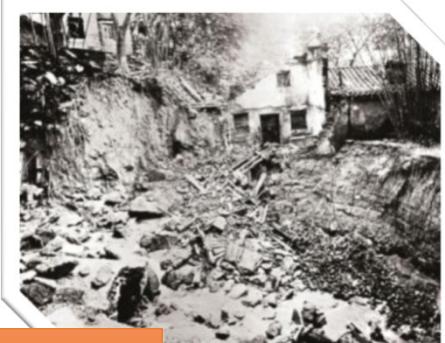
平均每年接獲300宗山泥傾瀉報告
An average of 300 reported landslide cases yearly



1966
司徒拔道
Stubbs Road



1889
己連拿利
Glenealy



1926
山道
Hill Road



山崩土淹

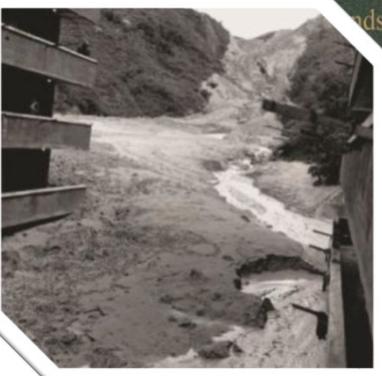
1970
司徒拔道
Stubbs Road



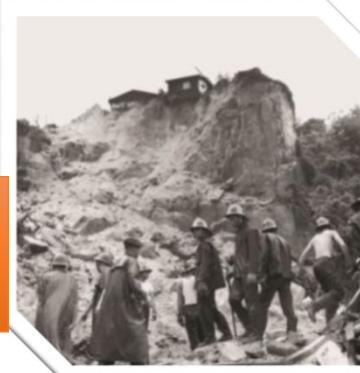
When Hillsides Collapse
Landslides in Hong Kong



1964
翠屏道
Tsui Ping Road



1968
馬山村
Ma Shan Village



「六一八大災難」
“618 Disaster”



18.6.1972

秀茂坪山泥傾瀉 (71人死亡)
Sau Mau Ping Landslide(71 dead)

「六一八大災難」
“618 Disaster”



18.6.1972 晚上
寶珊道山泥傾瀉
(67人死亡)

Po Shan Road Landslide
(67 dead)

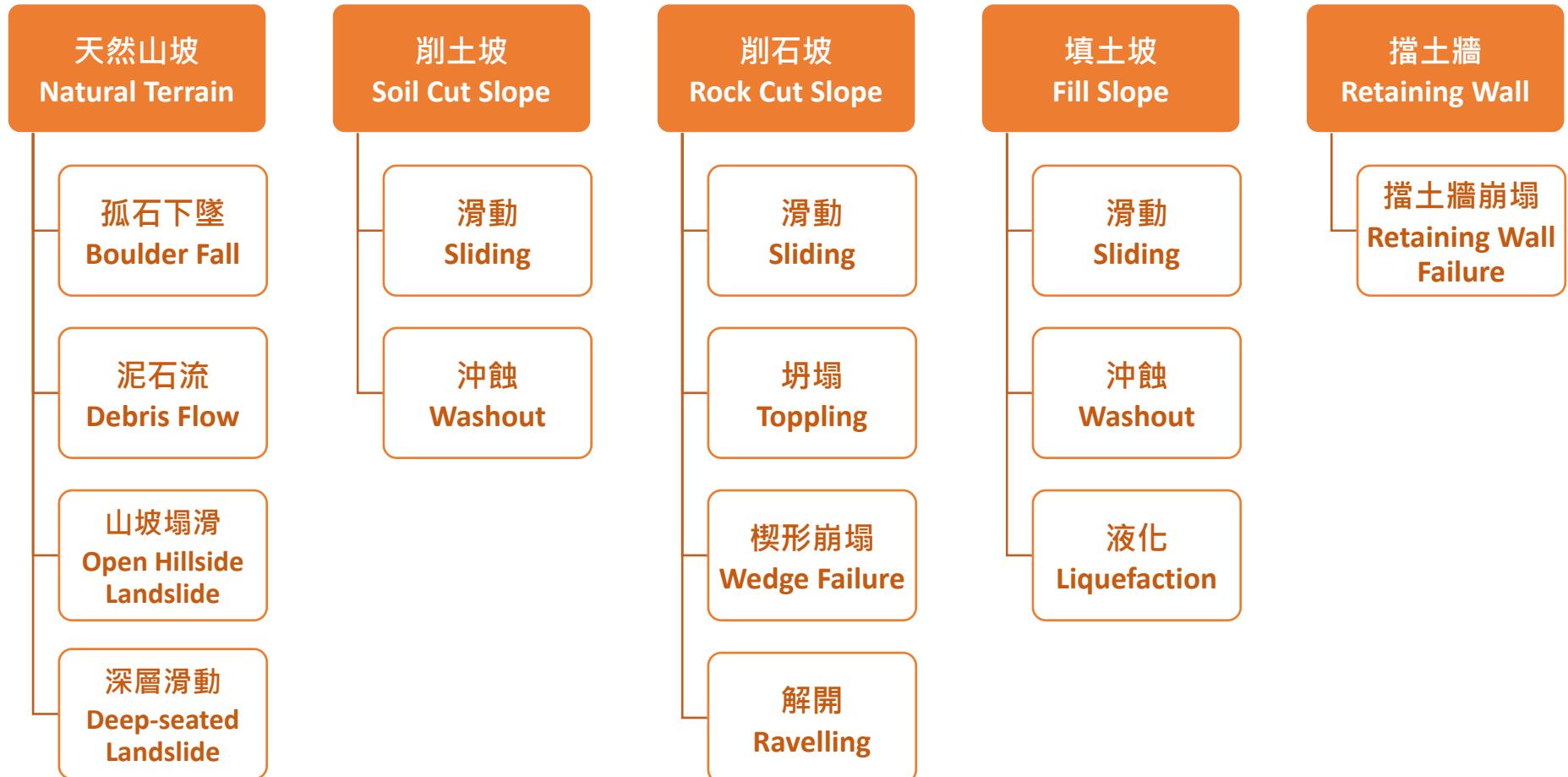


山泥傾瀉的類型

Common Types of Landslides

斜坡崩塌的形式

Failure Mechanisms of Slopes

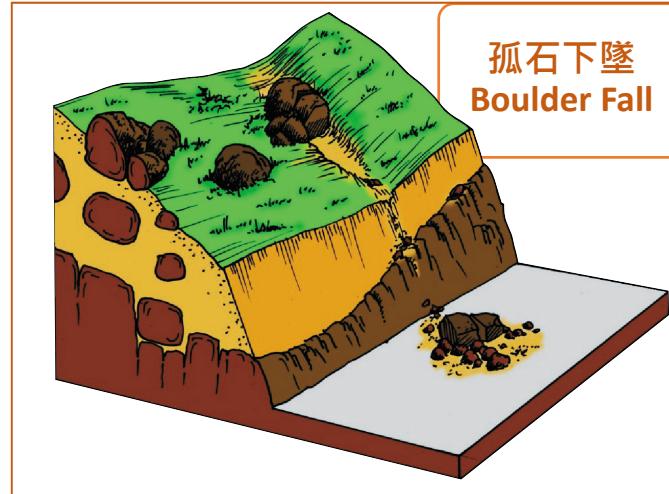


斜坡崩塌的形式

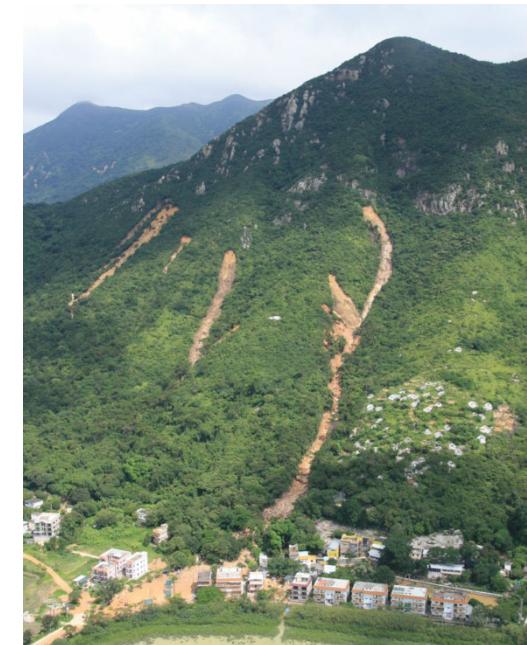
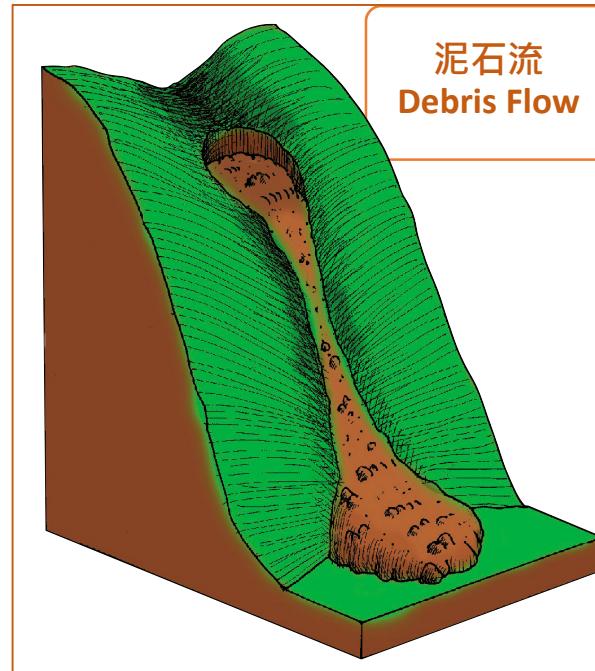
Failure Mechanisms of Slopes



山坡塌滑
Open Hillside Landslide



鯉魚門 - 孤石下墜
Boulder fall at Lei Yue Mun 1995



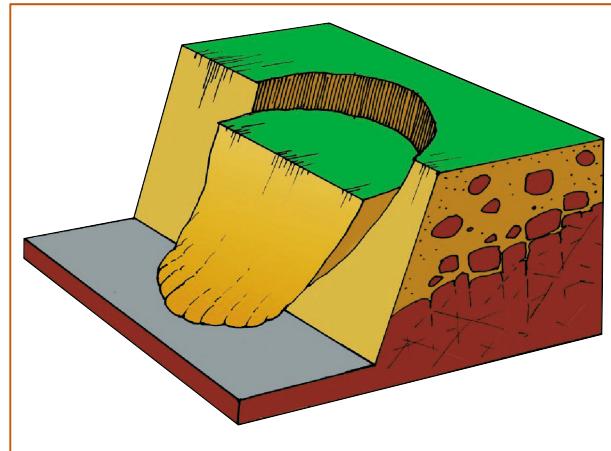
大嶼山 - 泥石流
Debris flow at Lantau , 2008

斜坡崩塌的形式

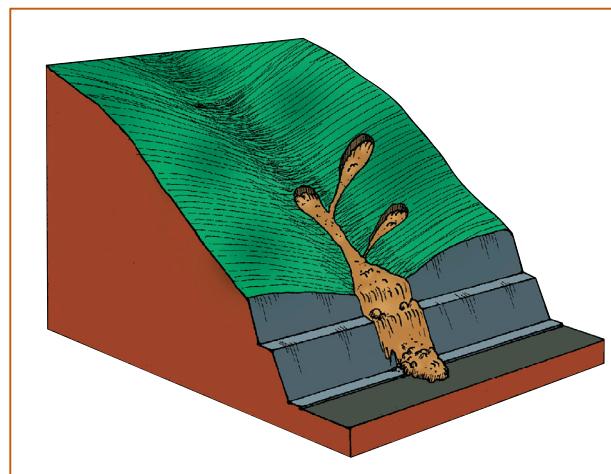
Failure Mechanisms of Slopes

削土坡
Soil Cut Slope

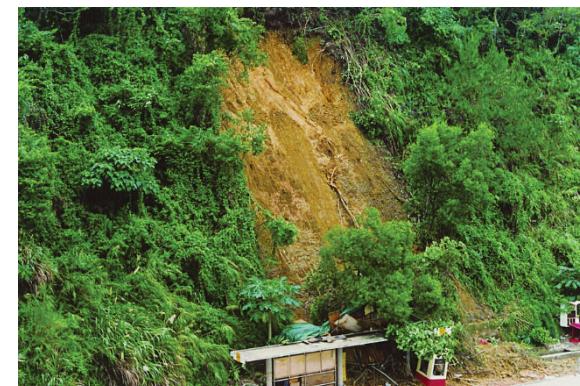
滑動
Sliding



沖蝕
Washout



翡翠道山泥傾瀉
Landslide at Fei Tsui Road
1995



象山邨山泥傾瀉
Landslide at Cheung Shan Estate
1993

斜坡崩塌的形式

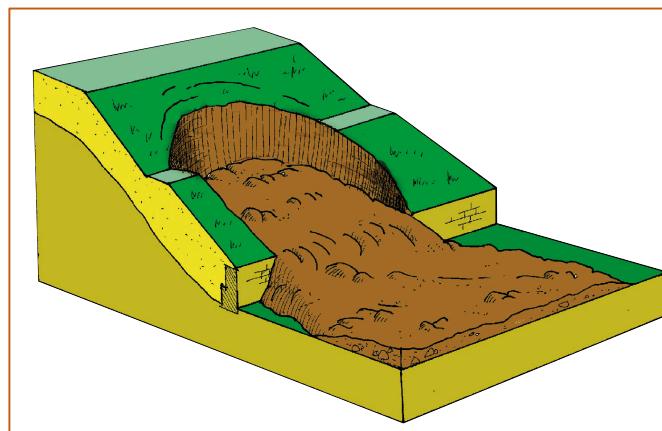
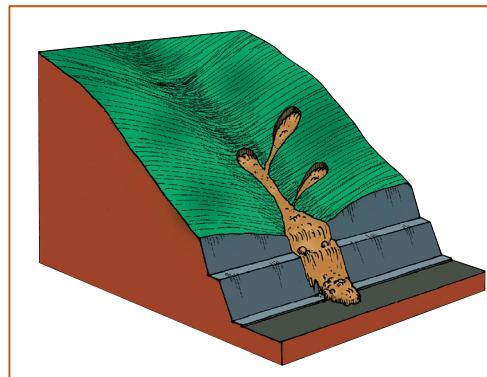
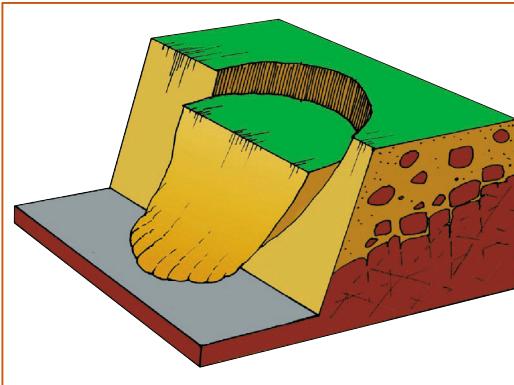
Failure Mechanisms of Slopes

填土坡
Fill Slope

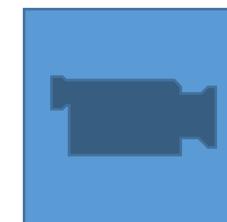
滑動
Sliding

沖蝕
Washout

液化
Liquefaction



麗都灣山泥傾瀉
Landslide at Lido Beach
1997



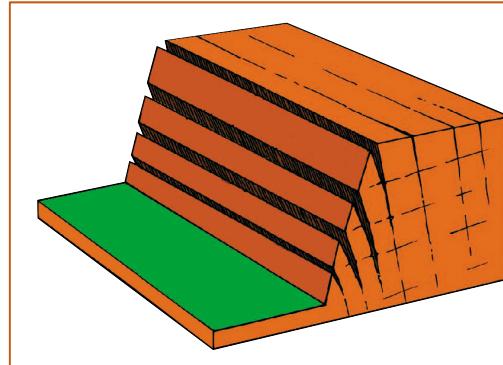
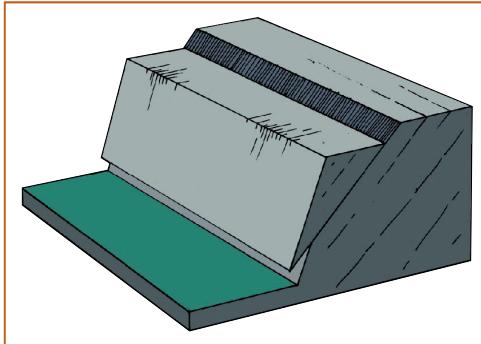
斜坡崩塌的形式

Failure Mechanisms of Slopes

削石坡
Rock Cut Slope

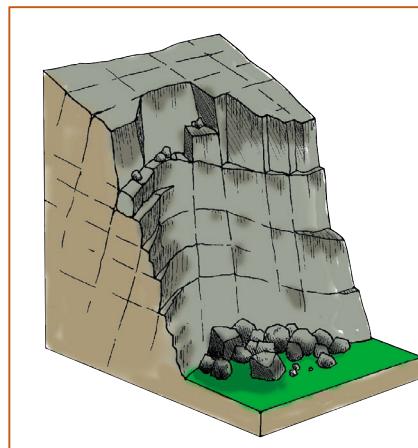
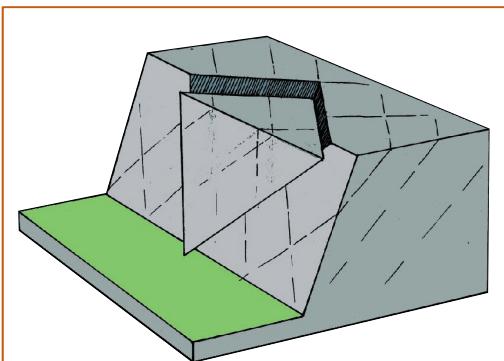
滑動
Sliding

坍塌
Toppling



楔形崩塌
Wedge Failure

解開
Ravelling



屯門公路 - 孤石墜下
Boulder Fall at Tuen
Mun Highway 1995



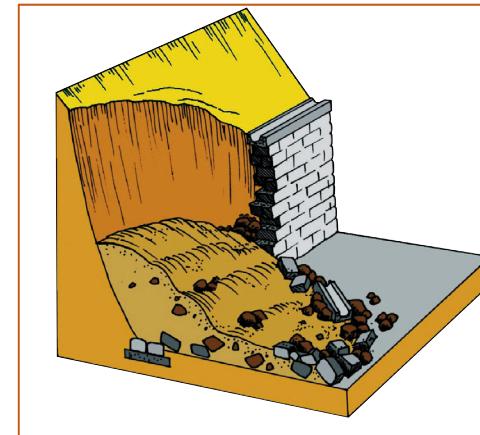
觀塘 - 削石坡崩塌
Rock cut slope failure at
Kwun Tong 1989

斜坡崩塌的形式

Failure Mechanisms of Slopes

擋土牆
Retaining Wall

擋土牆崩塌
Retaining Wall
Failure



觀龍樓 - 擋土牆崩塌
Retaining wall failure at Kwun Lung Lau
1994

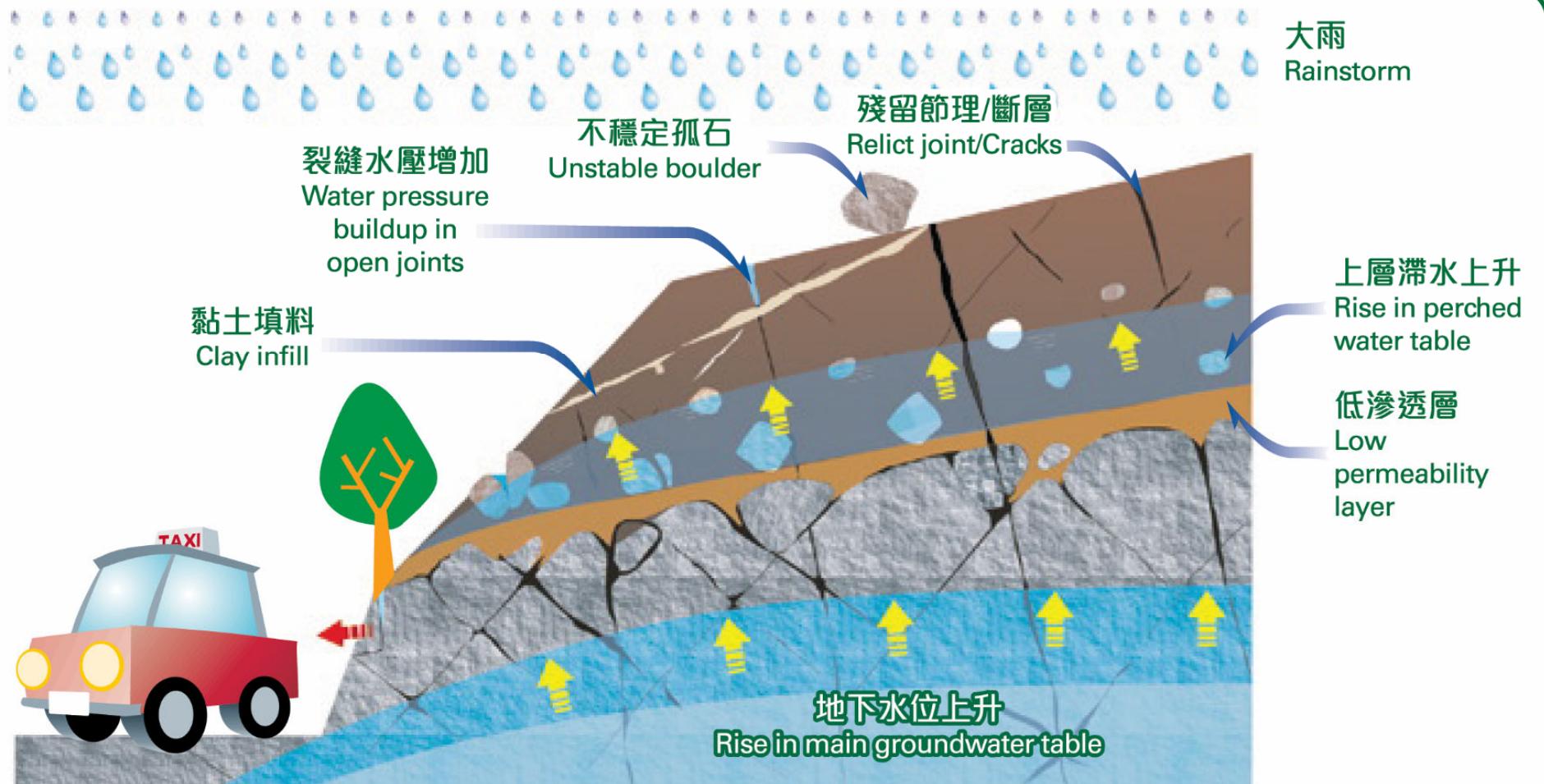
山泥傾瀉的成因

Causes of Landslides

導致山泥傾瀉的因素

Causes of Landslides

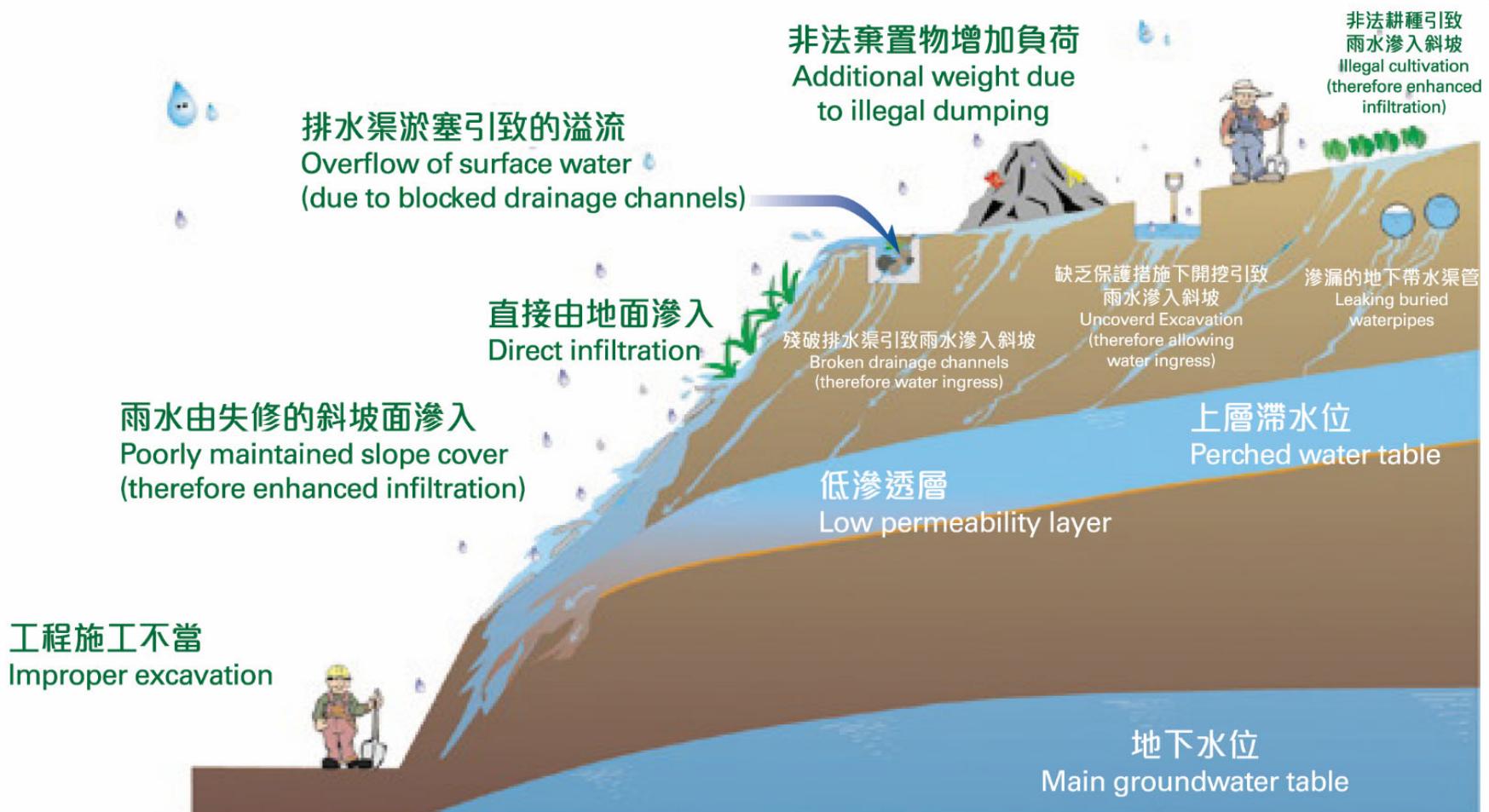
天然因素 Acts of Nature



導致山泥傾瀉的因素

Causes of Landslides

人為因素 Acts of Mankind

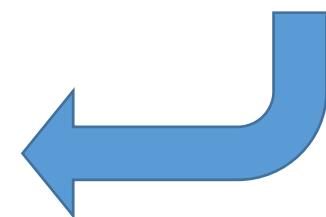
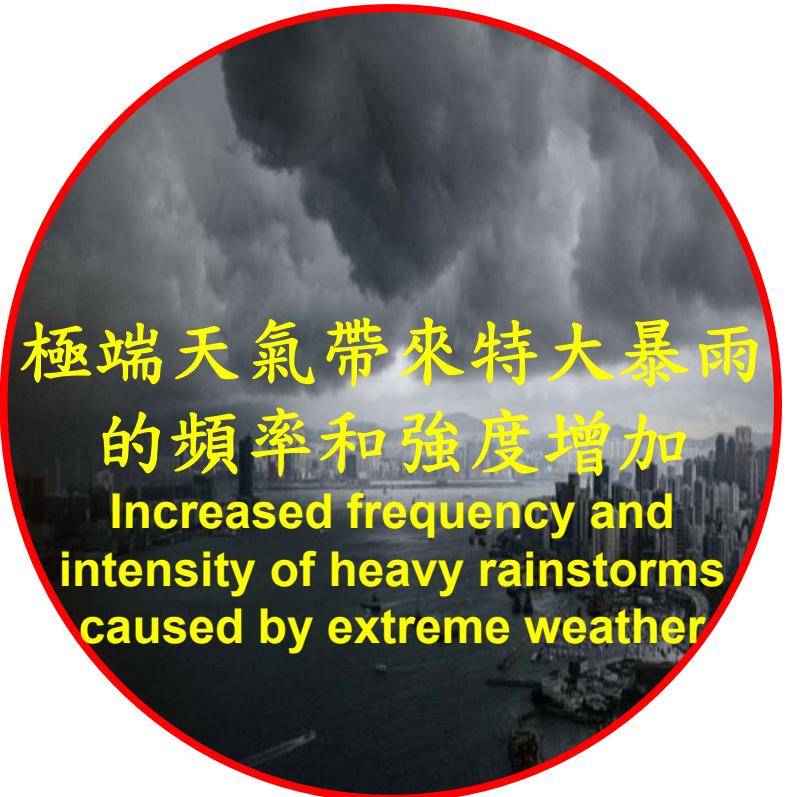


導致山泥傾瀉的因素

Causes of Landslides

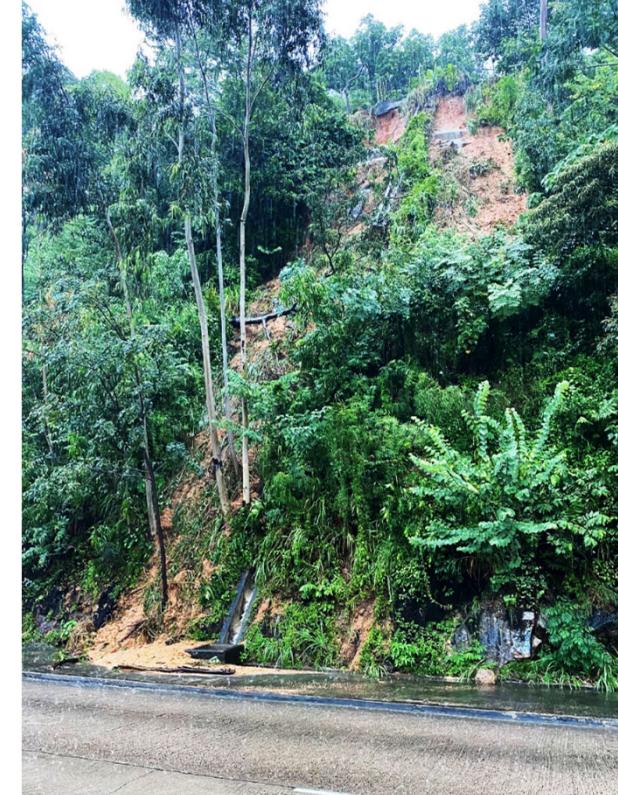
氣候變化的影響

Influence of Climate Change



導致山泥傾瀉的因素

Causes of Landslides



香港山泥傾瀉不可能是零風險

The risk of landslide in Hong Kong cannot be **ZERO**



大嶼山嶼南路近上長沙泳灘
山泥傾瀉警告及紅色暴雨
超過2,000立方米山泥塌下
嶼南路一度全線封閉及的士站損毀



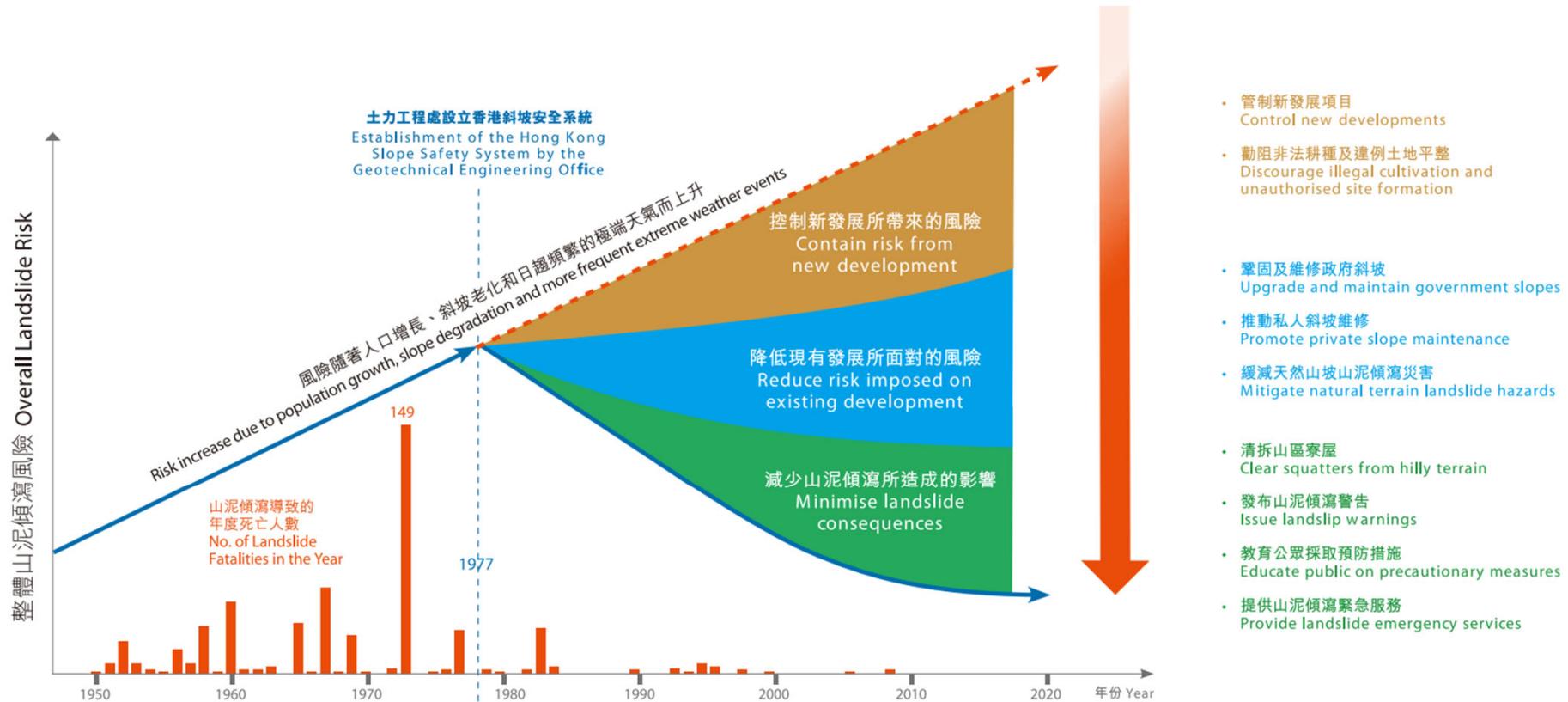
②
山頂道
超過2,000立方米山泥塌下
來往交通受阻達一星期

香港斜坡安全系統

Hong Kong Slope Safety System

香港斜坡安全系統

Hong Kong Slope Safety System



長遠防治山泥傾瀉計劃

Landslip Prevention and Mitigation
Programme (LPMitP)

計劃的每年目標包括：

The annual targets of the LPMitP are :



- 鞏固150幅不合符標準的政府人造斜坡；
- 為30幅有風險的天然山坡進行研究及施行必需的風險緩減工程；及
- 為100幅私人人造斜坡進行安全篩選研究。
- To upgrade 150 substandard government man-made slopes;
- To study and to implement necessary risk mitigation works for 30 vulnerable natural hillside catchments; and
- To conduct safety-screening studies for 100 private man-made slopes.

防止與緩減

Prevention vs Mitigation

防止 Prevention

- 防止山泥傾瀉發生
- Prevent landslide from happening
- 使用鞏固措施
- Use stabilization measures
- 用於人造斜坡非常有效
- Effective for man-made slopes

緩減 Mitigation

- 緩減後果 (山泥傾瀉仍會發生)
- Minimizing consequence (landslides still occur)
- 使用緩減措施
- Use mitigation measures
- 用於天然山坡具經濟效益
- Cost effective for natural terrain

鞏固措施例子

Examples of Preventive Measures



泥釘 Soil nailing



扶牆 Buttress



附加表牆 Skin Wall



石網 Rock mesh

鞏固措施例子

Examples of Preventive Measures



排水溝 Drainage channel



排水斜管 Raking drain

緩減措施例子

Examples of Mitigation Measures



泥石壩 Check dam



柔性防護網 Flexible barrier



石籠網屏障 Gabion barrier



抵擋柱 Baffles

泥石壩有效阻擋天然山坡上的山泥傾瀉

Checkdam Effectively Blocked Landslides Debris on Natural Hillside

薄扶林 明德村
Middleton Towers,
Pokfulam

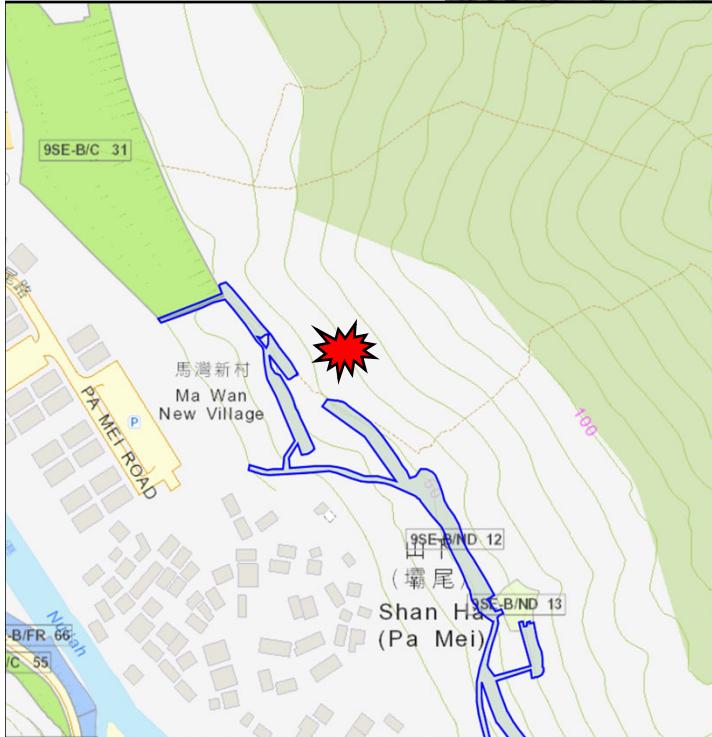


柔性防護網有效阻擋天然山坡上的山泥傾瀉

Flexible barriers Effectively Blocked Landslides Debris from Natural Hillside

壩尾 東涌

Pa Mei, Tung Chung



提升緊急應變能力

■ 「智能泥石壩」



- 全天候監測泥石壩的狀況
- 當發生泥石堆積時，透過流動應用程式即時通知本處
- 預警可能發生重大泥石流，從而及時通報相關部門和市民。

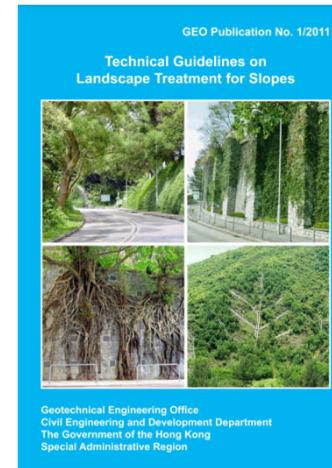
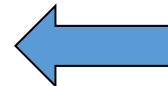
改善斜坡外觀

Landscape Treatment of Slopes



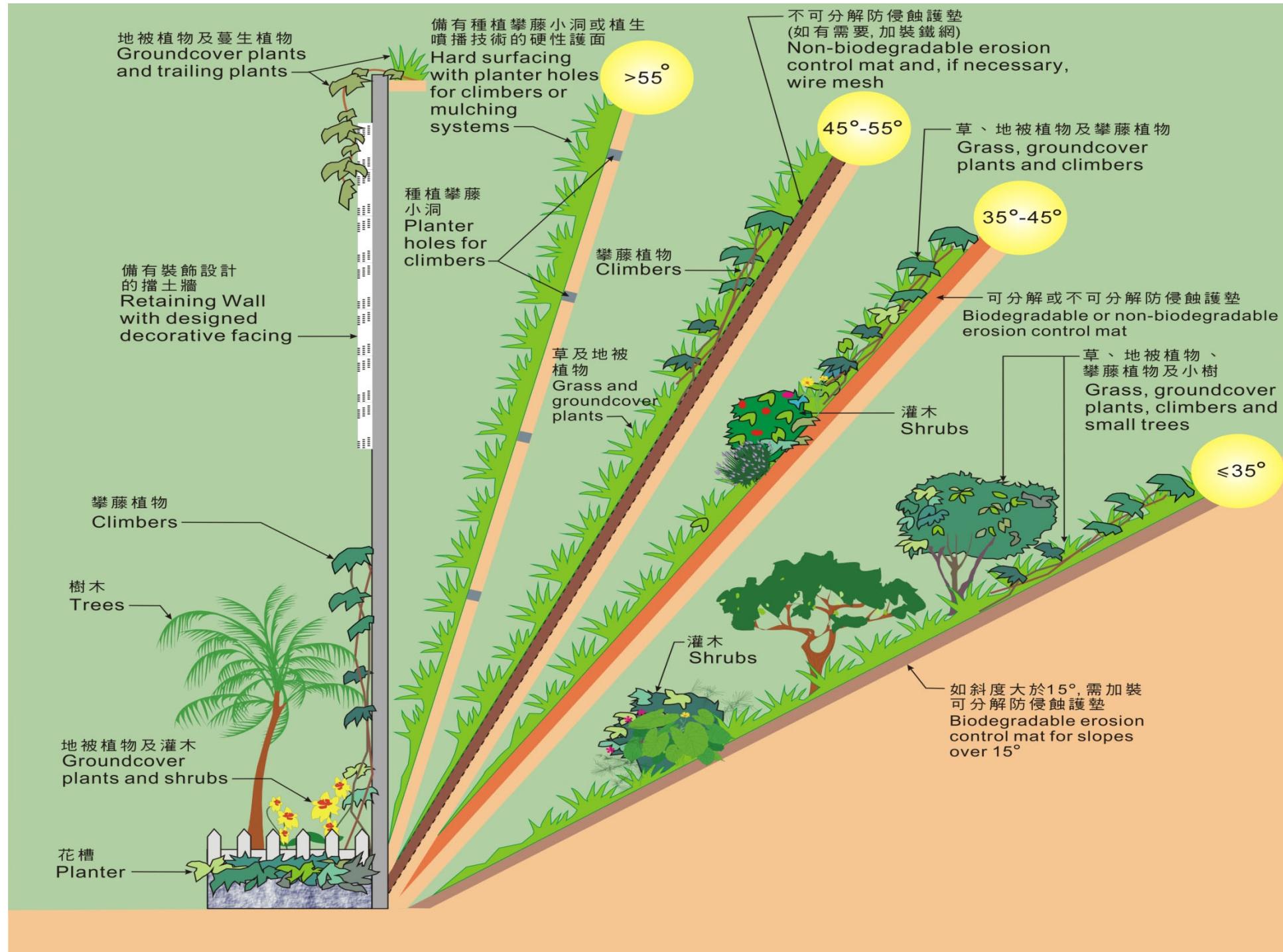
研究綠化技術
Research of greening technology

進行工地試驗
Conducting site trials



美化斜坡
Landscape treatment of slope

制定指引
Establishing guidelines







寶雲道 – 崩塌殘痕修復
Bowen Road – Recovery of Landslide scar



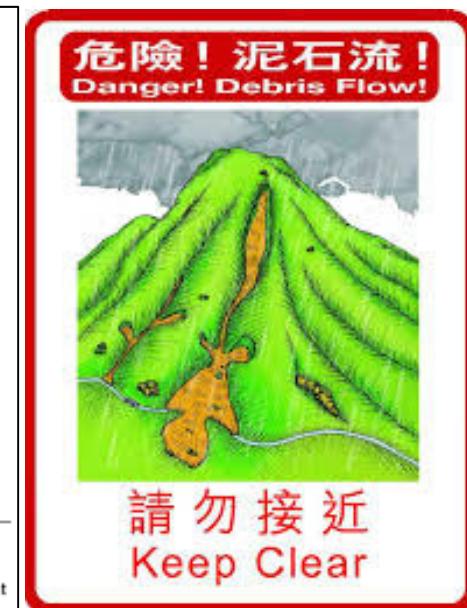
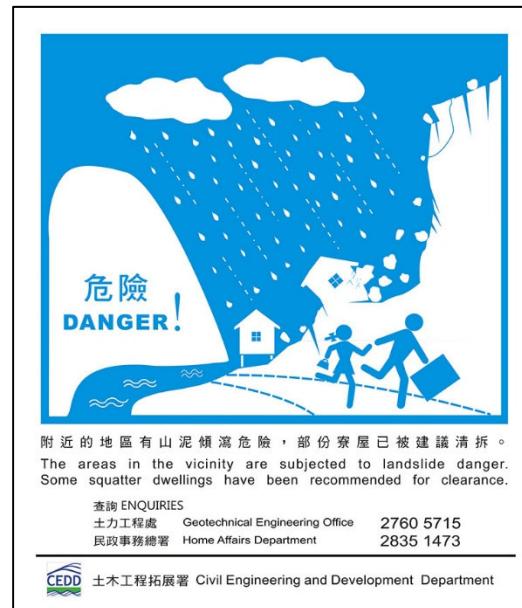
發布山泥傾瀉警告

Issuance Landslip Warnings

山泥傾瀉警報系統

Landslip warning system

- 提醒市民注意潛在的山泥傾瀉危險
To alert the public to potential landslide danger



提供山泥傾瀉緊急服務

Provision of Landslide Emergency Services

全年廿四小時的緊急服務

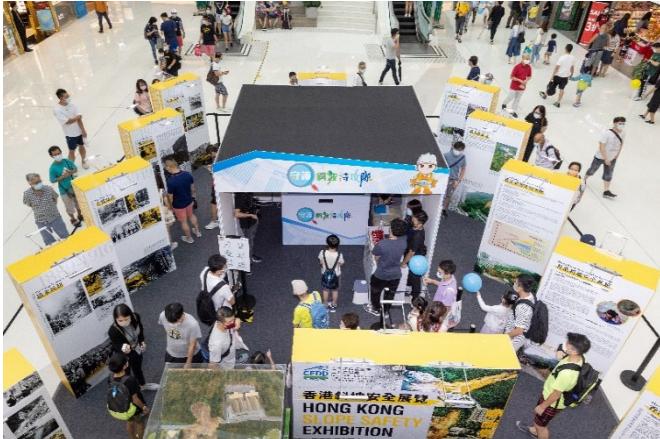
24-hour year-round emergency services

- 保障公眾免受山泥傾瀉威脅
To protect the general public from landslide hazards
- 盡快恢復受影響的公共設施
To restore public services disrupted by landslides as soon as possible



公眾教育活動

Public Education Activities



斜坡安全巡迴展覽和講座
Roving exhibitions and seminars



山泥傾瀉科技展學館導賞參觀
Po Shan Tunnel – Landslide Sci-tech Chamber guided tour



校際工作坊及比賽
Inter-school workshops and competitions



校園大使計劃
School Ambassador Programme

公眾教育活動 (疫情期間的安排)

Public Education Activities (Arrangement during epidemic)



網上斜坡保養維修講座
Online slope maintenance seminar

鄰舍輔導會茶果嶺中心
土力工程處「社區斜坡安全大使計劃」

斜坡安全講座



網上斜坡安全講座
Online slope safety seminar



網上校園大使計劃
Virtual School Ambassador Programme

山泥傾瀉警告勿輕視 遠離斜坡莫遲疑

詳情



危險斜坡修葺令



山泥傾瀉緊急應變



斜坡資訊系統



正在進行加固或待加固的政府人造斜坡



已納入防治山泥傾瀉計劃的天然山坡

更新香港斜坡安全網頁
方便市民掌握資訊



校園大使分享主題講座
Thematic talk by School Ambassador

校園大使計劃

School Ambassador Programme



STEM工作坊
STEM workshop



報名方法

聯絡人: 劉斯俊博士
Contact person: Dr Samuel Lau
電話: 2762 5286
電郵: samuelsclau@cedd.gov.hk



校內展覽
Exhibition at School



校園大使計劃 (疫情期間的安排)

School Ambassador Programme (Arrangement during epidemic)



網上的虛擬展覽 Online Virtual Exhibition

虛擬展覽的網址

Website of virtual exhibition:

<https://hkss.cedd.gov.hk/VR-Exhibition/>



山泥傾瀉科技展學館導賞參觀

Po Shan Tunnel – Landslide Sci-tech Chamber guided tour



報名網址 Registration link:

<https://hkss.cedd.gov.hk/hkss/en/visit-tour/po-shan-drainage-tunnel/index.html>

一九七二年「六一八雨災」山泥傾瀉事故五十周年 紀念及公眾教育活動



香港斜坡安全網頁

<https://hkss.cedd.gov.hk>



謝謝 Thank you



土木工程拓展署
土力工程處

Geotechnical Engineering Office
Civil Engineering and Development Department