

Chengdu Forum (UN-GGIM)
Global Map for Sustainable Development:
Development and Applications
in Urban Hazard Mapping
(15-17 October 2013)

Slope Maintenance Responsibility
Information System (SMRIS)
斜坡維修責任信息系統

Mr. SIU Wai-ching, Dominic, FHKIS, JP
Deputy Director/ Survey and Mapping
Survey and Mapping Office
Lands Department
Hong Kong SAR Government



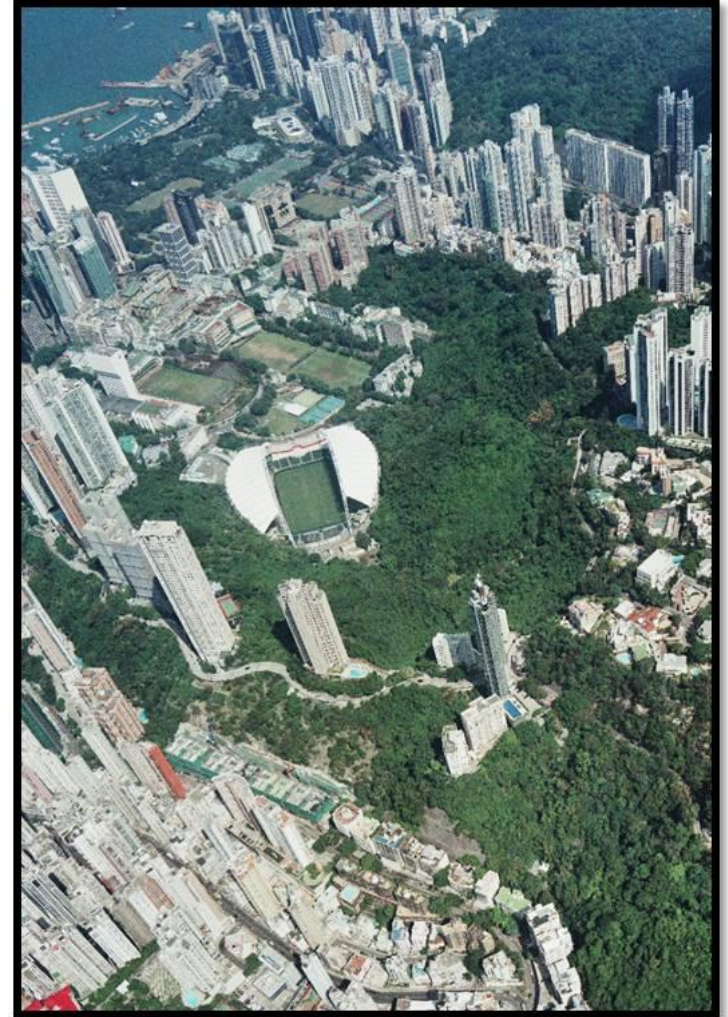
Contents

- ▶ Background
 - Landslides Disaster History
 - Slope Maintenance Responsibility
- ▶ Slope Maintenance Responsibility Information System (SMRIS)
 - Objectives
 - System Overview
- ▶ Revamp of SMRIS
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- ▶ Summary



Background

- ▶ Due to highly dense development and hilly terrain in Hong Kong, many buildings are constructed on hillsides or in the vicinity of slopes.
- ▶ During heavy rain, sub-standard slopes or slopes not under proper maintenance can cause landslides.
- ▶ In order to cope with the hazard of landslides, the HKSAR Government always take proactive actions to minimize the risk.
- ▶ In fact, Hong Kong has a history of disastrous landslides.



A view of Hong Kong Island (So Kon Po, Oct 2012)

Background–Landslides Disaster History

12 June 1966 Landslide behind Victoria Heights at No.43 Stubbs Road



Background–Landslides Disaster History

12 June 1966 Landslide behind Victoria Heights at No.43 Stubbs Road



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Background–Landslides Disaster History

12 June 1966 Landslide behind Victoria Heights at No.43 Stubbs Road



Background–Landslides Disaster History

18 June 1972 Kotewall Road/Po Shan Road Landslide



Background–Landslides Disaster History

18 June 1972 Kotewall Road/Po Shan Road Landslide



Background–Landslides Disaster History

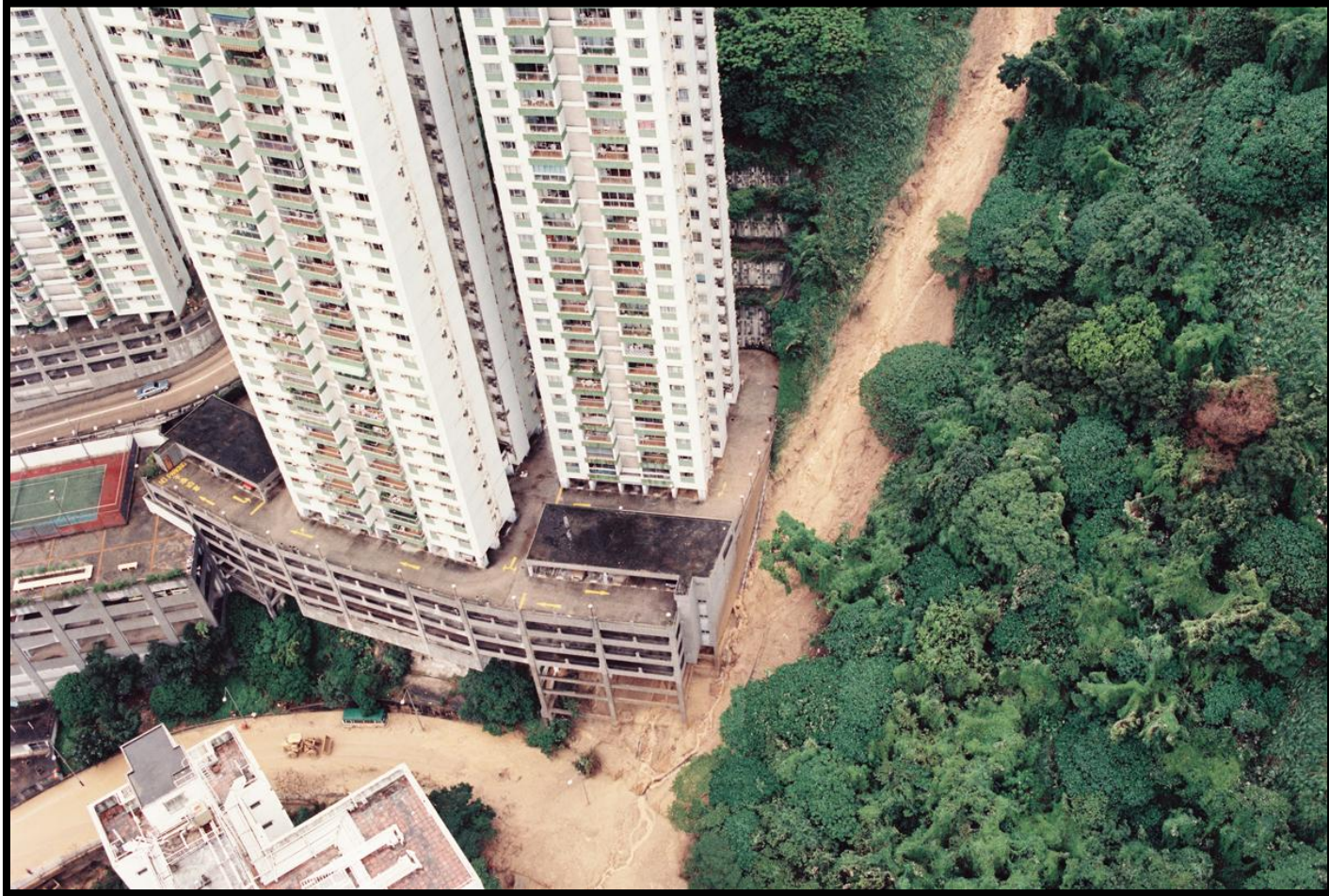
8 May 1992 Baguio Villa Landslide



(released about 3,500 m³ of debris, 2 fatalities)

Background–Landslides Disaster History

8 May 1992 Baguio Villa Landslide



(released about 3,500 m³ of debris, 2 fatalities)

Background–Landslides Disaster History

13 August 1995 Shum Wan Road Landslide



(released about 26,000 m³ of debris, 2 fatalities)

Background– Catalogue of Slopes

- ▶ An average of 300 landslides were reported annually.
- ▶ Geotechnical Engineering Office (GEO) has compiled a Catalogue of Slopes.
- ▶ The “New Catalogue of Slopes” was compiled in 1998 with continuous updating.
 - Over 61,000 man-made slopes recorded
 - Two thirds are managed by the Government.



Background– Catalogue of Slopes

- ▶ Unique slope registration number
- ▶ Slope information
 - Location description,
 - Slope type,
 - Size (Height, Width & Length),
 - Safety factor,
 - Structural information...etc.



Sign Plate showing Slope Registration No. and Maintenance Agent for a Government Slope

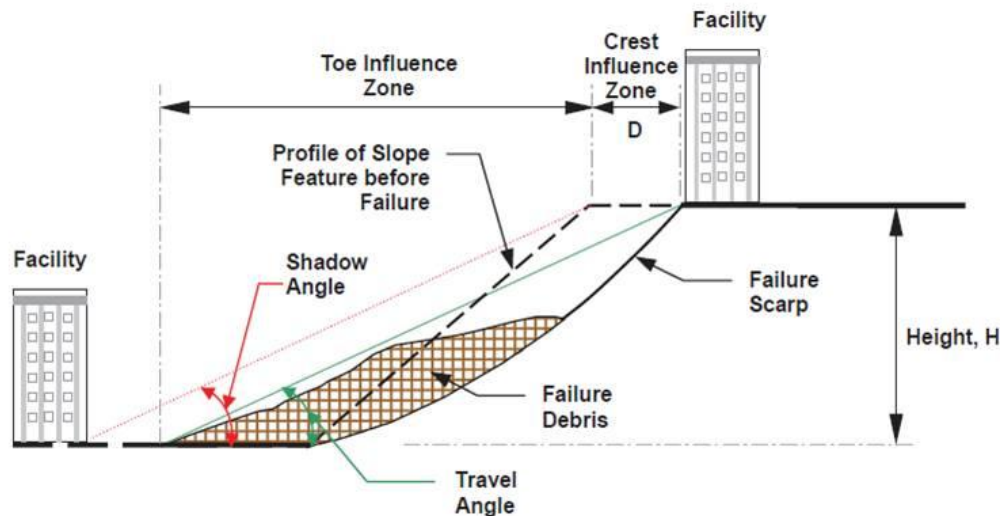
Background– Catalogue of Slopes

- ▶ Meaning behind the slope registration no, e.g. 11SE–A/R89
 - 11SE–A –Refer to 1:5,000 index plan
 - R –Slope Type:
 1. F: 填土斜坡 (Fill Slope)
 2. C: 削土斜坡 (Cut Slope)
 3. **R: 擋土牆 (Retaining Wall)**
 4. FR: 附擋土牆的填土斜坡 (Fill Slope with Retaining Wall)
 5. CR: 附擋土牆的削土斜坡 (Cut Slope with Retaining Wall)
 6. DT: 非原狀山坡 (Disturbed Terrain)
 7. NS: 加固工程措施, 天然山坡上建造, 以防止山泥傾瀉。
(Natural – Stabilization)
 8. ND: 建於岩屑; (滑坡) 泥石的防禦措施, 以保護附近建築物。
(Natural – Defense)
 - 89 –Reference number.

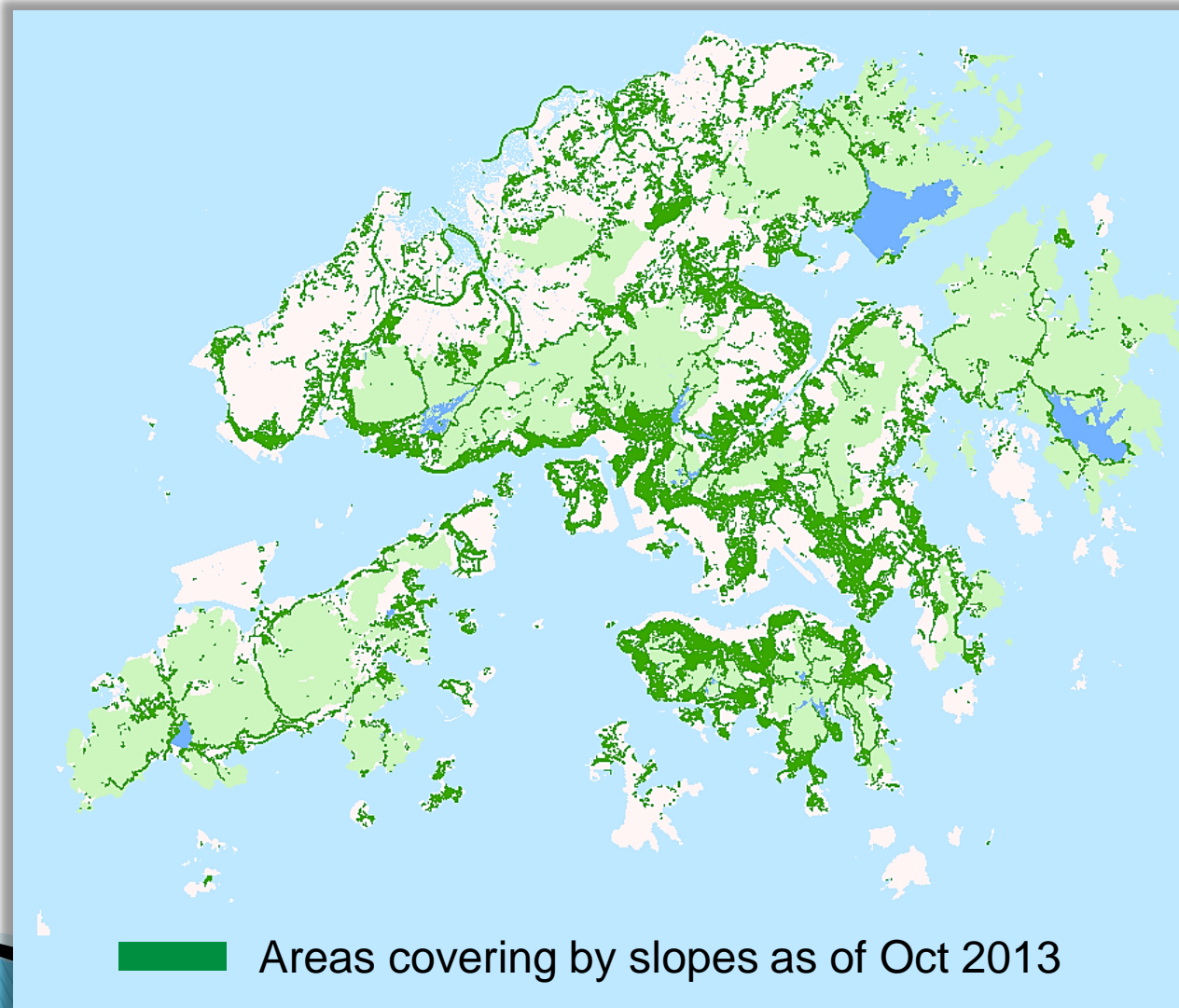


Background– Catalogue of Slopes

- ▶ Consequence-to-life (CTL)
 - Three categories 1, 2 and 3. (Category 1 represents the most severe consequence)
- ▶ Considerations to determine CTL
 - Facilities at Crest of the slope,
 - Facilities at Toe of the slope,
 - Crest/Toe Influence zone,
 - Dimension of the slope and so on.



Distribution of man-made registered slope recorded in the Catalogue of Slopes



Slope Maintenance Responsibility Information

- ▶ **Regular maintenance** is essential to ensure stability of man-made slopes and minimize risk of landslide.
- ▶ Information about **maintenance responsibility** of all man-made slopes shall be clearly identified to facilitate maintenance works and made available to concerned parties.



Slope Maintenance Responsibility Information

- ▶ In 1998, the HKSAR Government made maintenance responsibility of slopes available and it would be Lands Department's responsibility:
 1. To identify the maintenance responsibility for the 60,000 man-made slopes
 2. To disclose the slope maintenance responsibility to the public
 3. To upkeep the database and handle appeal cases



Slope Maintenance Responsibility Information

- ▶ Maintenance agents in the Government include
 - Agriculture, Fisheries and Conservation Department (AFCD),
 - Architectural Services Department (ArchSD),
 - Civil Engineering and Development Department (CEDD),
 - Drainage Services Department (DSD),
 - Housing Department (HD),
 - Hospital Authority,
 - Highways Department (HyD),
 - Lands Department (LandsD); and
 - Water Supplies Department (WSD).



Slope Maintenance Responsibility Information

- ▶ Private owners must take up their responsibility.
- ▶ GEO will carry out *safety screening of private man-made slopes*.
- ▶ Serving *Dangerous Hillside Order (DHO)* to the private owners for upgrading/improving their sub-standard slopes.



Slope Maintenance Responsibility Information

- ▶ Determination/Review of the maintenance responsibility
 - ▶ Slope boundary,
 - ▶ Current land status,
 - ▶ Leases and related land documents.
- ▶ Duly updated to SMRIS system.
- ▶ The information will subsequently be made available on:
 - ▶ Internet in *both Chinese and English languages* for the public
 - ▶ Government Intranet for the Government departments.

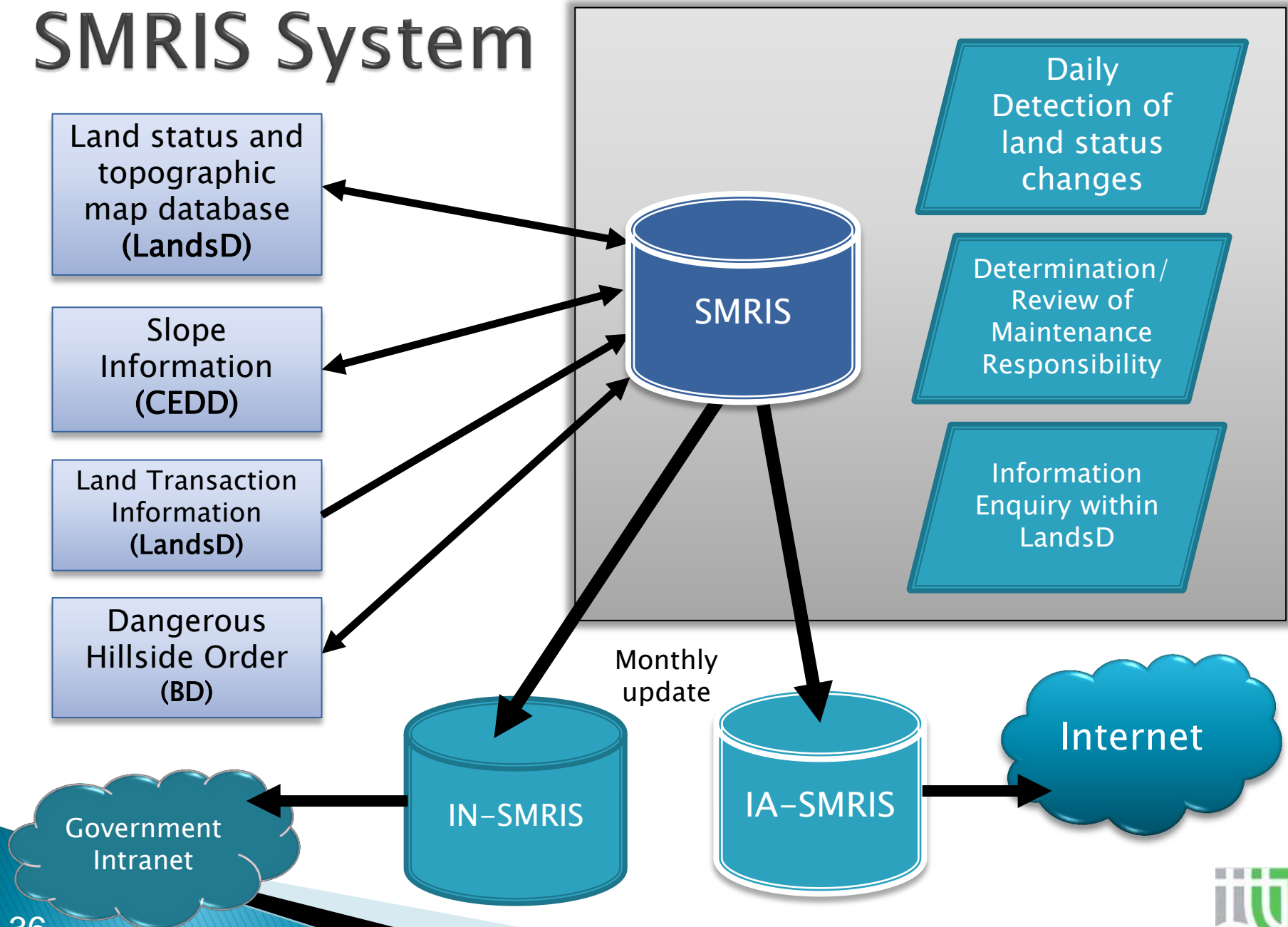


SMRIS System

- ▶ Slope Maintenance Responsibility Information System (SMRIS)
 - About 280 man-made slopes updated per month in 2012.
 - Over 61,000 slopes recorded in SMRIS.
- ▶ Internet – SMRIS (IA-SMRIS), <http://www.slope.landsd.gov.hk>
 - Freely available for public enquiry.
 - About 12,400 hits per month in 2012.
- ▶ Intranet – SMRIS (IN-SMRIS), <https://smris.landsd.ccgo.hksarg>
 - About 3,000 enquiries per month in 2012.



SMRIS System



Slope Maintenance Responsibility Information

- ▶ Slope Maintenance Responsibility Information is composed of two parts
 - Graphical part –
 - Slope Boundary;
 - Land status and topographic map.
 - Textual part –
 - Slope Registration No.;
 - Location description, coordinates;
 - Responsibility parties and their maintenance agent;
 - Related documents such as memo and letters;
 - Land Categories;
 - Reasons;
 - Remarks.



Slope Report (For SMRIS and IN-SMRIS only)

SMR0406 **SLOPE REPORT** Page 1 of 1
15032009 17:06

LANDS D FILE REF. SM/115W/0182/1/KW&S **ENDORSED BY SES(SM) ON** 07/09/2001

SLOPE IDENTIFICATION

SLOPE NUMBER 115W-D1892	DLO DISTRICT(S) HKW&S
SURVEY SHEET NO.(S) 115W-110	CO-ORDINATES N 11417 E 12403
LOCATION WITHIN RBL722	

MAINTENANCE RESPONSIBILITY

NO. OF PARTIES 1	SUB-DIVISION NO. 0
PARTY RESPONSIBLE RBL722	PERIOD UP TO 09/12/2018
PERIOD REMARK	
MAINTENANCE AGENT N/A	
REASON 1. WIDEN PRIVATE LOT	
RELATED DOCUMENTS SLOPE PLAN & OLD PLAN	
LAND CATEGORY 1	
WHOLE SLOPE AREA 2.01 m ²	SUB-DIVISION AREA 2.01 m ² % OF SUB-DIVISION AREA 100 %

ADDRESS OF RESPONSIBLE LOT

STREET NO & NAME	15, O'CAUGHY HILL ROAD
OR BUILDING / VILLAGE NAME ETC	N/A
ESTATE NAME	N/A

REMARKS UPDATED FOR MODIFICATION OF SLOPE BOUNDARY.

REMARKS 2

CHECKED IN ORDER BY: Jane LEUNG (SES(SM)) **PREPARED BY:** Jane LEUNG (SES(SM))
DATE: 7 Sep 2001 **DATE:** 7 Sep 2001

Slope Information

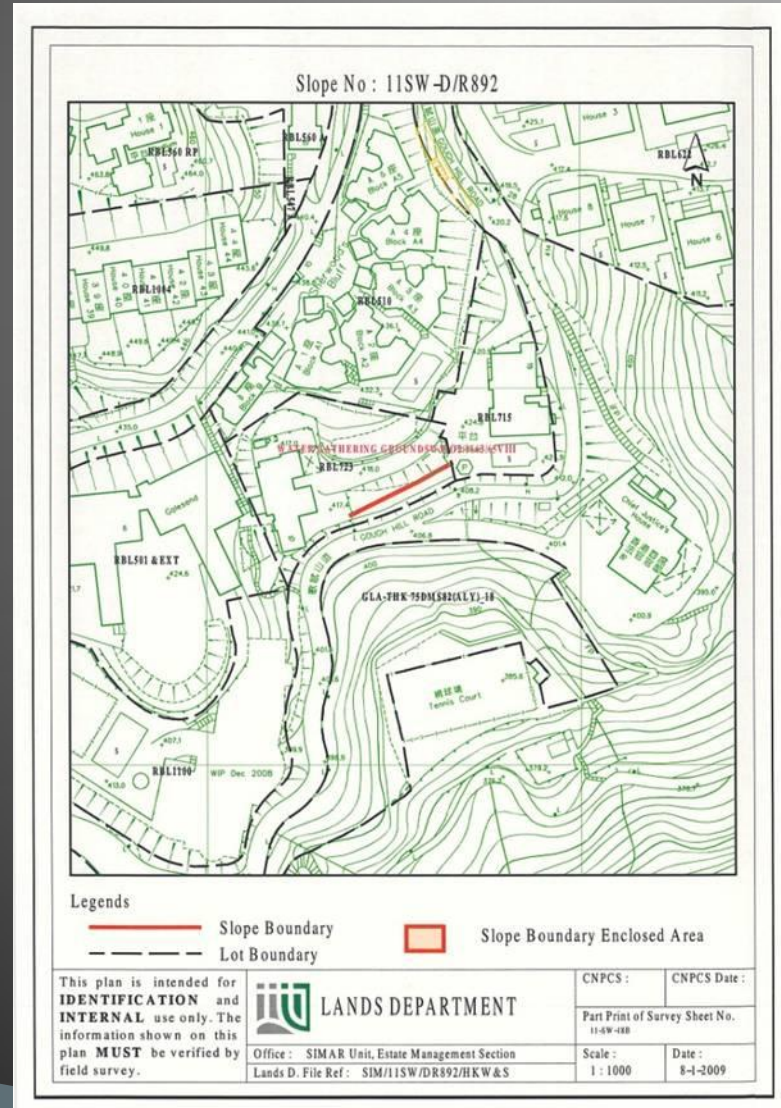
Maintenance Parties

Address of the
Maintenance Parties

Remarks



Slope Plan (for SMRIS and IN-SMRIS only)



SMRIS System

Information Enquiry and Data Maintenance User Interface

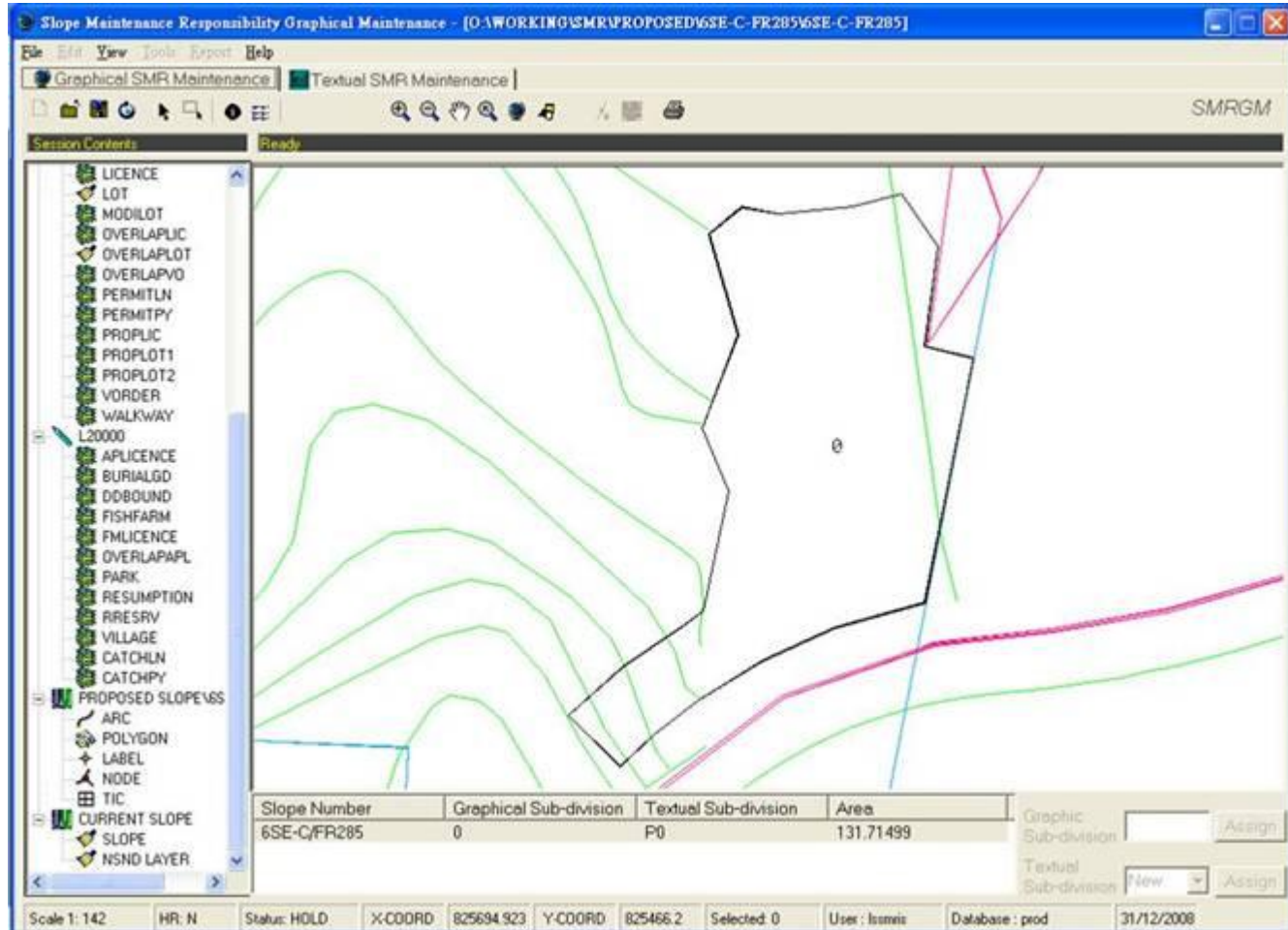
The screenshot displays the 'Technical Information' form within the SMRIS system. The form is titled 'Technical Information from Civil Engineering & Development Department' and contains 20 numbered fields for data entry. A map on the right side shows a site plan with a red highlighted area and labels '11NE-A/C12(1)' and '11NE-A/C12(2)'. The system interface includes multiple overlapping windows and a taskbar at the bottom.

Field No.	Field Name	Value
1	Consequence Category	1
2	Easting	839100
3	Northing	823422
4	Toe Facility	Residential
	Toe Facility (Chinese)	住宅
5	Crest Facility	Undeveloped green belt
	Crest Facility (Chinese)	未開發的綠化帶
6	Toe Facility Distance (m)	8
7	Crest Facility Distance (m)	0
8	Slope Material	Soil & Rock
	Slope Material (Chinese)	泥土及岩石
9	Slope Height (m)	18
10	Slope Length (m)	110
11	Slope Angle (deg)	50
12	Wall Material	
	Wall Material (Chinese)	
13	Wall Height (m)	
14	Wall Length (m)	
15	Structure Type of Wall (Chinese)	
16	Modification Type	Constructed
17	Construction Before year	1967
18	Construction After year	1963
19	Construction Date	
20	Location	TSZ CHING ESTATE



SMRIS System

Graphical Data Maintenance User Interface



SMRIS System

Intranet – SMRIS User Interface

The screenshot displays the SMRIS user interface within a Microsoft Internet Explorer browser window. The page title is "Slope Maintenance Responsibility Information System (SMRIS) - Microsoft Internet Explorer 是由 SMO 提供". The interface includes a navigation menu with tabs for "Slope Information", "Maintenance Responsibility", "Technical Information", and "Keyword Search". The "Technical Information" tab is active, showing a form with the following data:

Technical Information from Civil Engineering & Development Department			
Consequence Category	1		
Easting	839100	Northing	839100
Toe Facility	Residential		
Toe Facility (CH)	住宅		
Crest Facility	Undeveloped green belt		
Crest Facility (CH)	未開發的綠化帶		
Toe Facility Distance (m)	8	Crest Facility Distance (m)	0
Slope Material	Soil & Rock	Slope Material (CH)	泥土及岩石
Slope Height (m)	18	Slope Length (m)	110
Slope Angle (deg)	50		
Wall Material		Wall Material (CH)	
Wall Height (m)		Wall Length (m)	
Structure Type of Wall			
Structure Type of Wall (CH)			
Location	TSZ CHING ESTATE		

To the right of the form is a location map showing the "TSZ CHING ESTATE" and a "Basketball Court". A red boundary outlines a specific area labeled "11NE-A/C12(1)". Below the map is a legend for "Slope Maintenance Responsibility Category" with three categories: Government (blue), Private (pink), and Joint (Government and Private) (brown). The map also includes "Map Control" buttons for Zoom In, Zoom Out, Pan, and Pick, and buttons for "Print Slope Report" and "Print Slope Plan".

A white box with the text "Technical Information" is overlaid on the bottom center of the screenshot.



SMRIS System

Internet -SMRIS (IA-SMRIS) User Interface

Technical Information

Technical Information from Civil Engineering & Development Department

Slope No.	11NE-A/C12			Page 1	
Consequence Category	1	Easting	839100	Northing	823422
Toe Facility	Residential		Toe Facility Distance (m)	8	
Crest Facility	Undeveloped green belt		Crest Facility Distance (m)	0	
Slope Material	Soil & Rock				
Slope Length (m)	110	Slope Height (m)	18	Slope Angle (deg)	50
Wall Material	NULL	Wall Height (m)	NIL	Wall Length (m)	NIL
Structure	NULL				
Type of Wall	NULL				

Hong Kong Slope Safety
Civil Engineering & Development Department

Location Plan - For Identification Purposes Only
© Survey and Mapping Office, Lands Department. Copyright Reserved. reproduction by permission only

Print Tech Info 2 record(s) found. Map Control Zoom In Zoom Out Pan Pick HK Overview

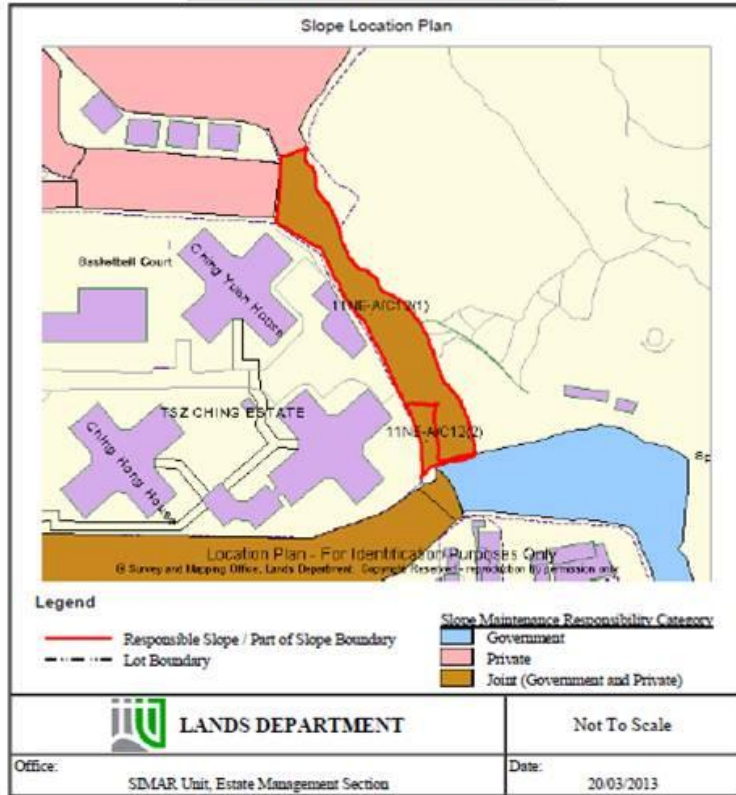
Slope Maintenance Responsibility Category
 Government Private Joint (Government and Private) Other Legends



Slope Report (IA-SMRIS)

Slope Report

FOR IDENTIFICATION PURPOSES ONLY



IASMP01001

SIMAR REGISTER

20/03/2013 09:59 AM

<u>Slope No.</u>	<u>Slope Sub-division No.</u>	<u>Location</u>	<u>Responsible Lot(s) / Part(s)</u>	<u>Maintenance Agent</u>	<u>Slope Plan*</u>	<u>Remarks</u>
11NE-A/C12	1	PARTLY WITHIN TSZ CHING ESTATE AND PARTLY WITHIN ADJOINING GOVERNMENT LAND	NKIL644	N/A	as per the attached	
11NE-A/C12	2	PARTLY WITHIN TSZ CHING ESTATE AND PARTLY WITHIN ADJOINING GOVERNMENT LAND	HD	HD	as per the attached	For enquiries about the maintenance of this slope / sub-division of the slope, please contact the Maintenance Agent direct.

- End of Report -

* Note: (i) The attached slope plan(s) are for the purpose of identification of the slope(s) only.
(ii) The slope(s) mentioned in the Register may not be shown in the attached slope plan(s).

Slope Number

11NE-A/C12

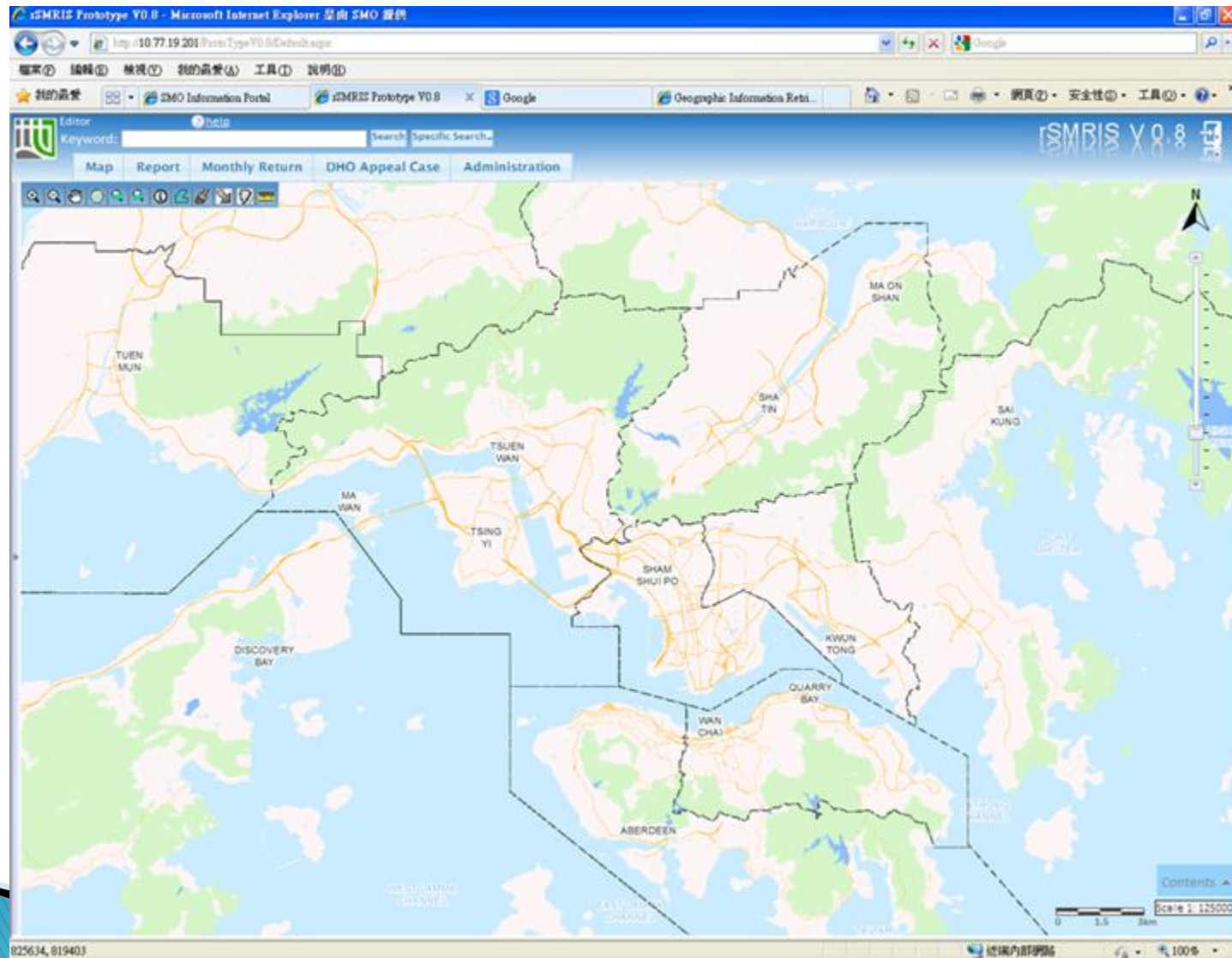


Revamp of SMRIS (rSMRIS)

- ▶ Revamp of SMRIS (with approved project estimates HK\$9.79m) is now in System Integration and Implementation Stage.
- ▶ Major Enhancement Areas
 - Based on the new spatial database – Better performance and flexibility for integration and data analysis.
 - Intuitive User Interface;
 - Intelligent Keyword search;
 - Build on latest Web technology;
 - Higher availability.
- ▶ Plan to be launched in 2014.
- ▶ Subject to approval of funding, Revamp of IA/IN–SMRIS project will be commenced after completion of rSMRIS.



rSMRIS Prototype User Interface (09.2012)



rSMRIS Prototype User Interface - (09.2012)

Basic Information

Status	APPROVE	Previous Slope No (if Any):	11SW-A/C12
Landfile Ref.	SIM/11SW/TPE3	Endorsement Date:	2002-10-08
CNPCS	12.33	Slope Area (sq.m)	89.2
Hold Reason	MBT - Change of Slope Boundary and Slope Number		
SMR - Category	MIX - Govt. & Private Jointly Reasonable (Sub sub-division)		
Have DHO Cases	Y	Have Appeal Cases	N
No. of Sub-Division	3	No. of Resp. Party	4
Consultant No.	M1-344		

Maintenance Responsibility

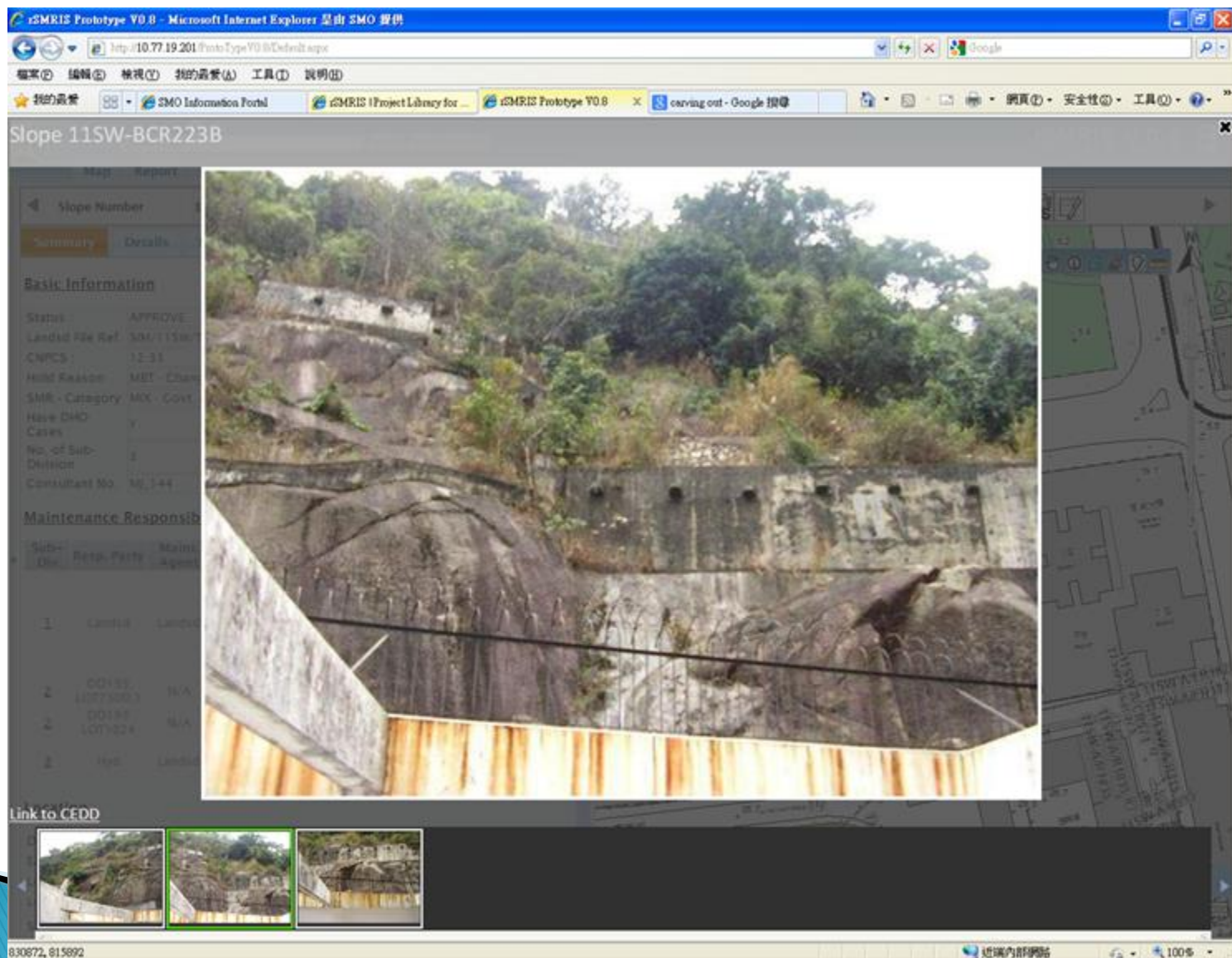
Sub-Div	Resp. Party	Maint. Agent	Land Cat.	Resp. Reason
1	Landfile	Landfile	2 - Allocated govt. Land 7 - Mixture of categories	59 - Government department agree to maintain 62 - Within unallocated govt. Land not be limited to land affecting squatters & all other land affecting life & property
2	DD193 LOT730D,1	N/A	1 - Alienated land	1 - Within private lot
2	DD193 LOT1024	N/A	1 - Alienated land	1 - Within private lot
2	Hyd	Landfile	2 - Allocated govt. Land 7 - Mixture of categories	17 - Within allocated government land to hyd

Location

District	TP	Sub-District	South
Easting	821213	Northing	834569
Location	WITHIN ST1 SHX1024 AND ADJOINING SOUTH BAY ROAD		
Location (Chinese)	位於烈顯徑的SHX1024內及毗鄰南灣道		
Site Photo	Open		



rSMRIS Prototype User Interface – Photos of Slope (09.2012)



rSMRIS Prototype User Interface – Instant land status retrieval

The screenshot displays the rSMRIS Prototype User Interface in Microsoft Internet Explorer. The browser title is "rSMRIS Prototype Y0.8 - Microsoft Internet Explorer 是由 SMO 提供". The address bar shows "http://10.77.19.201/ProtoTypeY0.8/Default.aspx". The interface includes a search bar with the keyword "11SW-A/C100" and a navigation menu with options like "Map", "Report", "Monthly Return", "DHO Appeal Case", and "Administration".

The main content area shows details for Slope Number "11SW-A/C100". A summary table is visible:

Previous Slope	11SW-A/CR100	LandsD File Ref.	SIM/11SW/TPE3
No. of Parties	1	CNPCS	3.4
CNPCS Date		CEDD Rel Date	
NPRS	4.38		

Remarks: PREVIOUS SLOPE NO. 11SW-A/CR100 先前斜坡編號為11SW-A/CR100

Maintenance Responsibility (Sub-Division: 0)

Sub-Division No. 0

Land Category: 2 ALLOCATED GOVT. LAND 已撥款政府土地

Responsible Party Information:

Resp. Party	Main. Agent	Area (sq)	Area (%)	Period Up To	Period Remark	Related Doc	Lot	Party Type	DSD	DLO
LCSD 康樂及文化事務署	Arch SD 建築署	173.28	50		PERMANENT 永久	SLOPE PLAN 斜坡圖則	G	HK	HKW	
IL 7086	IL 7086	173.28	50		PERMANENT 永久	MEMO 備忘錄	G	HK	HKW	

Responsible Party Address Information:

Street No	Street Name	Building Name	Estate Name	Street Name (Chinese)	Building Name (Chinese)	Estate Name (Chinese)
				文咸街	文咸街	文咸街

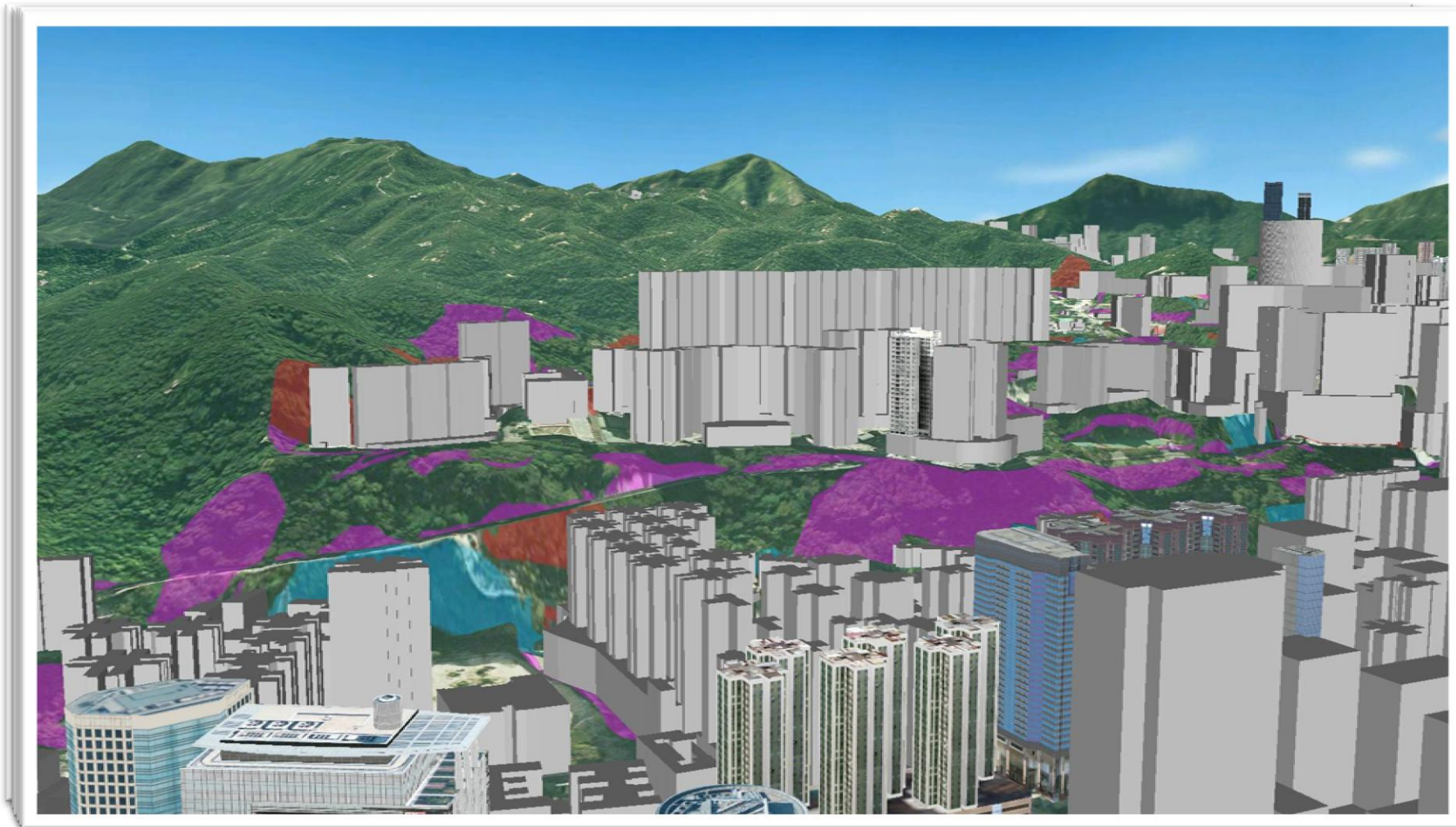
An "Identify Result" popup shows "GLA No.: GLA-HK 687". A red box highlights an "Identify Result Detail" popup with the following data:

GLAID	1800009251
GLACODE	GLA-HK
GLANUMBER	687
GLANUMBERALPHA	Null
SECTIONCODE	Null
GLATYPE	Permanent
CISLOTDISPLAYNAME	GLA-HK 687
SHAPE	Polygon

The background map shows a site plan with various slope areas and buildings. A scale of 1:2000 is indicated in the bottom right corner.



Registered man-made slopes in 3D Model



Government Slopes



Private Slopes



Government &
Private Jointly
Maintenance
Slopes



Warning Services provided by Hong Kong Observatory (HKO)

- ▶ To alert the public keep away from landslide hazard, the Hong Kong Observatory will issue Rainstorm and Landslip warnings to the public based on actual rainfall distribution and rainfall forecast.

<i>Names of Warnings and Signals</i>	<i>Record of start</i>
 <p>Tropical Cyclone Warning Signals</p>	1946
 <p>Strong Monsoon Signal</p>	1951
 <p>Rainstorm Warnings</p>	1998
 <p>Landslip Warning</p>	1983
 <p>Thunderstorm Warning</p>	1967
 <p>Fire Danger Warnings</p>	1995
 <p>Special Announcement on Flooding in the northern New Territories</p>	1998
 <p>Cold Weather Warning</p>	1999
 <p>Very Hot Weather Warning</p>	2000
 <p>Frost Warning</p>	1998

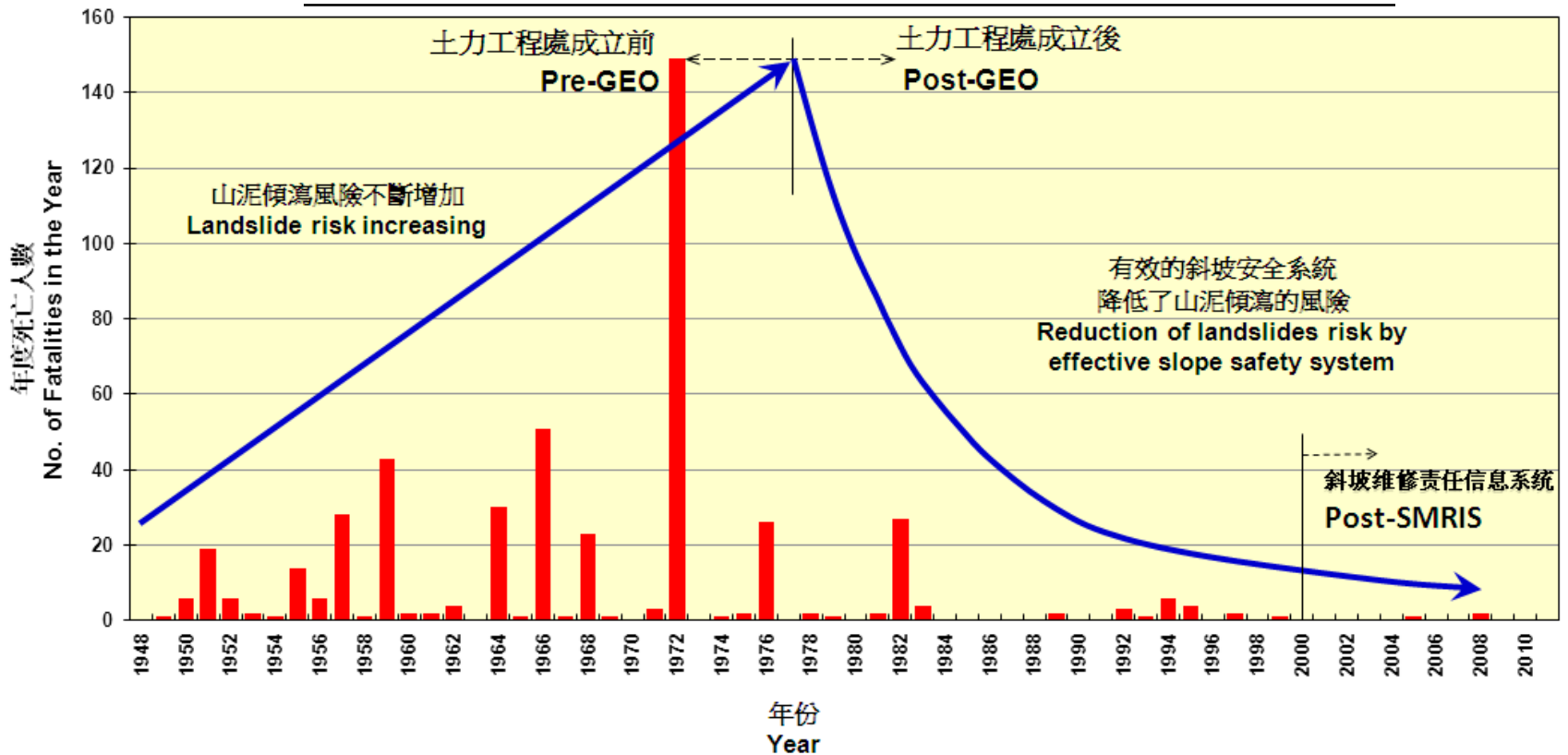
www.hko.gov.hk



Fatalities Chart

- ▶ The sharp declining casualty rate over the years indicates the effectiveness of the Slope Safety System.

No. of Fatalities due to landslides from 1948 to 2012



Sources from GEO, CEDD, 2013



Summary

- ▶ Around 300 cases per years, mostly minor.
- ▶ Landslip preventive measure implemented.
- ▶ Identify slope maintenance responsibility to facilitate regular maintenance of slopes.
- ▶ Issue Dangerous Hillside Order by the Government authority if necessary.
- ▶ Improve sub-standard slopes.
- ▶ Sharp decline in fatality.
- ▶ Promotes public awareness and response in slope safety. (e.g. landslip warning)



For more information, please visit

- ▶ Hong Kong Slope Safety Website
 - <http://hkss.cedd.gov.hk>
- ▶ Internet SMRIS
 - <http://www.slope.landsd.gov.hk>
- ▶ Lands Department
 - <http://www.landsd.gov.hk>



Thank you

»» Question & Answer

