United Nations
Global Geospatial Information Management
Hangzhou Forum 2012

Sharing of Geospatial Data within Hong Kong Government

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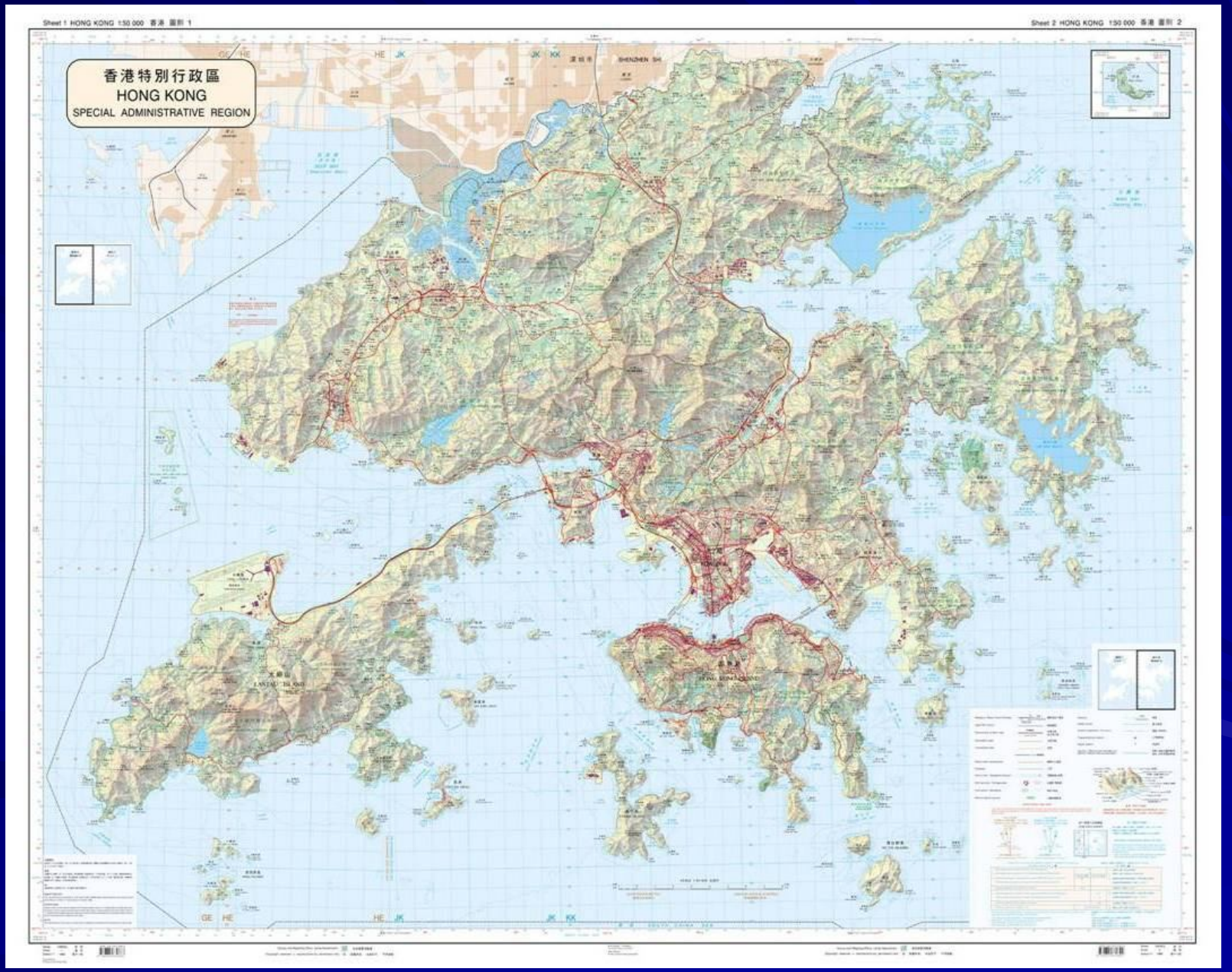
Lands Department

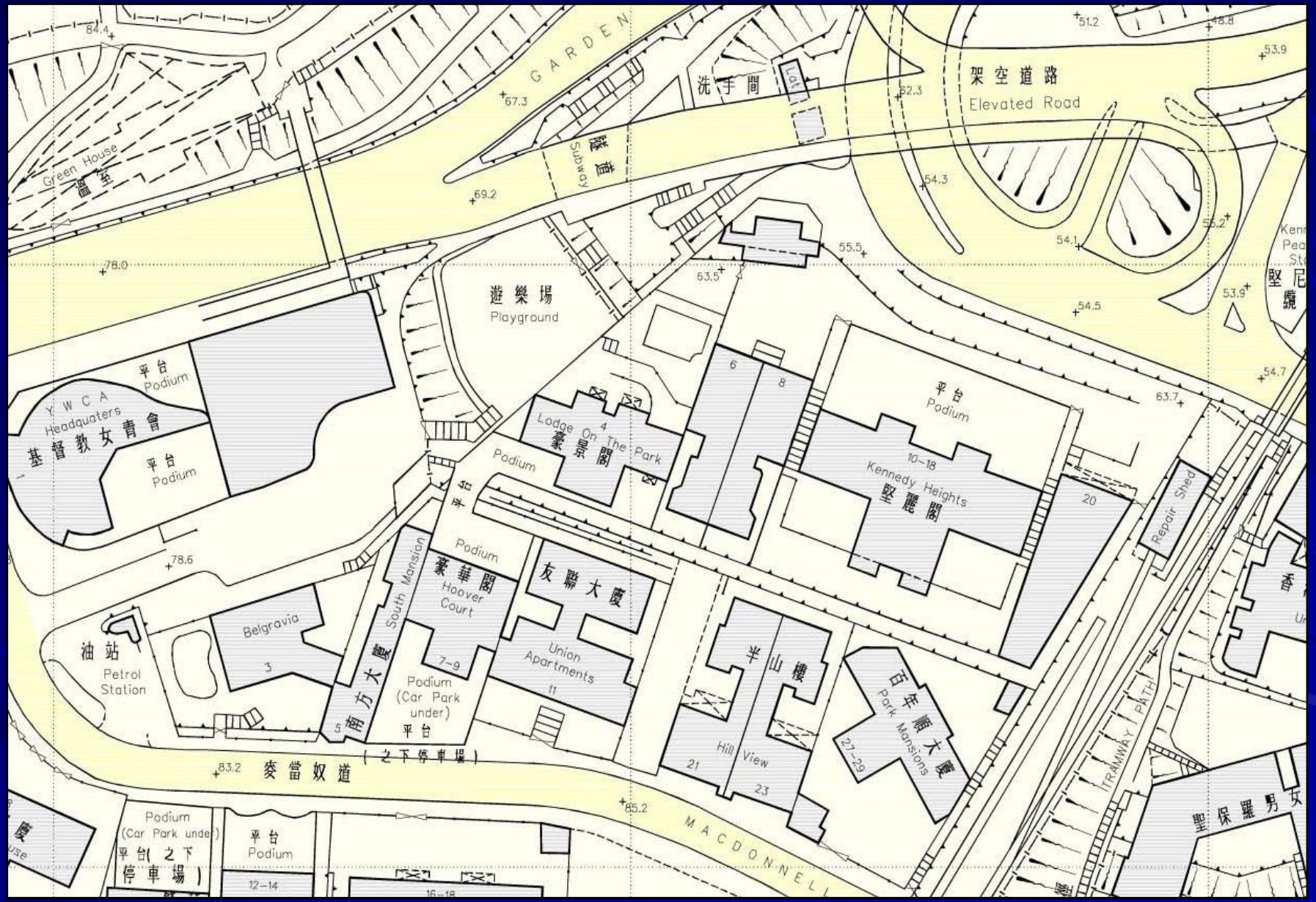
Map of Hong Kong



Geospatial Data of Lands Department

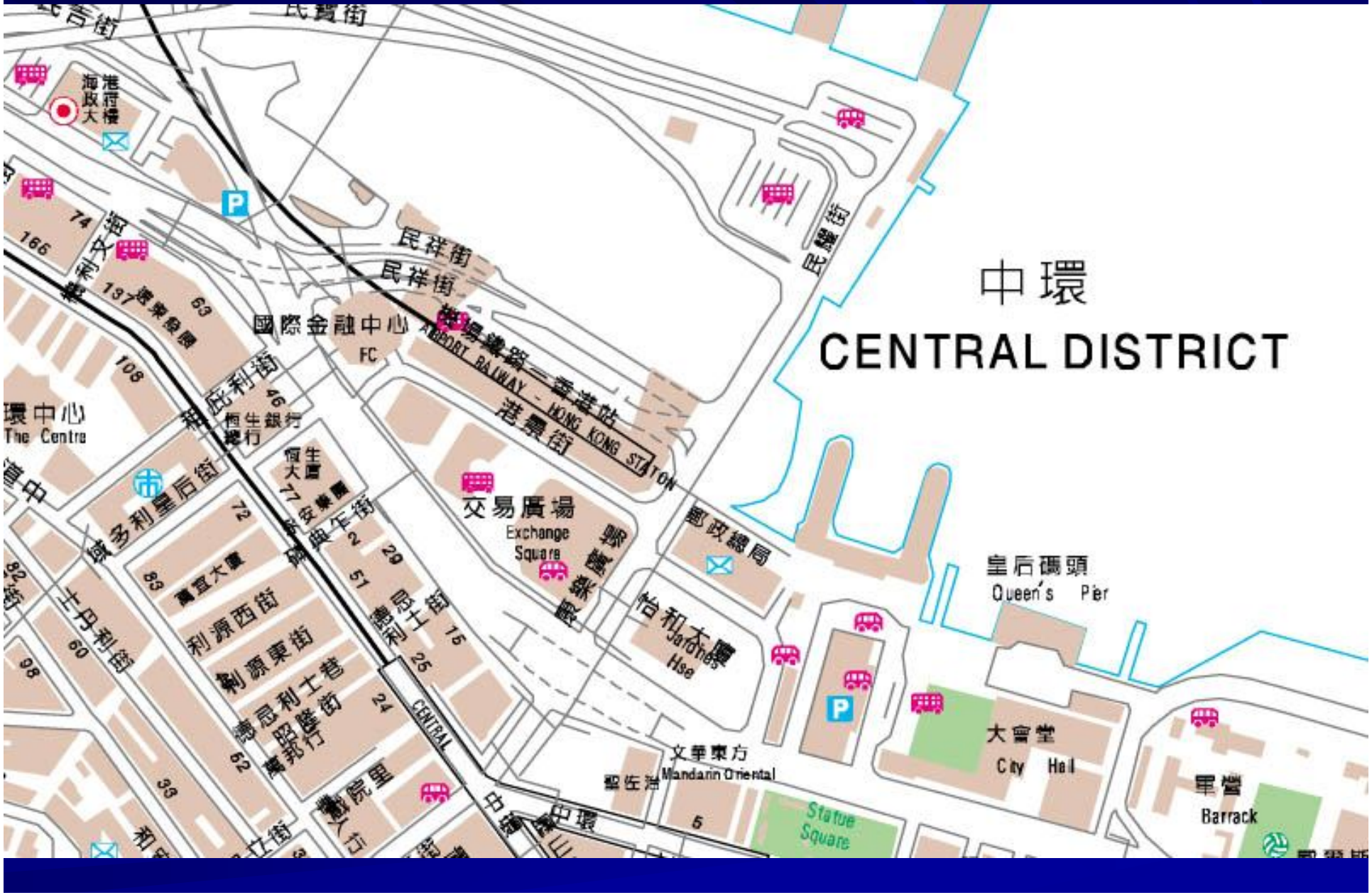
(a) Digital Topographical Maps
(b) Land Status Information
(c) Aerial Photos
(d) 3D Photo-realistic Models

1:1000 Topographical Map

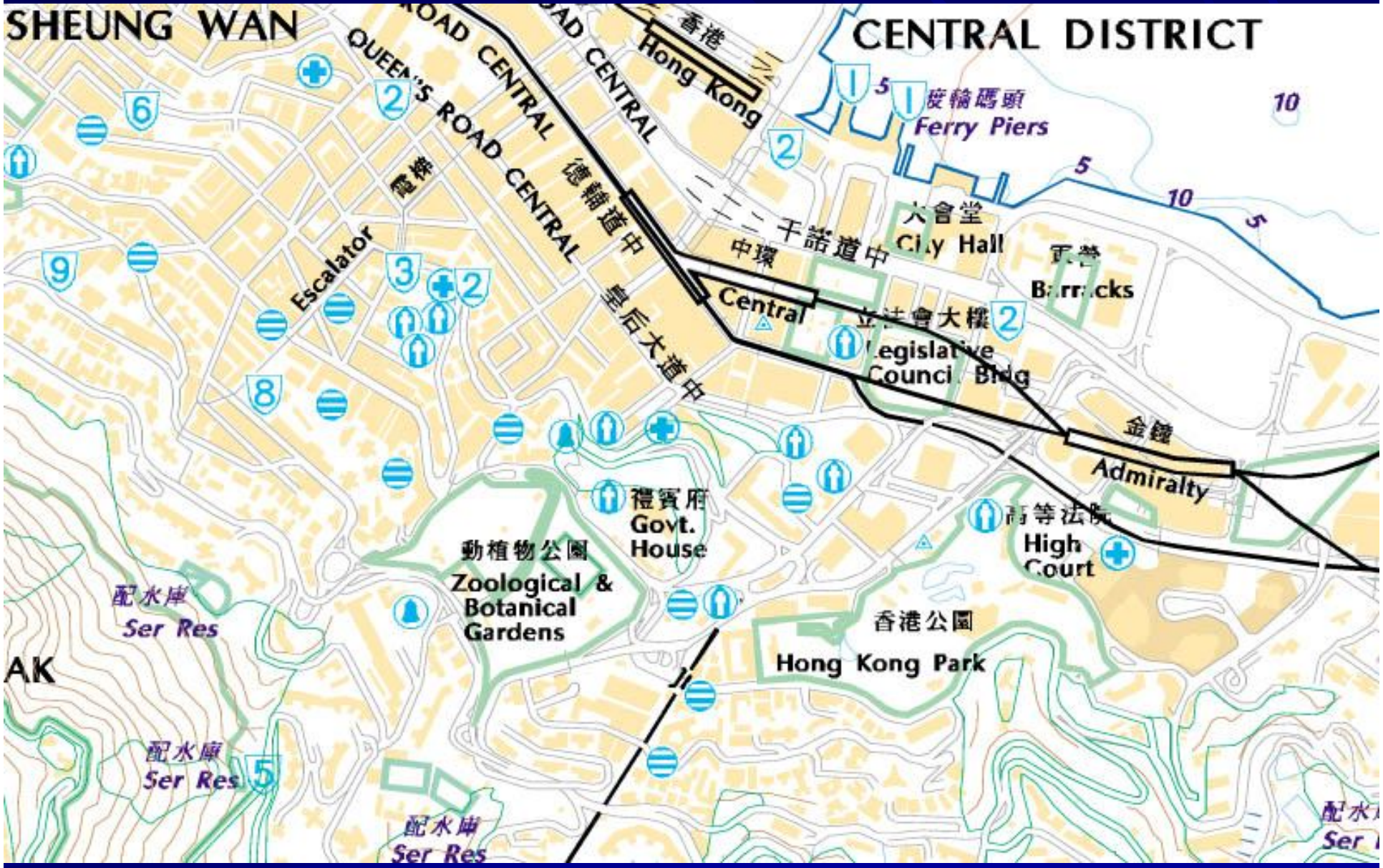


1:5000 Topographical Map

1:10000 Topographical Map



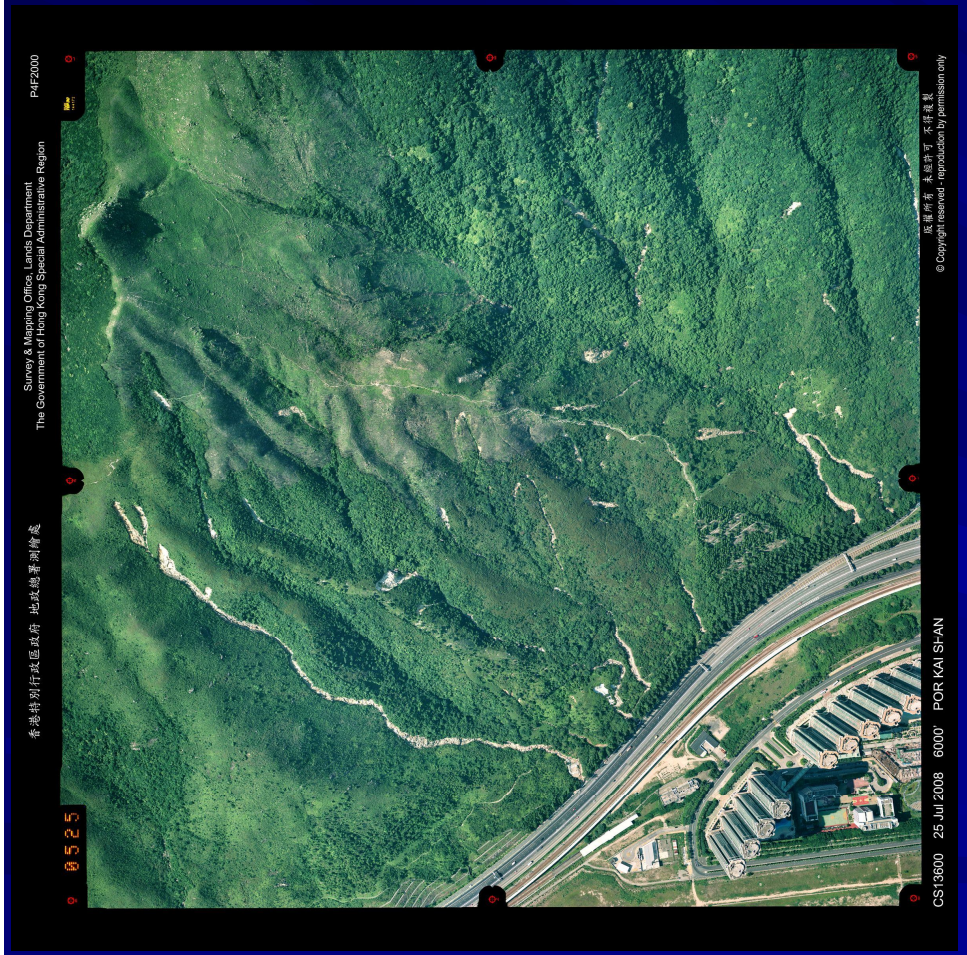
1:20000 Topographical Map



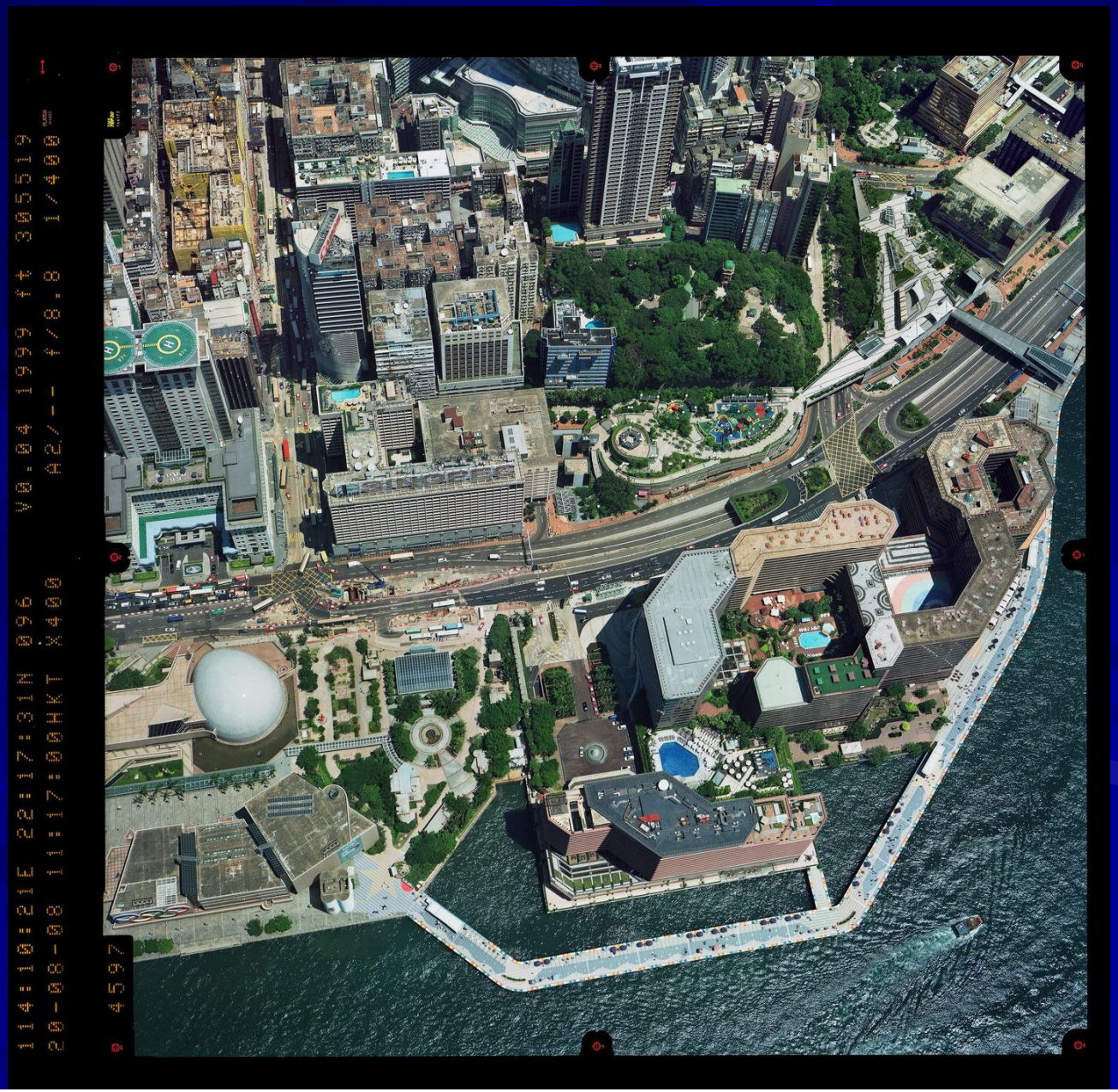
Land Status Information

Vertical Aerial Photo

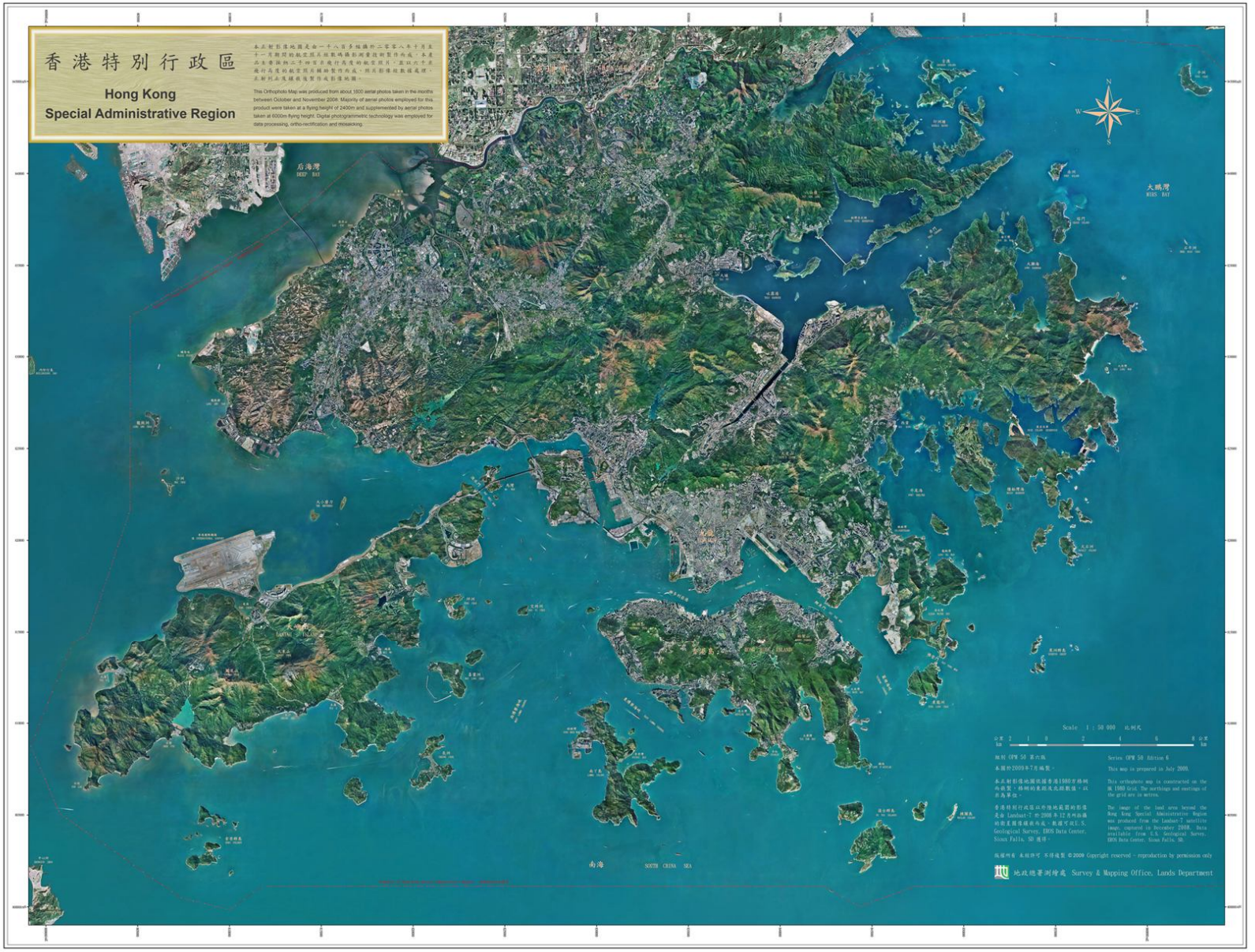
Vertical Aerial Photographs



Oblique Aerial Photograph



Digital Orthophoto

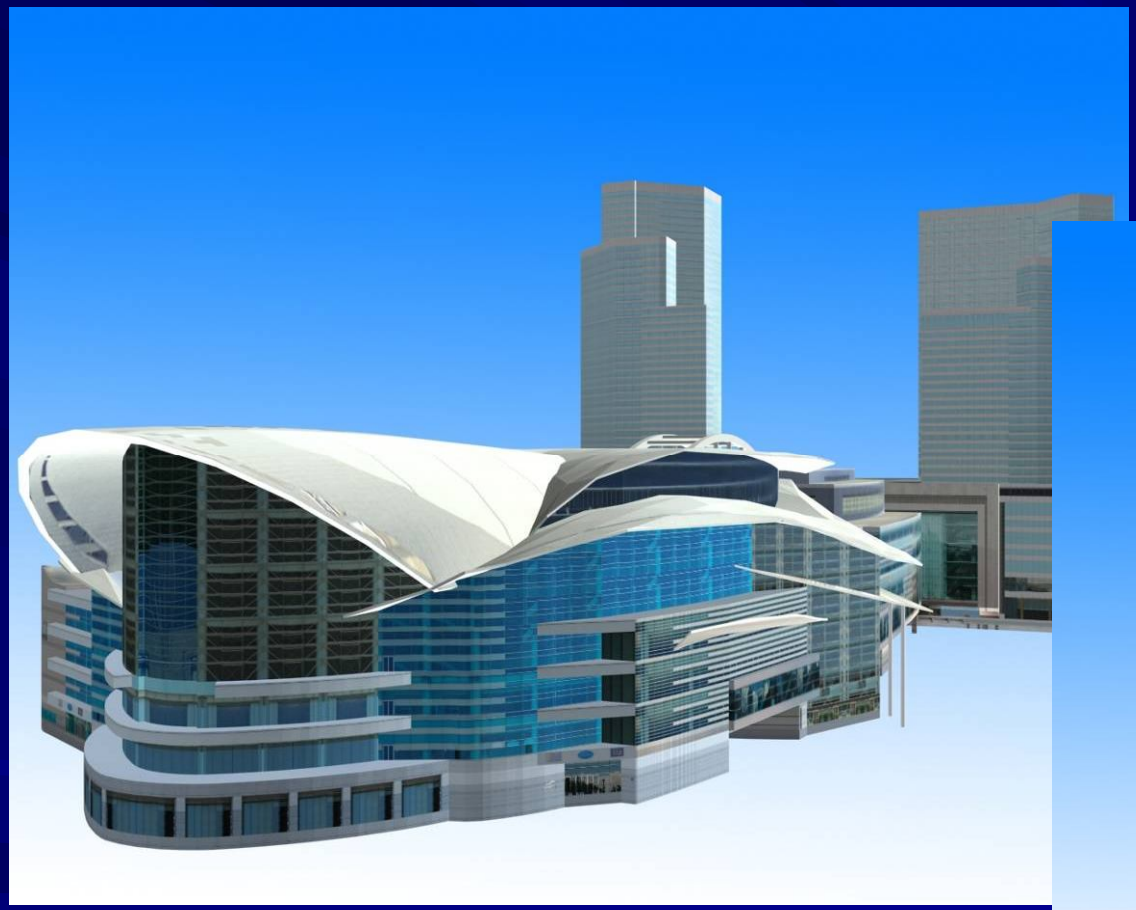


Digital Orthophotos

3D City Model

3D City Model

3D City Model



Geospatial Data of other Departments

Land Use Information
Outline Zoning Plans
Housing / Buildings
Slope Conditions
Transportation
Community Facilities
Population / Health
etc …

Geo-spatial Information

地图 Maps

航空照片Air Photo

规划 Planning

工程 Works

建筑物 Buildings

交通 Traffic

普查 Census

选区 Election

卫生 Hygiene

紧急 Emergency

古树 Old Trees

Difficulties in Data-sharing within Government

- Different data definitions, data formats and computer systems
- Incompatible and not readily accessible
- Data Quality issue

1. Who is responsible for data integration?
2. Who will be liable for inaccurate data?

- Labour intensive and time consuming in obtaining and processing spatial data

Labour intensive and time consuming in obtaining and processing information from different sources

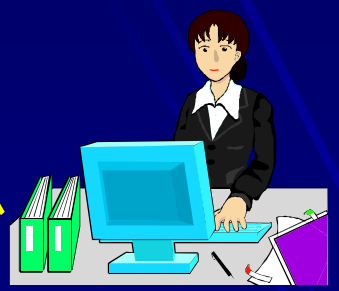
Dept A

Request Information

Receive information within a few days

Request Information

Receive information in a week



Dept B

Request Information

Receive information within 2-3 weeks

Dept C

Slow in Decision making and Crisis Management

Geospatial Information Hub (GIH)

Lands Department

Hong Kong Special Administrative Region

Geospatial Information Hub

- Effective management of our location-based information is one of the key elements for social and economic development.
- Means a need to gain access to geospatial information more readily

Geospatial Information Hub

Roles played by the Lands Department

- Join-up government departments by adopting GIS technology
- Integrate geospatial data from different departments
- Make geospatial information readily accessible within the Government
- Better information to support quick decision
- Better response in crisis management
- Better policy research and formulation
- Better service to the public

Spatial Information Management by Lands Department

Strengths

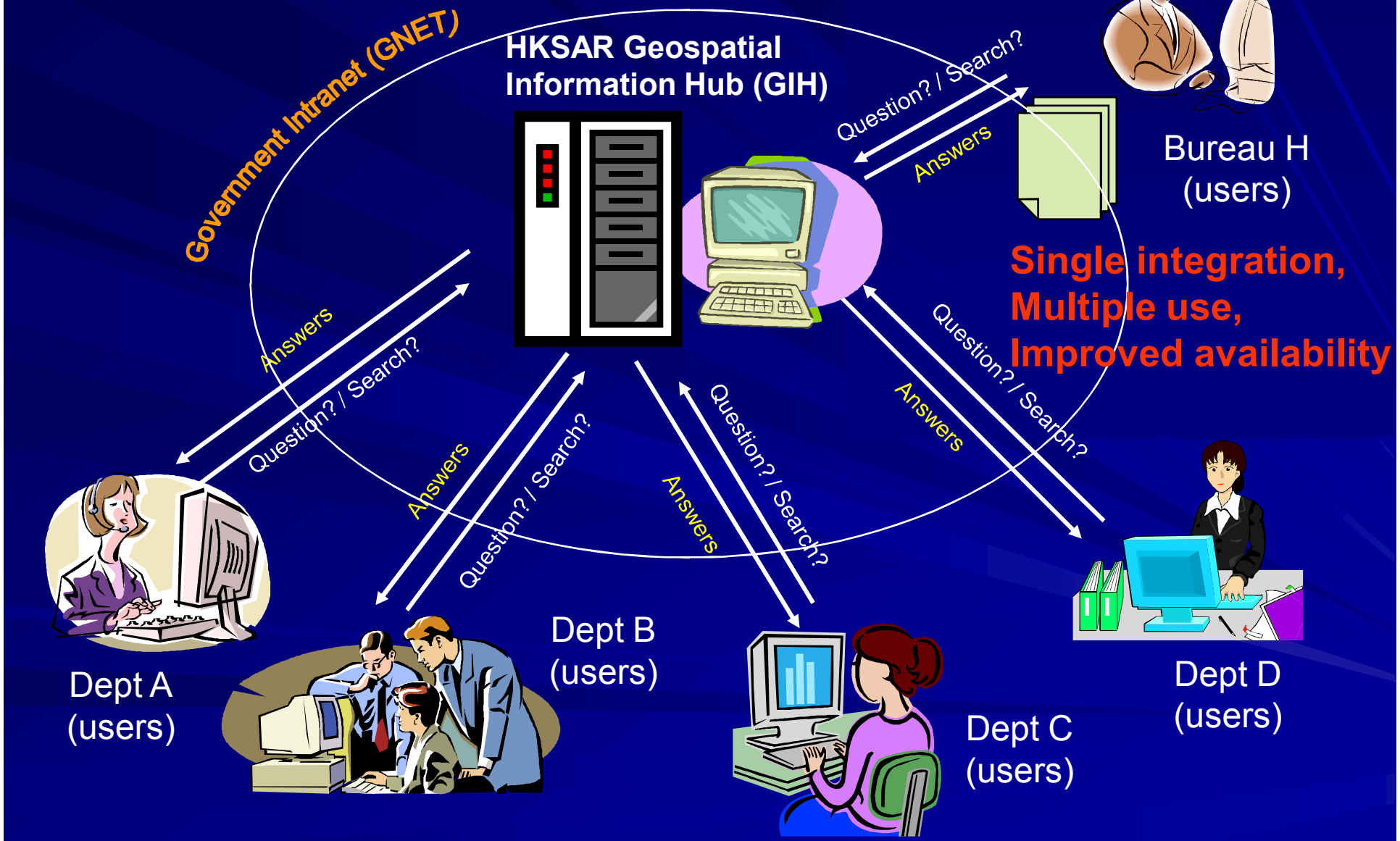
- Multi-scale intelligent digital maps, land information and rectified aerial photographs covering the whole Hong Kong territory
- Vast amount of data collected from more than 10 government departments
- More than 40 major types of information grouped into 12 main categories
- Expertise in data conversion, integration and system development

User Needs

- Streamline daily operations through quick and easy access to other departments' geospatial information
- Web-based access to various types of geospatial information through the Government Intranet (GNET)
- Direct download accurate digital maps, aerial photos, and 3D models for spatial analysis

A New Way of Accessing

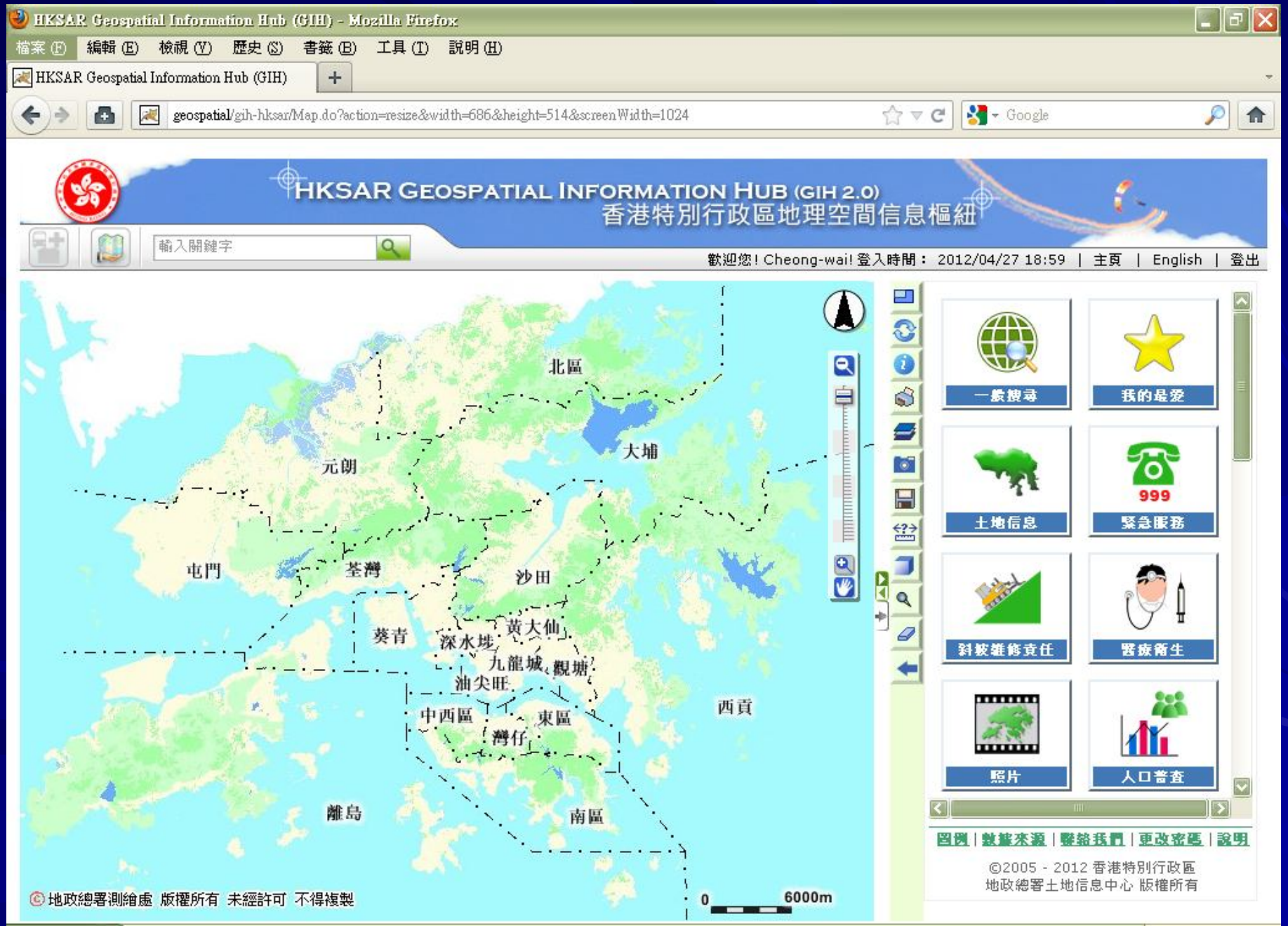
Geospatial Information in Hong Kong Government



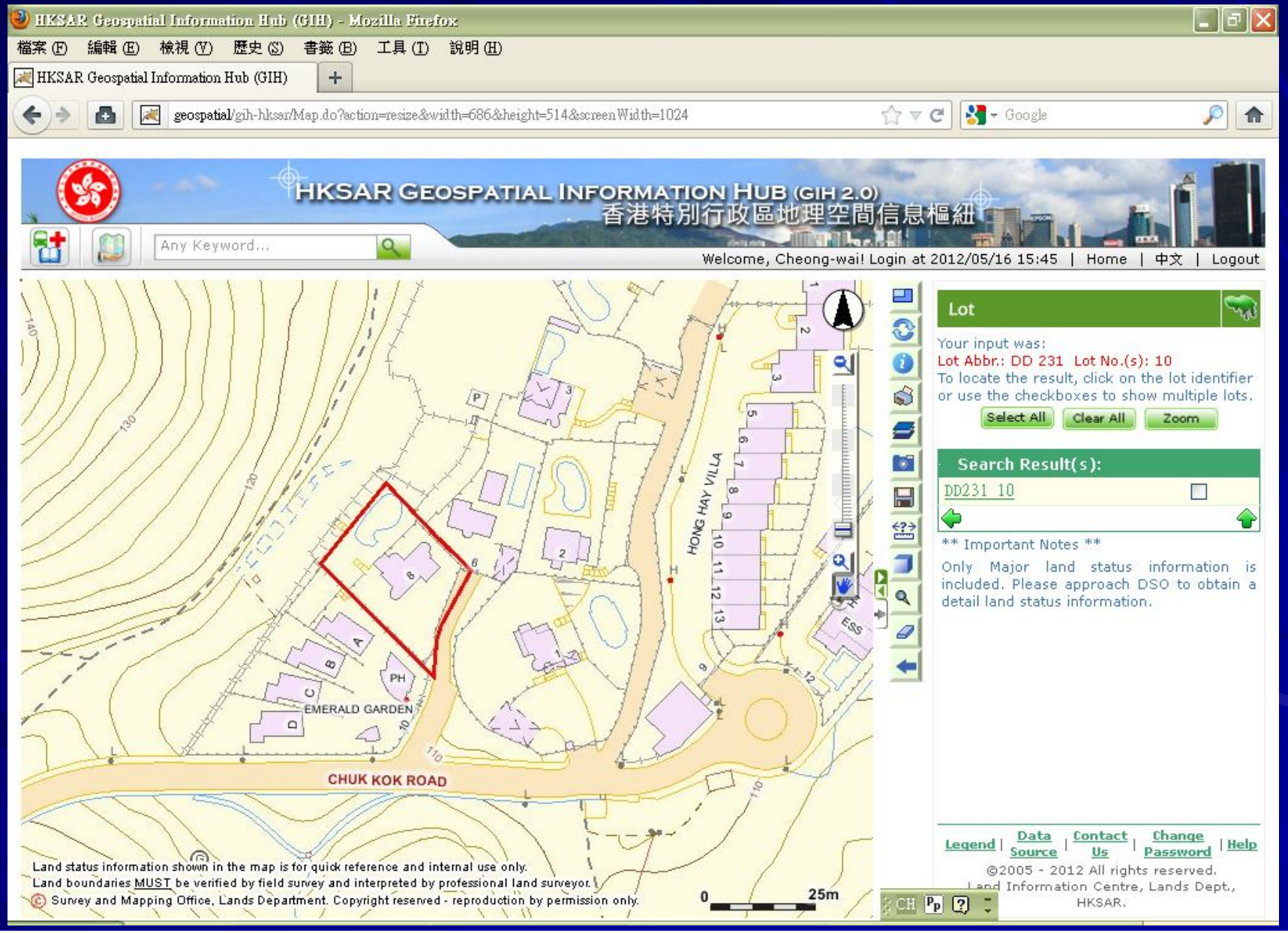
Geospatial Information Hub

- One-stop Geospatial Information Sharing Platform to support government's services to the community

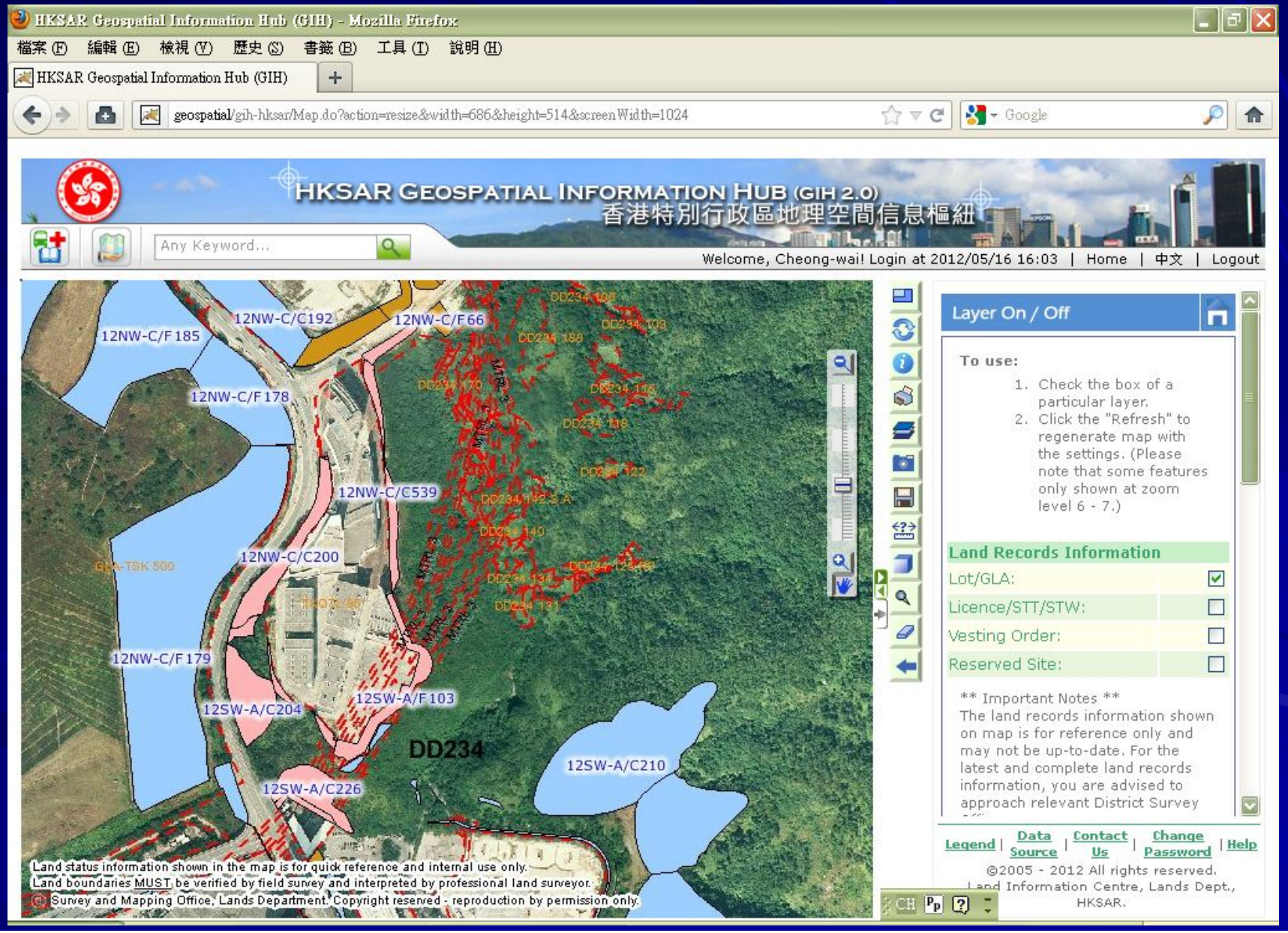
Geospatial Information Hub



Land Status Information

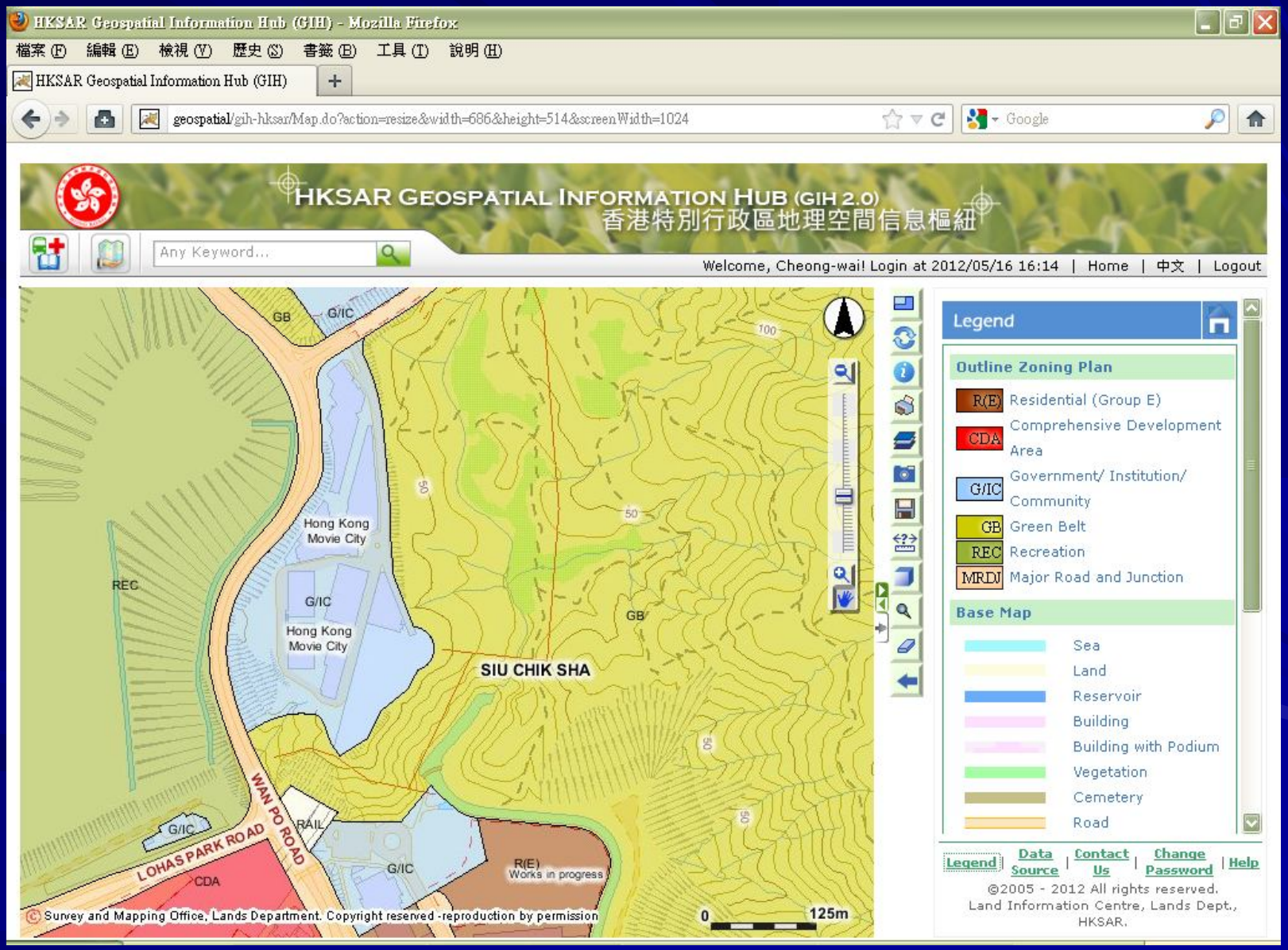


Land Status Information on Orthophoto

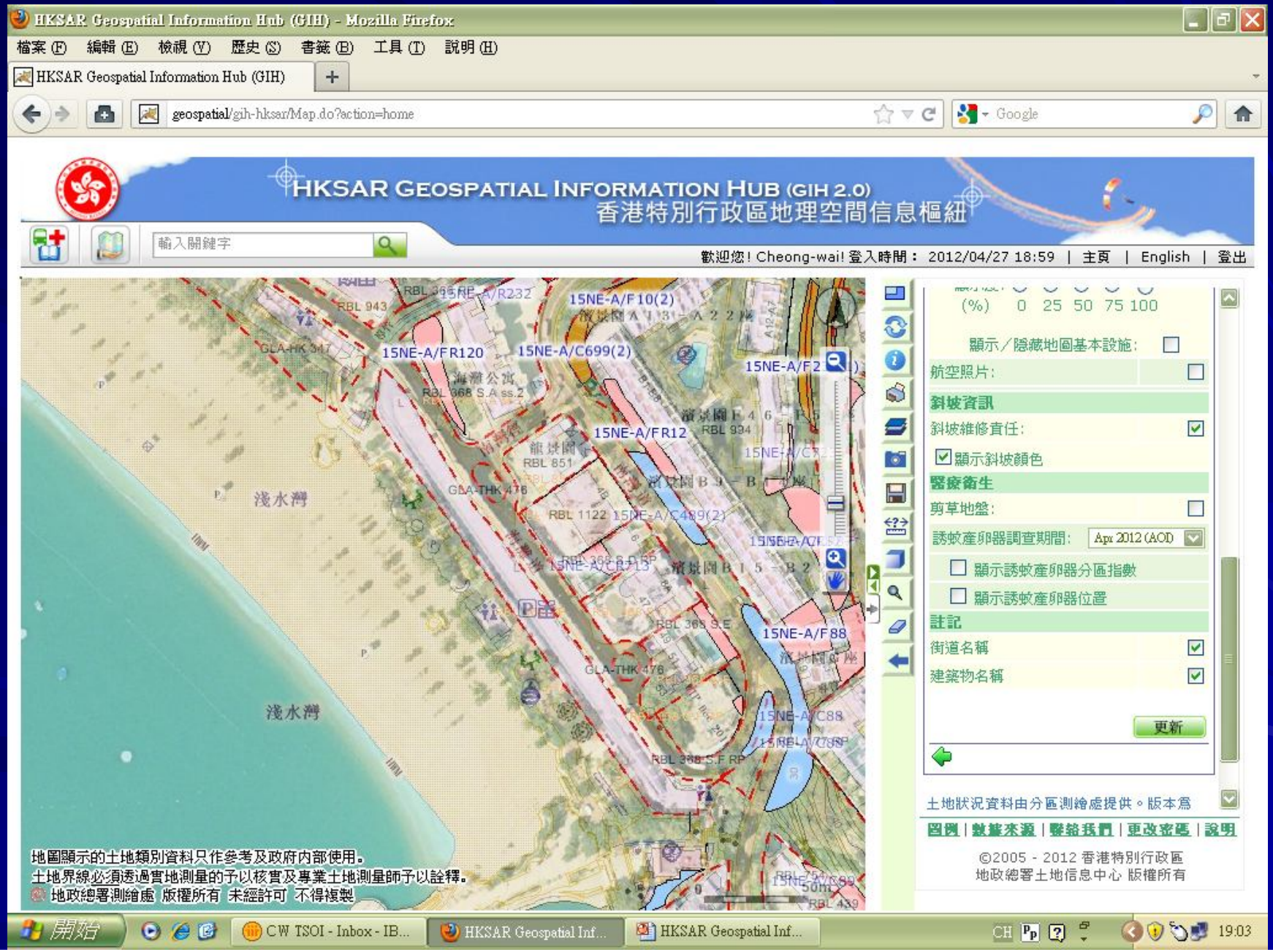


Land Boundary Information

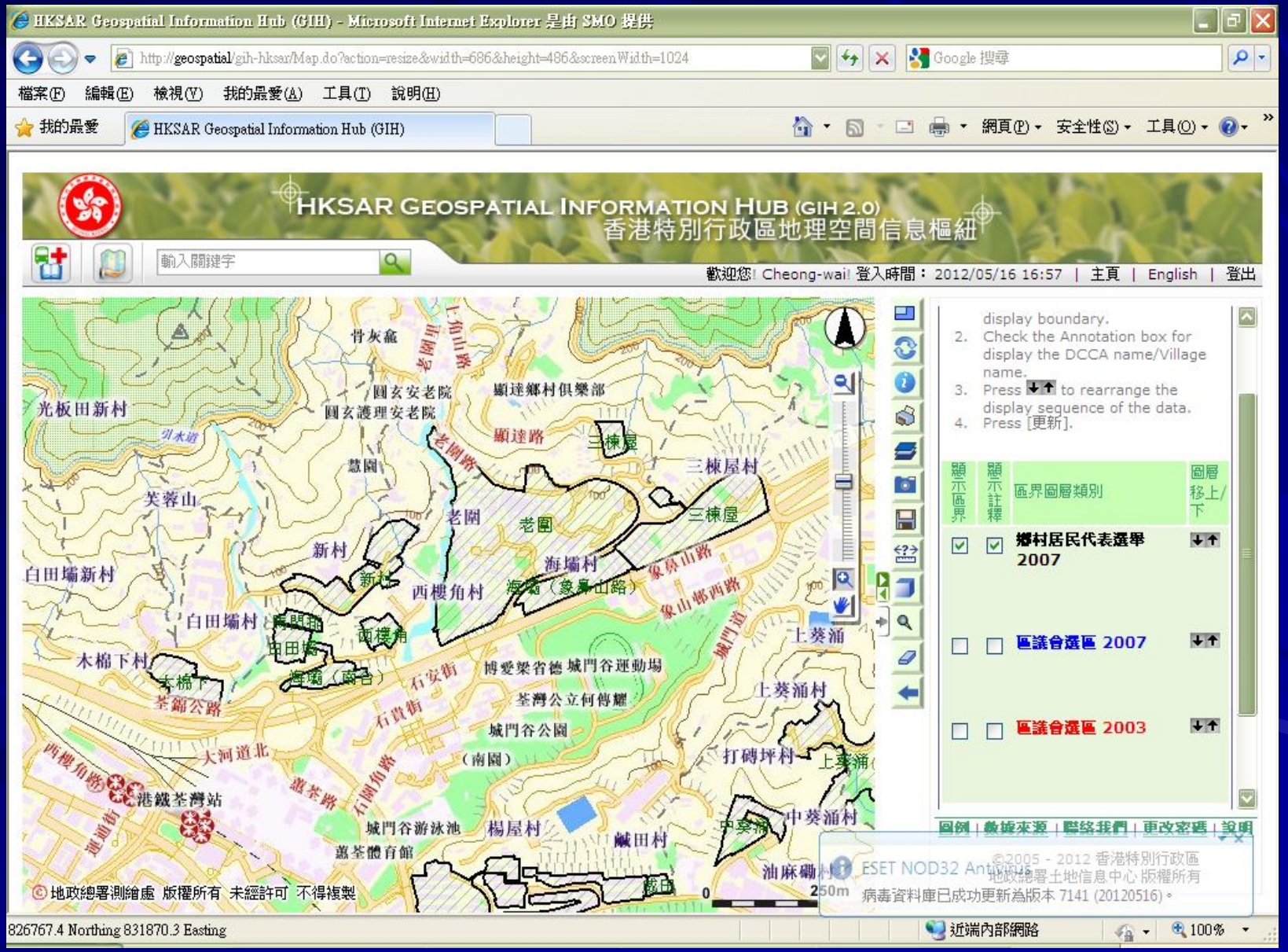
Town Planning Outline Zoning Plan Information



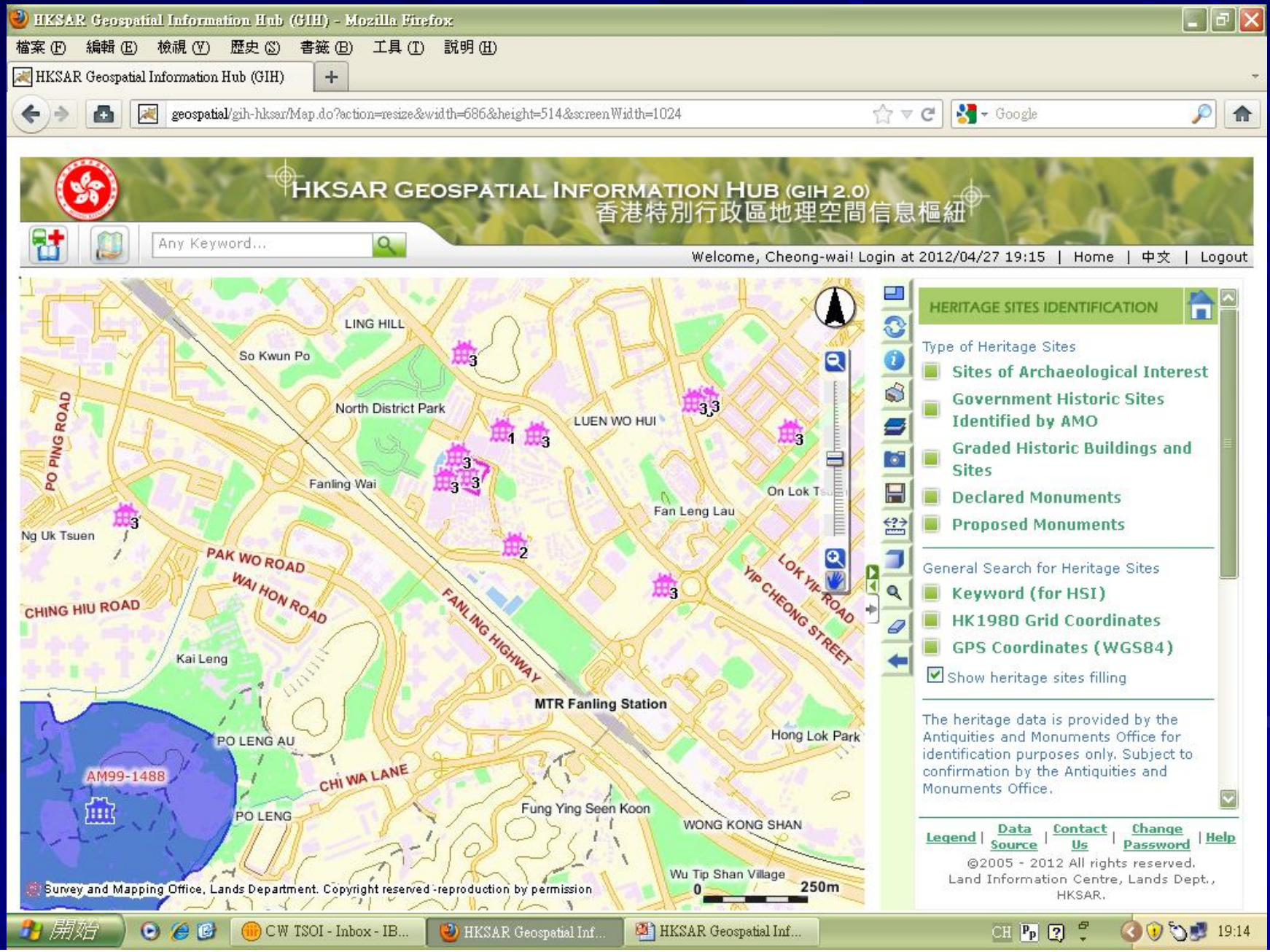
Slope Maintenance Responsibility Information



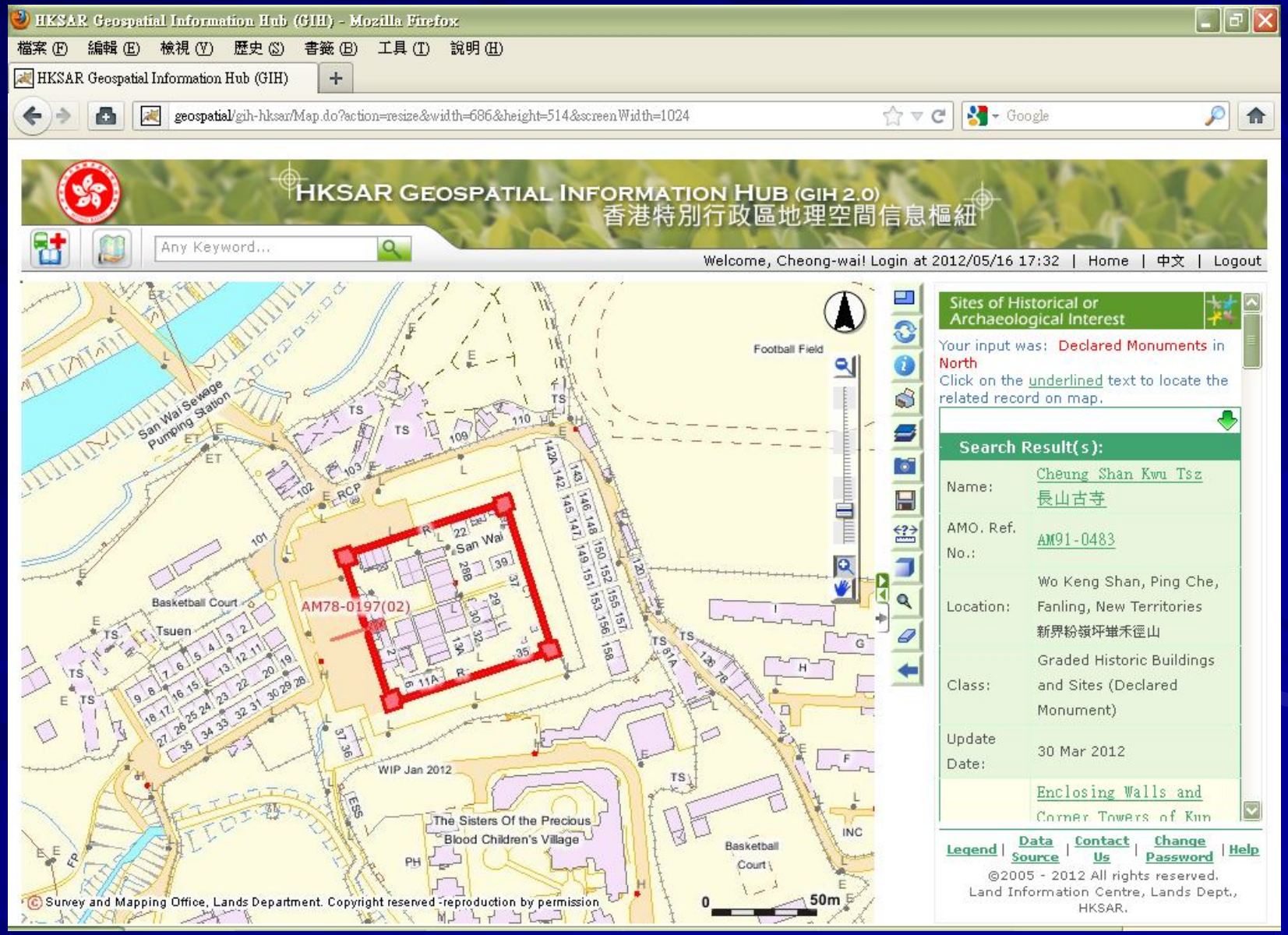
Village Representative Election Information



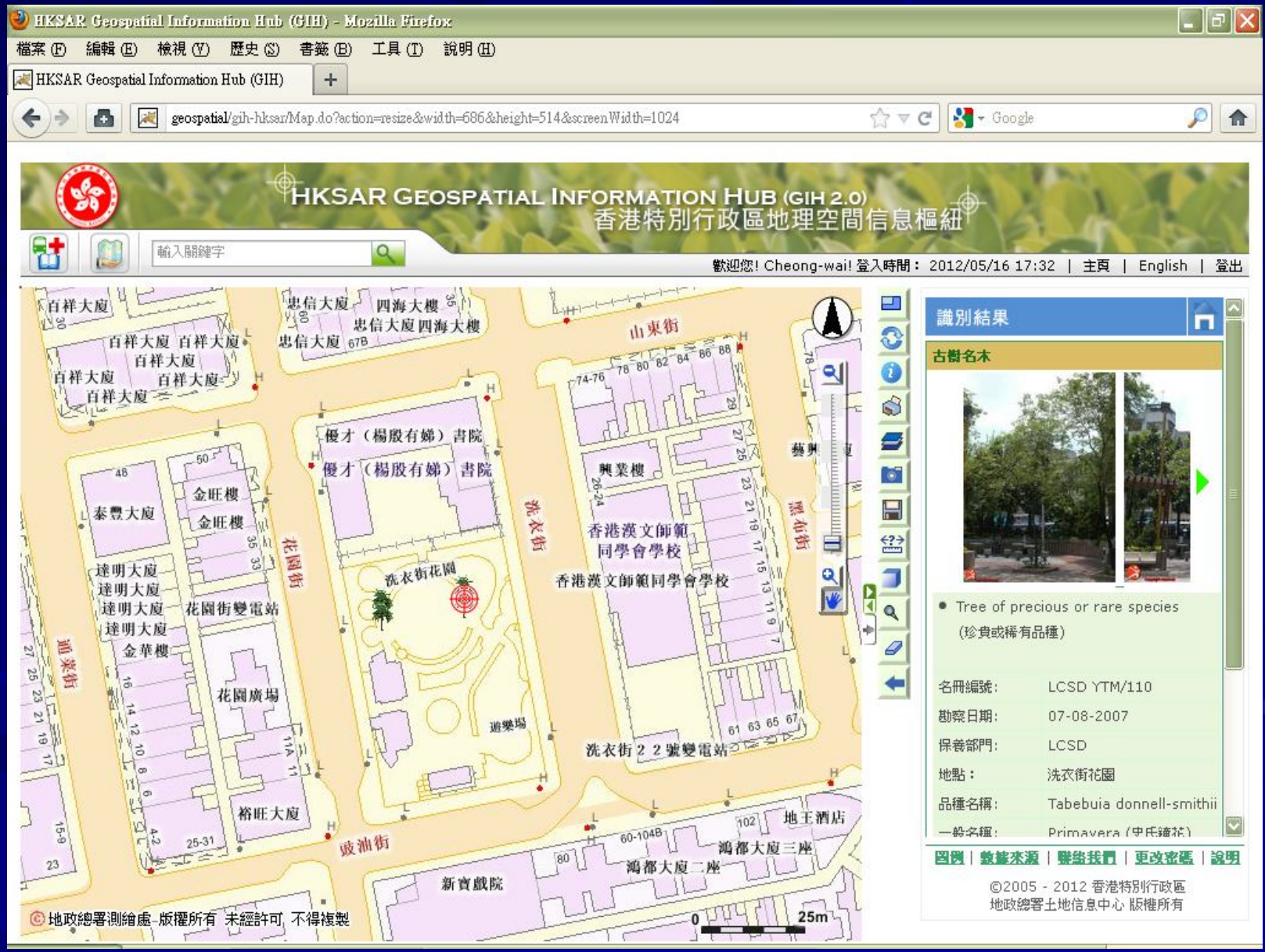
Heritage Sites Information



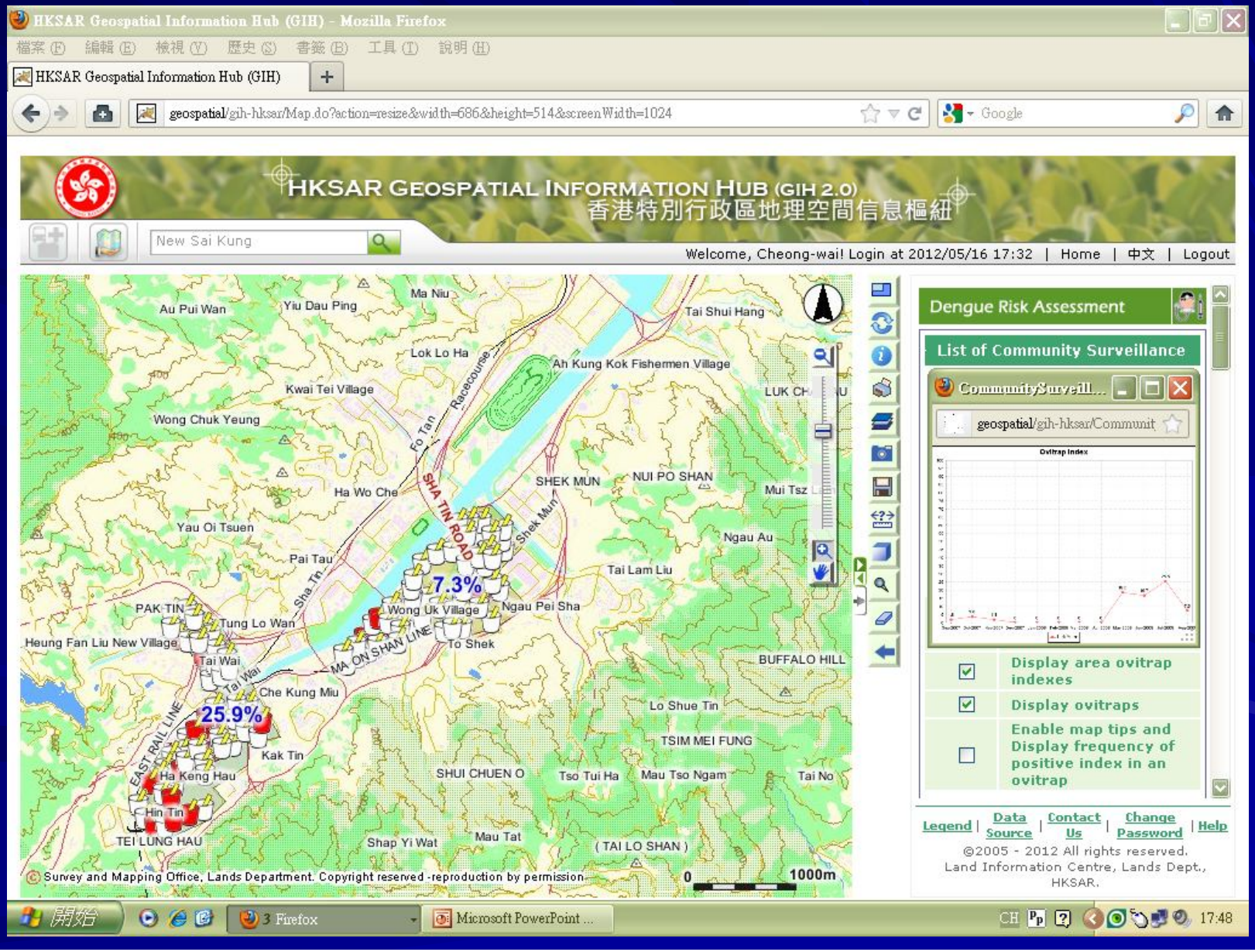
Declared Monuments Information



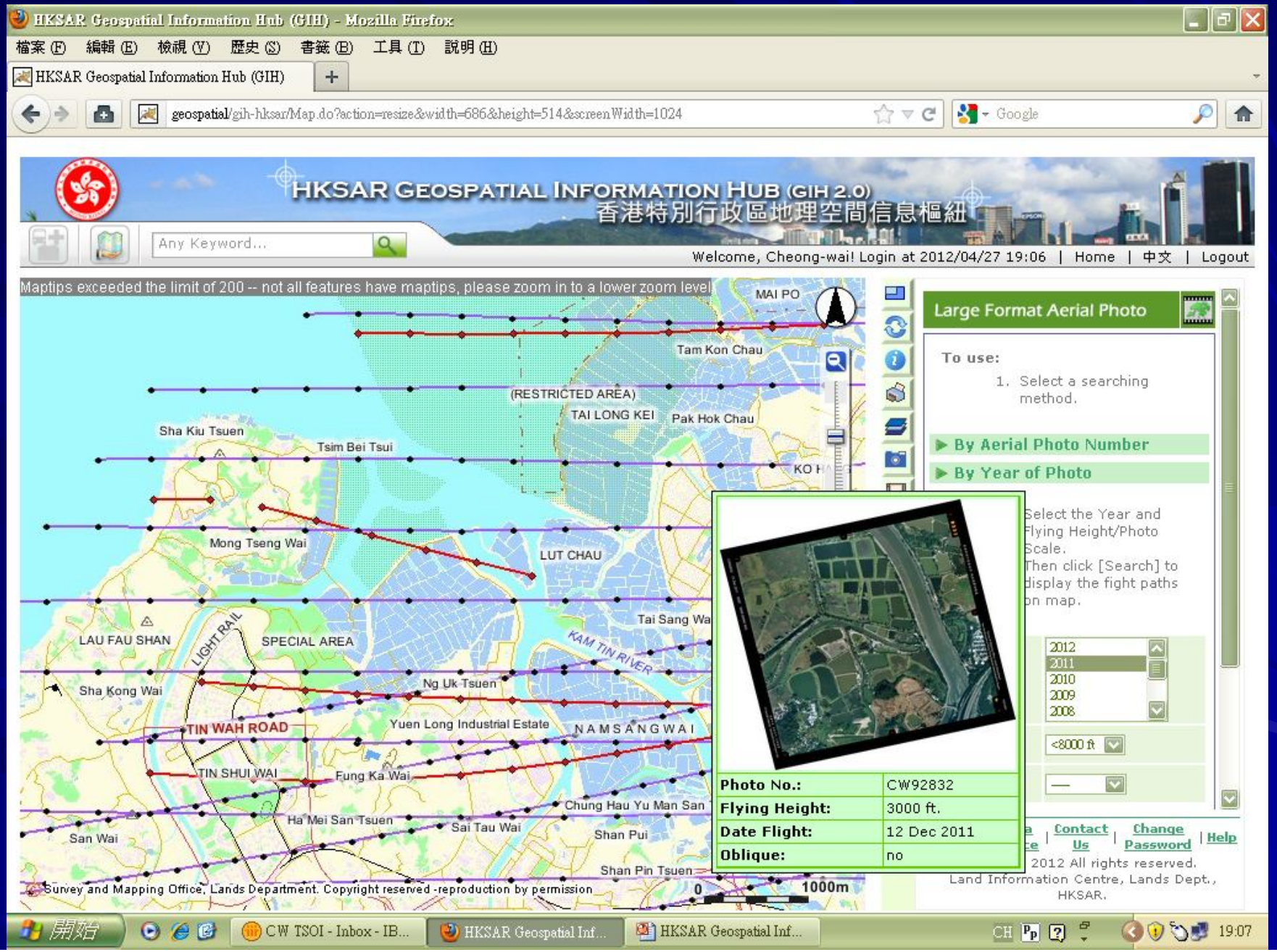
Old and Valuable Trees Information



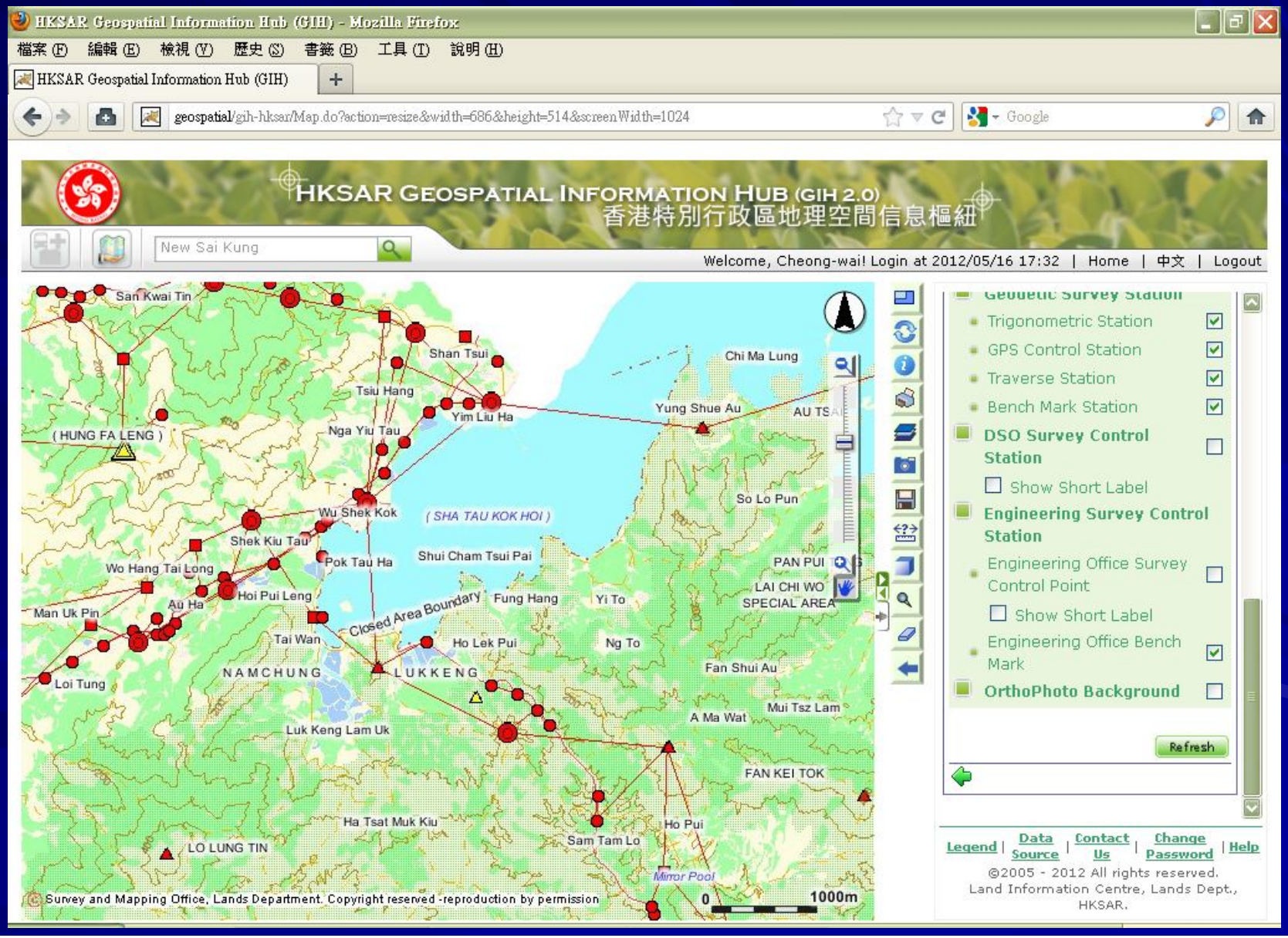
Ovitrap Information for Dengue Risk Assessment



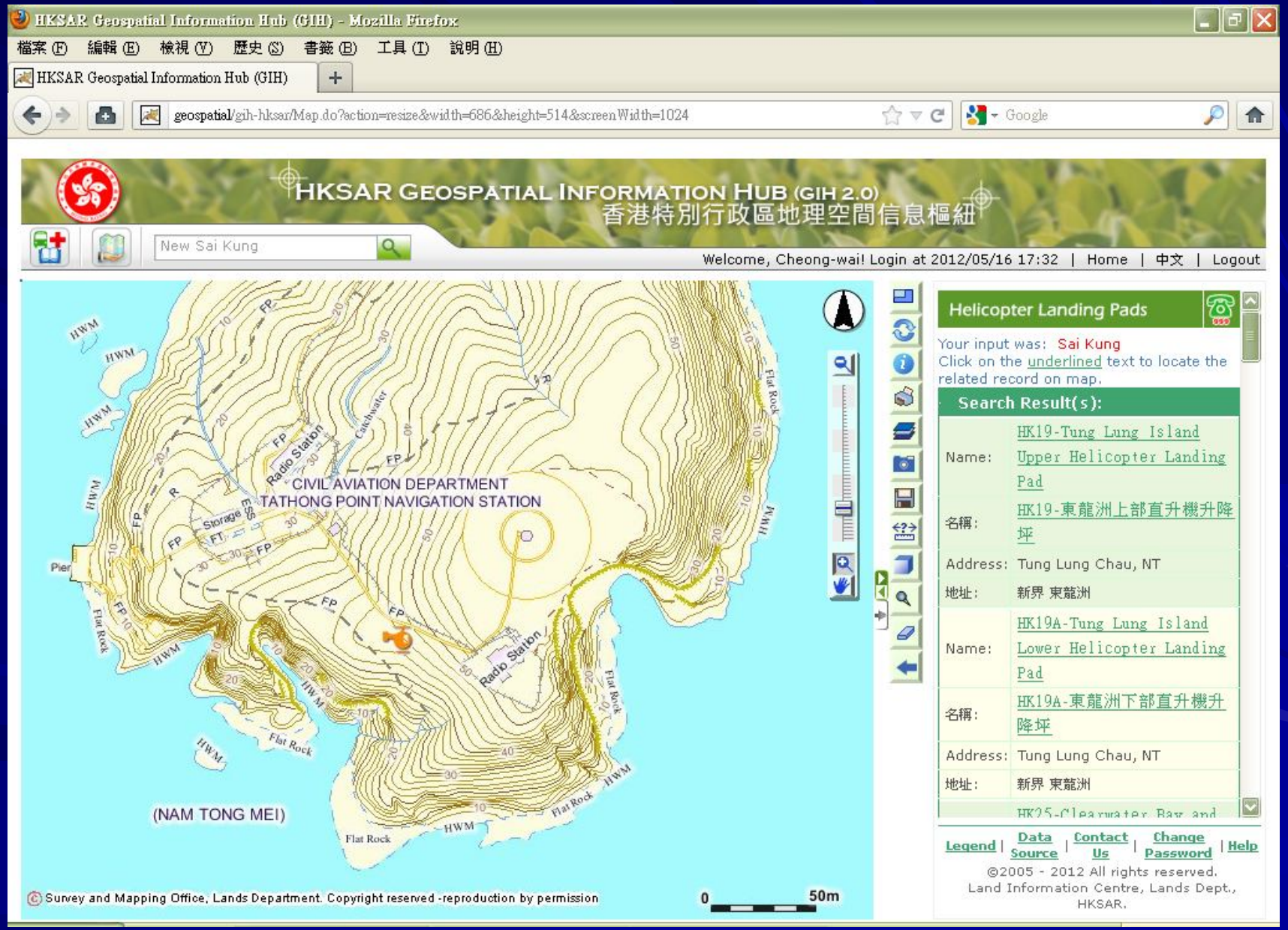
Aerial Photos Flight Index



Geodetic Survey Control Stations Information



Helicopter Landing Pad Information



Objectives fulfilled

- Enhancing the availability and accessibility of geospatial information
- Providing a common geospatial information platform that encourages information sharing
- Improving overall operation efficiency and the government's ability to respond to different situations
- Reducing the total cost of data ownership within the government

数码地图是应用资讯科技的基础设施
Digital Map is the Infrastructure for IT Applications

- 用 「地理空间信息枢纽」 建设「数字城市」
  Use Geospatial Information Hub to build our “Digital City”

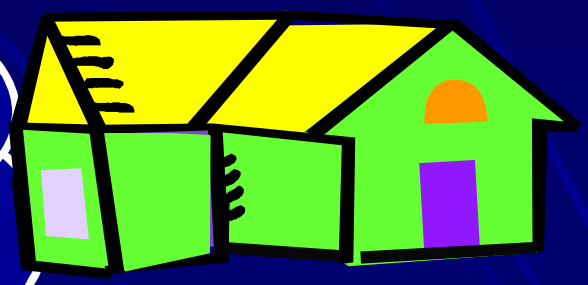
Data Alignment Measures (DAM)

for Planning, Lands and Public Works Geospatial Data

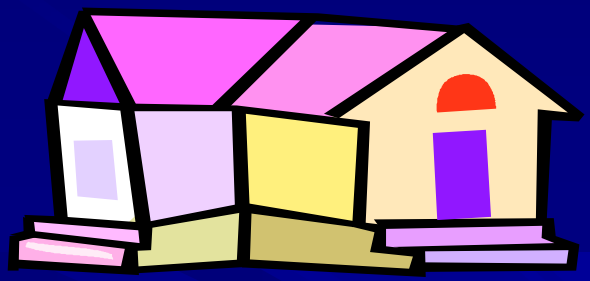
Data Alignment Measures

- Different government departments having different geographical information systems (GIS) with different data standards, data formats and data definitions
- Increasing need to use other department's data to perform the spatial analysis for decision making
- Explore ways to minimize the resources needed for data collection and integration

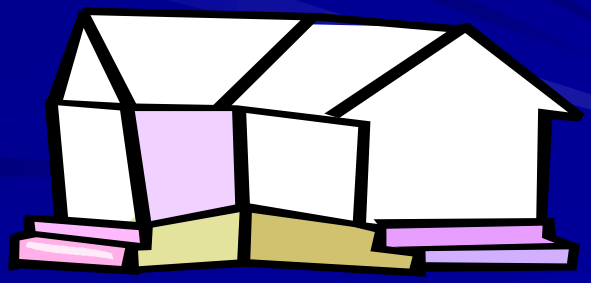
Different data structures
Different definitions
Different formats
Different keys



X Department



Y Department



Z Department

Data Alignment Measures

- To facilitate data exchange, 15 departments under the Housing, Planning, Lands and Works Group started an initiative to align the spatial data created by them in early 2000

- A consultancy study recommended a Data Alignment Strategy that included the implementation of a Data Alignment Measures project to resolve the data exchange problems within the participating departments

Data Alignment Measures

- The project was successfully implemented and completed in March 2007

Data Alignment Measures

- Major measures completed:

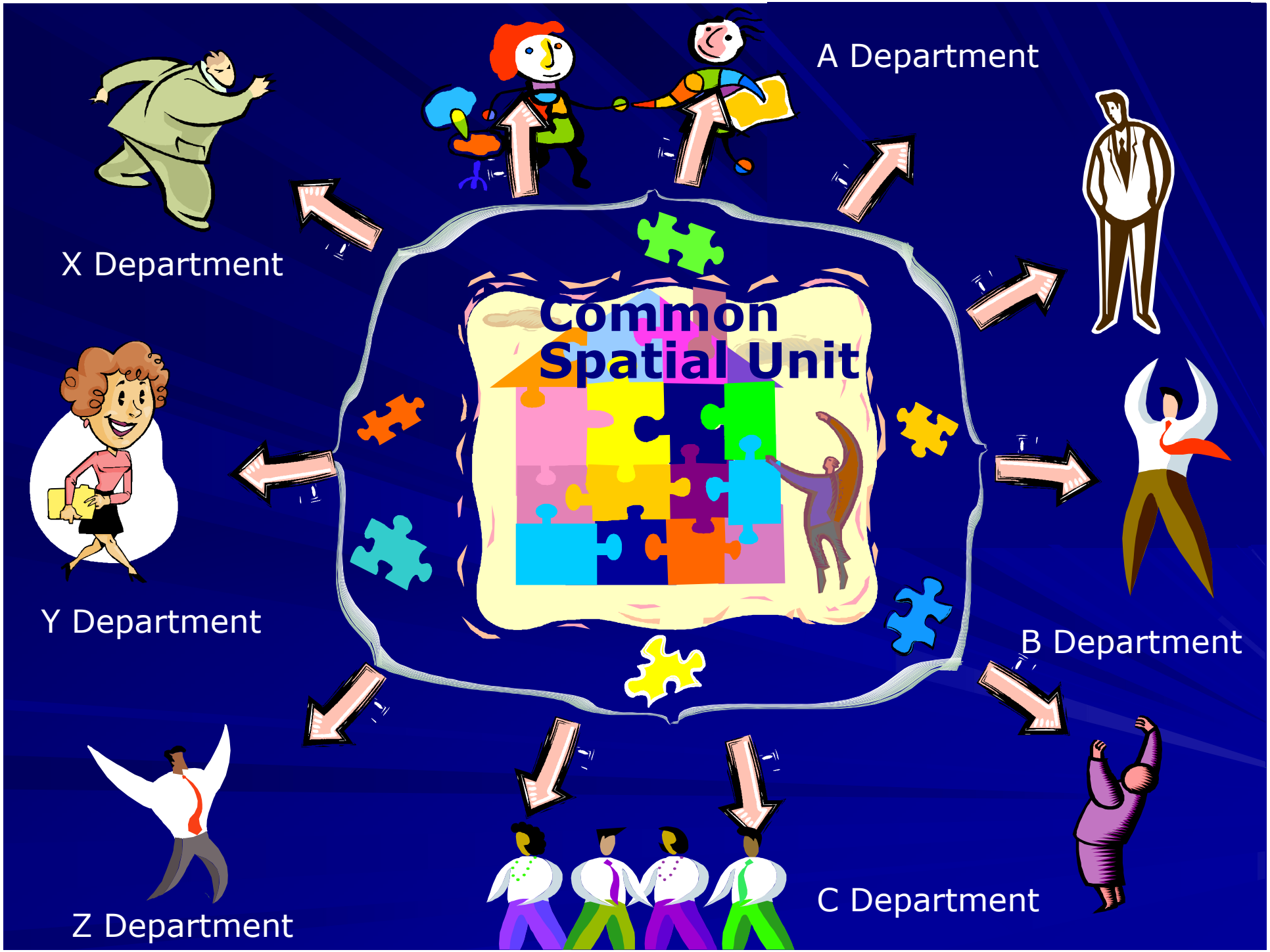
  (1) Create the Common Spatial Units (CSU)

  (2) Standardize the file formats for data exchange

  (3) Provide the Metadata Catalogue services

Common Spatial Units (CSU)

- To solve the data definition problems of the most commonly used geospatial data among government departments
- To agree on the standard units and the identifiers for exchange of geospatial data (both the graphic entities and the textual attributes)
- Five CSUs were identified and created, namely Building, Lot, Road Centreline, Slope and Tertiary Planning Unit


A Department
X Department
Common
Spatial Unit
Y Department
B Department
Z Department
C Department

Building Common Spatial Unit

- Types of buildings for data exchange
  - (1) Private buildings permitted under the Buildings Ordinance
  - (2) Public housing blocks
  - (3) Village small houses
  - (4) Government buildings
  - (5) Temporary and open sided structures (basic mapping specification)

Building Common Spatial Unit

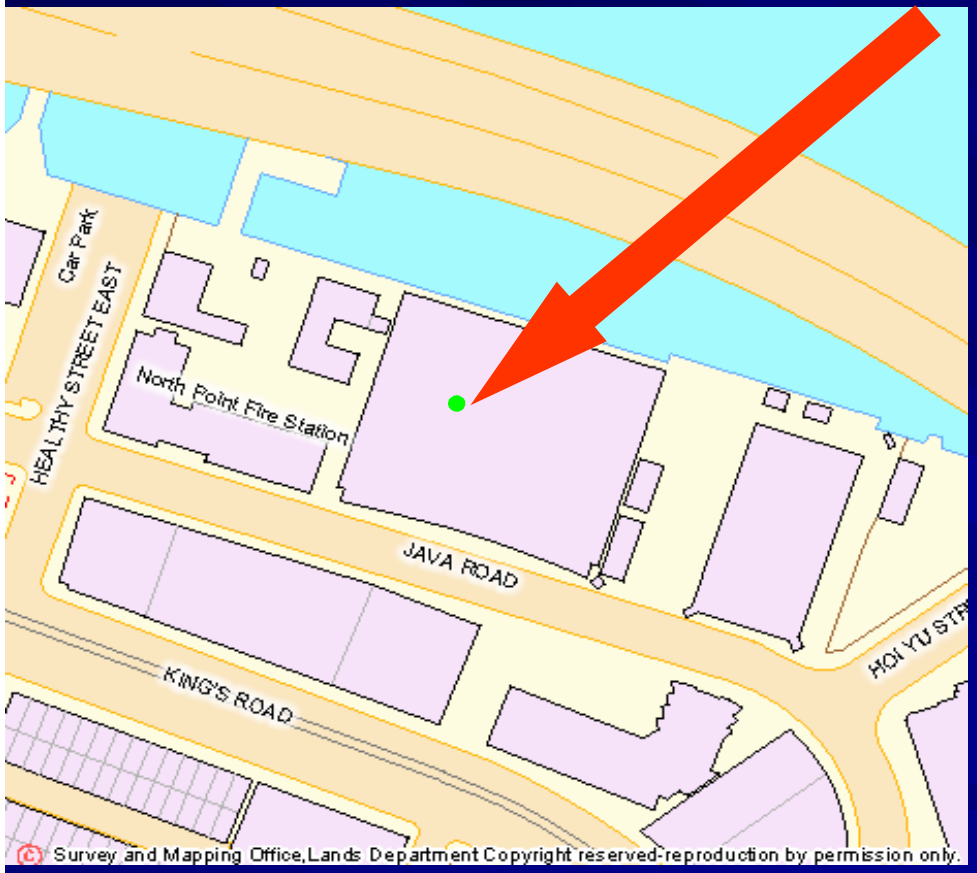
- Graphic Entity: Tower and Podium of buildings
- Types of Polygons: Tower and Podium are represented separately
- Identifier: Unique for each polygon
- Building Status: Active, Proposed, Demolished

Building CSU Identifier

- Composite key comprises

1. the geo-reference number,
2. polygon type and
3. the record creation date

Building CSU Identifier



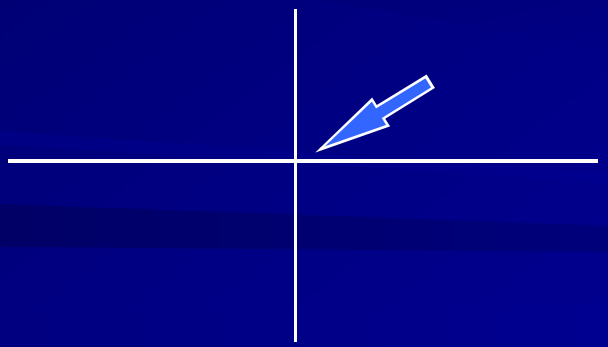
Geo-reference No.	1357924680
Polygon Type (Tower or Podium)	T
Creation Date	22/11/2004

Building CSU ID

1357924680T20041122

Building CSU Identifier

- Geo-reference Number on Basic Map -
  - A 10-digit identifier formed by combining the Easting and Northing of the building label point within the polygon. Decimal is truncated and ‘8’ removed from the coordinates.



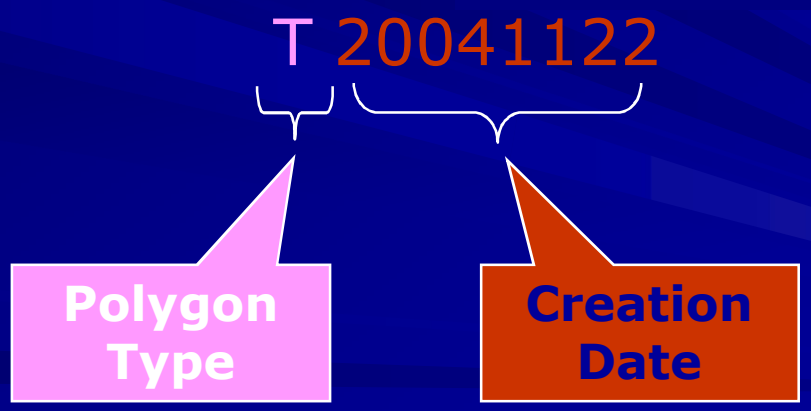
824680.41 N
813579.08 E

Building CSU Identifier

Basic map

Geo-reference Number 1357924680

Building Common Spatial Unit ID



Lot Common Spatial Unit

Current Situation

- A lot is a piece of land held by a private owner under a lease granted by the government
- Only the Lands Department has maintained the graphic information about the land boundaries of all land parcels in Hong Kong
- Different departments (e.g. BD, LR, RVD and LandsD) have their own set of lot identifiers in handling their lot textual information

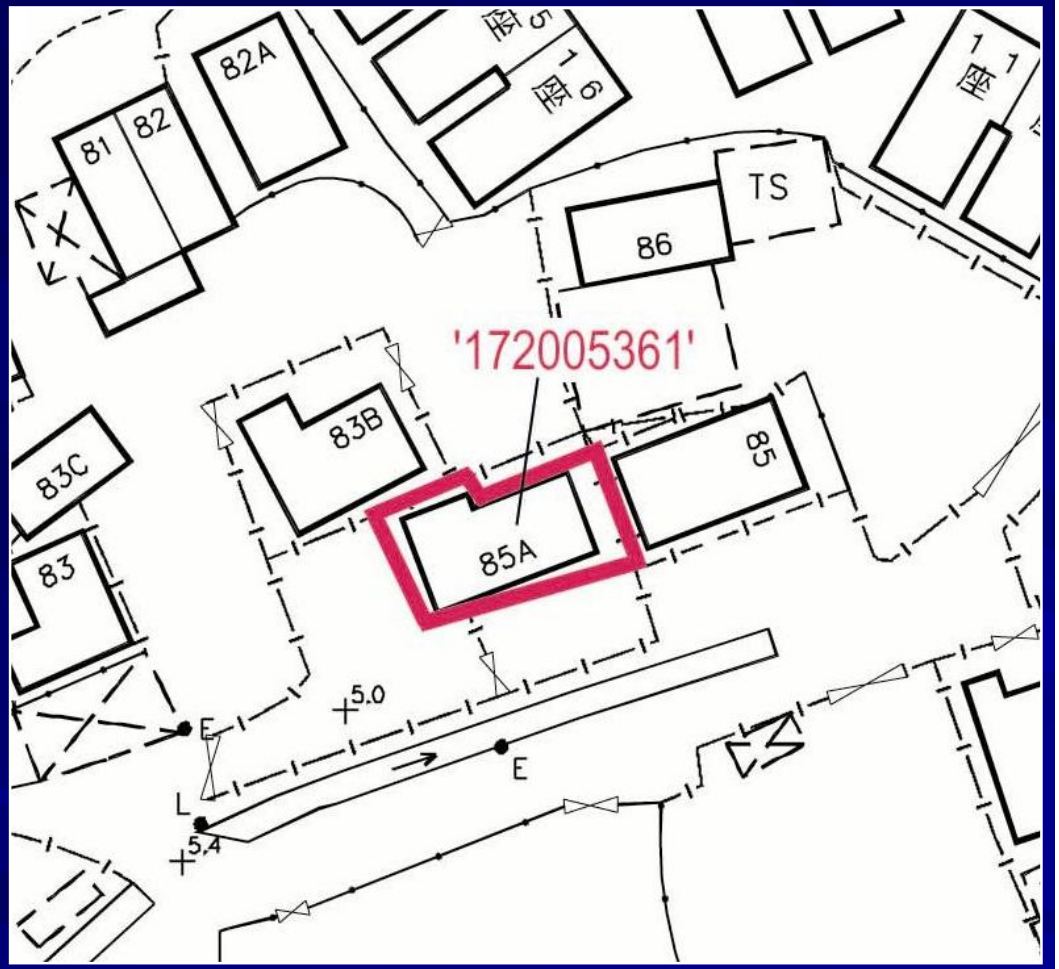
Lot Common Spatial Unit

- To facilitate data exchange, Lot CSU has the following components:

  Graphic Entity: the approximate graphical boundary of the land parcel polygon

  Identifiers: the land parcel identifiers (Lot ID) being used in the Lands Department's Cadastral Information System and the Property Reference Number (PRN) adopted by the Land Registry

Lot Common Spatial Unit



LD_INFO

LOTID	172005361
LOTCD	1720
LOTNO	5361
LOTALPH	
SECTCD	
PRN	
CSU_STATUS	U
CLASS	OSL
SITEAREA	109.4
AREAU	SM
OWNER	
HELD	COEX
HELDNO	4360
USE	BLDG
COMDT	1997/6/20
EXPDT	2047/6/19
LOT_LTERM	50
LOT_LTERMU	Y
RENEW	N
DATESTAMP	2006/4/6
ACT_CD	Z

(DD116)

Lot CSU Identifier

- Lot CSU Identifier
  - The current Lot ID of the Cadastral Information System is adopted as the common identifier, i.e.

Lot Code

+ Lot Number (Numeric)

+ Lot Number (Alpha)

+ Section Code

where Lot Code and Lot Number (Numeric) are mandatory items

Lot CSU Identifier

- Lands Department and Land Registry are responsible for assigning the unique Lot ID and PRN respectively for each CSU record.

- Lands Department is responsible for providing a one-one matching table for the two identifiers, i.e. Lot ID and PRN.

Road Common Spatial Unit

Current Situation

- The road centrelines are stored in the Street/Road layer of the Lands Department's Basic Mapping System

- The "road centrelines" is a topologically structured road network database - a collection of line segments (roads) and nodes (road intersections)

Road Centreline as CSU for Data Exchange

- Road Centreline CSU ID:

  [Street code + Sub-ID]

- Street Code is the unique identifier for each road

  5 digits 3 digits

  The first digit is used to show the types of roads:

  1xxxx, 2xxxx for gazetted street

  3xxxx for flyover, tunnel and by-pass

  5xxxx for street without name

- Sub-ID is the unique identifier for each segment of a road

(2) Standardized File Formats

- To agree on the file formats for exchange of geospatial data
- To streamline the first time data conversion and the future data integration of common spatial units
- To recognize the industrial standards, e.g. ArcInfo, Microstation

(3) Metadata Catalogue Service

- To provide efficient access to the list of spatial data available for use by other government departments
- To implement a Metadata Catalogue System to house the metadata documents of all government spatial data, including those of the common spatial units (CSU)

Roles of Data Agent in DAM

- Provide facilities for the submission of spatial data from data owners
- Convert spatial data into CSU in accordance with the agreed DAM standards
- Integrate new spatial data to form CSU
- Disseminate the DAM compliant CSU data to data users
- Develop and maintain a Data Dissemination System for efficient CSU data transfer

Roles of Data Agent in DAM

- Lands Department has continued to play its roles as the Data Agent for Building CSU, Lot CSU and Road Centreline CSU
- The Data Dissemination System (DDS) has been rolled out for use by participating departments since December 2006

Roles of Data Agent in DAM

- Being the Data Agent, the Lands Department has also completed the production of metadata of the Building, Lot and Road Centreline CSUs and maintained the respective metadata documents in the Metadata Catalogue System
- The Metadata Catalogue System being maintained by the Lands Department has become the central depository for all spatial data metadata documentations
- The Metadata Catalogue System is now open to the Public on the Internet

Success Factors

Policy and financial support

- Top-down approach
- Strong management framework

1. Project Steering Committee headed by Bureau
2. Cross-department collaboration
3. Departmental management support
4. Departmental working groups

- Sufficient resources allocated to departments for implementation

Success Factors

- **Awareness of the need for data exchange**
  - Importance of geospatial data for decision making
  - Collaboration means greater success
- **Active participation among data owners, data users and data agent**
  - Good communication and frequent discussion
  - Willingness to address the concerns of stakeholders
  - Consensus reached before implementation

Tangible Benefits of DAM

- Work on common data definitions and identifiers
- Availability of more useful information
- Enhanced cross-department collaboration
- Avoided tedious work for data collection or merging information from various sources
- Elimination of duplicated efforts in application system development

Intangible Benefits of DAM

- Setting a cornerstone for future cross-department cooperation
- Knowing how to optimize the use of government resources in the future
- Knowing the way forward for establishing the Spatial Data Infrastructure in Hong Kong

Thank you

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- 用 「地理空间信息枢纽」 建设「数字城市」
  Use Geospatial Information Hub to build our "Digital City"

「统一数据措施」是建立「空间数据基础设施」的第一步

Data Alignment Measures is the first step towards the establishment of the Spatial Data Infrastructure