Amendment History				
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1. CURRENT ENVIRONMENT DESCRIPTION

1.1 CURRENT SYSTEM DESCRIPTION

1.1.1 Background

1.1.1.1 Base Map Data

The Lands Department (LandsD) is responsible for the administration of land in Hong Kong. Its major functions include the disposal of land, acquiring private land, clearing private and Government land required for the implementation of public works and other projects, managing leased and unleased land held by the Government of the Hong Kong Special Administrative Region (HKSAR), and regranting and modifying lease conditions. It consists of three major functional offices:

- Lands Administration Office (LAO) – conducts and manages the administrative exercise of land development and land grant/sale proposal in HKSAR
- Survey & Mapping Office (SMO) – undertakes survey and maintains the base set of topographic and land record in HKSAR
- Legal Advisory and Conveyancing Office (LACO) – provides legal and conveyancing services to Government, mainly to the Lands Department but also to the Home Affairs Department and the Government Property Agency

The SMO maintains topographical and land record maps within the Computerized Land Information System (CLIS). This was designed in 1989 and maintains up-to-date digital map and land record information databases to increase the efficiency and productivity of producing land boundary plans and topographic maps. The topographic maps, geo-reference information and the land records information are all available in digital form and constantly kept up-to-date.

Since 1995 a comprehensive set of digital topographic maps at a range of scales down to 1:1,000 has been made available by SMO. This has been augmented with additional digital map products covering land records (cadastre at 1:1,000 scale) and geographic information (road centrelines, addresses, building polygons). This information is available for use by other Government departments, private organizations and the general public. As the amount of digital map data available from SMO has increased and the use of digital map systems and Geographical Information Systems (GIS) within Government departments and other organizations has expanded, there has been a dramatic increase in demand for SMO's digital map data and improved methods and techniques for their distribution and delivery.

1.1.1.2 Planning, Lands and Public Works Data (PLW Data)

PLW Data is the data relating to topography; land parcels, land use and land administration; buildings and developments; planning of future land uses and future land supply; infrastructures delivered or maintained by the Works Departments; and Works projects in the Public Works Programme. Regular as well as ad hoc data exchange arrangements on PLW Data, PLW Data Exchange Processes, are made between data consumers and providers on all identified data entities. Some exchange processes required data consumers to spend considerable staff resources in post processing, in particular in matching of records and dealing with differences in data definitions.

1.1.1.3 Data Alignment Measures

Housing, Planning and Lands Bureau (HPLB) started an initiative to align the exchange of PLW Data among different participating departments in early 2000. The Consultancy Study on Alignment of Planning, Lands and Public Works Data (the PLW Study), completed in Jan 2002, recommended a Data Alignment Strategy (DAS), a component of which includes six Data Alignment Measures (DAM), to address pressing data exchange problems existing within the participating departments (PDs).

HPLB commissioned Azeus to conduct the implementation of DAM in October 2002. The objectives of the Data Alignment Measures include:

(i) DAM 1: Common Spatial Units (CSU) - to establish CSUs for solving the data definition problems and provide a data model for data dissemination purpose;

(ii) DAM 2: Standardisation of symbology for themes of cartographic entities - to identify existing symbologies for the CSU Themes (to be incorporated in each respective data model) and a plan to save the effort of re-symbolisation through standardising the symbologies for layered themes of cartographic entities;

(iii) DAM 3: Standards for file formats and reformatting technology used to exchange data - to streamline file conversion through standard file formats and technology for exchanging of data;

(iv) DAM 4: Policy on exchange of data in electronic formats - to formulate appropriate policy relating to the exchange of PLW Data;

(v) DAM 5: Catalogue service - to establish a central catalogue for providing efficient access to list data content available for sharing from the Subject Entities; and

(vi) DAM 6: Automation of production of metadata - to automate the production of data source metadata through the use of software tools.

As part of the recommendation on the solution of DAM 1, five Common Spatial Units, including Slope, Building, Road Centreline, Lot and TPU/SB are defined.

The participating departments (PDs) of the CSUs include:

HPLB	ETWB	FSTB
BD	ArchSD	C&SD
LandsD	CED	RVD
LR	DSD	
PlanD	EMSD	
	HyD	
	TDD	
	WSD	

Common Spatial Unit (CSU) is a desired unit for storing spatial data that is shared with other PDs. Implementation of CSU includes development of system interfacing facility,

data conversion and development of data dissemination facility. Upon completion of implementation, PDs have to prepare their data that need to be shared with other departments as stipulated in the CSU specifications.

Appendix 3.1.6 lists the existing PLW data exchange processes identified in DAM. The processes were classified according to its related DAM component and its related CSU.

It is anticipated that, with the implementation of Common Spatial Units (CSUs), the post-processing efforts incurred in resolving data definition problems in the existing data exchange processes could be reduced.

LandsD was nominated as the Data Agent[1] for Building, Lot and Road Centreline CSUs. In order to support the required data importing and dissemination functions, a data dissemination system is required.

Included in the appendix of this document are the existing and revised workflows of Building CSU (Appendix 3.1.1), Lot CSU (Appendix 3.1.2) and Road Centreline CSU (Appendix 3.1.3). Details of the current and recommended file formats are illustrated in Appendix 3.1.4, and the dissemination option recommended is summarized in Appendix 3.1.5.

1.1.2 Business Areas Served

1.1.2.1 Base Map Data Dissemination

The current data dissemination operations in SMO serve the following business areas:

(i) LAO – facilitate LAO function by providing timely land information including cadastral plans for the enquiries from other Government departments and the general public.

(ii) Other Government departments – provide digital map data to other Government departments and their consultants/contractors, both on a regular and specific project basis.

(iii) General public/private sector – the digital map data is sold and used by the general public or private sector for various purposes and developments such as utility management, engineering works, business development and education etc.

(iv) Business Partners with LandsD – supply the digital map data to the business partners having specific contract with LandsD in order to promote the use of digital map data by building their own applications on the digital map data.

(v) Value Added Reseller (VAR) – the digital map data is sold and used by the VAR to produce value added map product for the general market.

(vi) Internet Map Permittee (IMP) – the digital map data is sold and used by IMP to develop map applications on the Internet for the general market.

[1] For detailed description on roles and responsibility of a Data Agent, please refer to Section 1.1.2.2 – CSU Data Dissemination .

1.1.2.2 CSU Data Dissemination

In the context of DAM, there are three defined roles applicable for each CSU. The roles include Data Agent, Data Owner and Data User – and their roles and responsibilities are defined in details in the Policy in DAM 4, and highlighted as follows:

Data Agent
A Data Agent is a PD assigned with the responsibility to being the central point of contact for developing and disseminating information of the entrusted CSU. The Data Agent is responsible for working with Data Owners to implement the CSU standards, this includes:
(i) Enforce the specification of CSU;
(ii) Respond to Data Owners/Data Users requests for enquiries on features;
(iii) Assign and maintain CSU IDs; and
(iv) Administer dataset ownership.

Data Owner
A Data Owner is a PD who, through the course of its business operations, develops and maintains datasets that are shared with other PDs in the context of CSUs. The Data Owner would be responsible for preparing the relevant CSU data (under their ownership jurisdiction) to the CSU specification and ensuring the completeness and accuracy of its datasets and making them timely available for sharing.

There can be multiple Data Owners for one CSU. Each Data Owner contributes a portion of the CSU data under their ownership jurisdiction.

Data Users
In the context of DAM 1, Data Users include only the PDs who shall undertake or sign a license agreement, when applicable, to ensure that the data obtained from the respective Data Owners through the Data Agent is for the purpose stipulated in the license agreement. Also they shall conform to the requirements with respect to data privacy, security and confidentiality. On successful implementation of DAM 1 or possibly in the future implementation of Data Alignment Framework (DAF), Data Users might include non-PDs and external users outside government. Similar arrangement might apply.

Table 1.1.2.2-1 below summaries the role(s) taken by each PDs in the five CSUs from DAM:

PDs	Slope CSU	Building CSU	Lot CSU	Road Centreline CSU	TPU/SB CSU
ArchSD	DO, DU	DO			
BD	DU	DO, DU	DU		DU
C&SD		DU			DU
CED	DA, DO, DU		DU	DU	
DSD	DO, DU		DU	DU	DU
EMSD					
HyD	DO, DU			DU	

PDs	Slope CSU	Building CSU	Lot CSU	Road Centreline CSU	TPU/SB CSU
LandsD	DO, DU	DA, DO, DU	DA, DO, DU	DA, DO, DU	DU
LR			DO		
PlanD		DO, DU	DU	DU	DA, DO, DU
RVD		DO, DU	DU		DU
TDD	DO				DU
WSD	DO, DU				

Note:
DA: Data Agent
DO: Data Owner
DU: Data User

Table 1.1.2.2-1 - List of Data Agent, Data Owners and Data Users for the 5 CSUs

1.1.3 Major Business Operations

1.1.3.1 Operation in LAO

LAO comprises a Headquarters, some specialist sections and 14 District Lands Offices (DLO). The main functions of LAO are listed as follows:

- Land Disposal
- Lease Enforcement
- Land Exchanges and Lease Modifications
- Government Land Control
- Land Acquisition
- Task Force Black Spots

DLO Linkage to CLIS establishes direct linking for all DLO to the relevant District Survey Offices (DSO). It is essential that DLO have to access the most up-to-date and accurate land information. DLO therefore work closely with the DSO to ensure that map data and land boundary data used in performing their functions is accurate and up-to-date. DLO does not make any modifications to base maps. They use it as a reference when evaluating Land Disposal, Acquisition and Grant proposals.

DSO is responsible to produce maps and plans required by DLO in order to facilitate DLO to execute their functions as stated above, for example, Land Boundary Plan and Land Status Plan are the major plans produced by DSO to support the Land Conveyancing in DLO.

1.1.3.2 Operation in SMO

SMO comprises a Headquarters, 12 DSO and other functional offices. It is the central authority for land surveys and the production of all types of maps in HKSAR and is responsible for the following:

- The establishment and maintenance of a geodetic control network
- The provision of topographic surveys, land boundary (cadastral) surveys, photogrammetric survey as well as cartographic and reprographic services (i.e. map sale)
- The production and revision of maps and plans at different scales for various purposes

Land Information Centre (LIC) is one of SMO's functional sections. It undertakes the responsibilities to collect the digital map data from all DSOs and maintain the up-to-date digital map data for LandsD. LIC is also responsible to disseminate the digital map data to external parties. Major functions of the LIC:

(i) maintains a centralize database of topographic and land record mapping information from the data prepared in various DSOs
(ii) setup data standard and conduct quality assurance of the digital mapping databases
(iii) provision of digital mapping information (with or without charges) to users

Other details of operation in LIC are explained in section 1.1.3.3.

DSOs are district survey offices of SMO. Each DSO produces the latest digital map data of its own district by conducting the required land survey. Once it is completed, the digital map information is uploaded into the district digital map library and transmitted to the LIC through the WAN network on a daily basis.

DSO does not disseminate digital land record or map data to any external parties. However, they provide a map sales counter service to the general public for the sales of hardcopy map product. The available hardcopy map data from DSO only covers its own district area (with the exception of the Map Sales counters in Hong Kong and Kowloon which sell hardcopy map products for the entire HKSAR).

DSO also support other Government departments and their consultants by producing project related plans such as land resumption plan, street name plan, gazette plan in hardcopy format.

Very often, DSO receives:
- hardcopy or
- digital map data such as project alignment

from other Government departments or external project consultants which are working for the concerning departments. DSO would carry out their own data conversion for importing the data to Arc/Info platform. For more complicated jobs, they could also seek the assistance from LIC for data conversion. For the latter case, the files will be uploaded to LIC for data conversion. After conversion, the data will be sent back to DSO for further processing or plan production.

1.1.3.3 Operation in LIC

LIC is currently the only dedicated section of SMO responsible for dissemination of the digital topographic map, land boundary map, Geo-Reference database, Geo-community data and digital orthophoto. Dispatch of the data is centralized at Map Publications Centre (Hong Kong). These products cover the whole of HKSAR and are continuously being updated. Many utility companies, engineering consultants, computer consultants and

education institutes have established their own Computer Assisted Drafting System, Facilities Management, Management Information System and Geographic Information System using the digital maps provided by LandsD for different applications. Appendix 3.2.1 shows the Price List of Hong Kong Digital Map Product.

Currently, the digital map data is disseminated to the following five categories of users:
(i) Other Government departments and their consultants/contractors,
(ii) Private sector and the general public,
(iii) Business partners,
(iv) IMP and
(v) VARs

Details of each category are described as below:

i. Other Government departments and their consultants/contractors

Other Government departments generally are required to send a memorandum to the LandsD requesting the required digital map data. Many of these Government departments have a specific section/unit that coordinates all the map requests within the department. Subsequently, they will send the requests to LandsD for processing. After receiving data from LandsD, those sections/units will arrange to re-distribute the data to the concerned parties within the department. The following are those departments having established the aforesaid arrangement:

- Highways Department (HyD)
- Civil Engineering Department (CED)
- Drainage Services Department (DSD)
- Agriculture, Fisheries and Conservation Department (AFCD)

In the case of PlanD, they can download the Arc/Info format of the digital map data in the Digital Topographic Map Database via the network, as both Government departments are in the same building with network connection through the network backbone of North Point Government Offices. However, this arrangement is very undesirable from the data and network security point of views.

A data server from Fire Services Department (FSD) is placed in LIC for its Third Generation Mobilizing System. Rating and Valuation Department (RVD) also places a data server in LIC. The digital topographic map and land boundary data are downloaded from the LIC central data library to the FSD's and RVD's data servers daily and weekly respectively.

Buildings Department (BD) and Government Property Agency (GPA) both place their data server in LIC. Updated 1:1000 digital topographic maps and digital land boundary records are uploaded to these servers daily from the LIC central data library. BD and GPA perform query search for their required information on their client side. They cannot directly download the data from their data server.

Consultants/contractors of Government departments working on Government projects can request for the Government digital data on a project basis with the completion of the following documents:

- an "Undertakings by Government Department for provision of Digital Map Data from Land Information Centre, Survey and Mapping Office, Lands Department to Consultants/Contractors" form (please refers Appendix 3.2.2)
- a plan showing the project area to the LandsD for data preparation
- a "Digital Map Data Order Form (for Government Department's Consultant/Contractor Only)" (please refers Appendix 3.2.3)
- an "Undertakings by Consultant/Contractor on the use of Digital Map Data from Land Information Centre, Survey and Mapping Office, Lands Department" form (please refers Appendix 3.2.4)
- a "Confirmation by Government Consultant/Contractor on the Cessation of the Use of Digital Map Data from the Land Information Centre, Survey and Mapping Office, Lands Department" form (please refers Appendix 3.2.5)

The records of digital map data used by these consultants/contractors are kept track in LandsD. The corresponding Government departments will be informed by LandsD to enforce the cessation of using the LandsD digital map data by their consultants/contractors.

HyD, CED and DSD are authorized by the Director of Lands to directly distribute the digital topographical map DGN data to their consultants/contractors. Usually guidelines and condition for distribution are stated in their departmental internal documents, for example Technical Circular in CED. The consultants/contractors need to sign the agreement of using the digital map data and cease to use the digital map data after the completion of project. These departments shall send a copy of the completed forms together with relevant copies of location plans showing the project area(s) to LandsD for record purposes. For digital map data other than DGN format Topographical Map Data, these departments shall request for the desired data in a case by case basis.

If additional copies of digital map data are required, normal digital data charges may be levied. Normally a single data format of a particular data set will be provided once, free of charge, for a particular project. Requests for multiple data formats or additional copies shall be considered on individual cases and data or handling charges may be required.

LIC has arranged with about nine departments to periodically provide them with the updated digital topographic and/or land boundary data according to their requirements. The update frequency is usually at half-yearly or quarterly interval.

In 2002/03, about 33 Bureaux/Departments (B/Ds) requested for the various kinds of digital map data.

ii. Private sector and the general public

Currently the private sector and the general public can purchase the LandsD digital map data at the Hong Kong Map Publication Centre (HKMPC) at the LIC Headquarters (HQ). The procedure for the purchasing is as follows:

- Complete a "Digital Map Data Order Form (The Form)" (Please refers Appendix 3.2.6) which is available either from the Sales Counter or the SMO web page and return it to the LIC HQ.

- The sales staff confirms the data change with the client for making payment at the time of data collection.
- Payment will be settled either at the HKMPC or returned the receipt of the demand note to the LIC HQ.

iii. Business partners

Another major operation for LandsD is to disseminate the digital map data to the business partners. For example, PCCW Directories Limited is the typical business partner of LandsD. There is a specific contract with LandsD and the major operations and conditions are listed as follows:

- LandsD supply the update digital map data to the business partners on a monthly basis.
- Specific data format are supplied to the business partner.
- Certain percentage on the revenue make by the business partner is charged by LandsD.

There was one business partner in year 2002/03.

iv. VAR

The VAR service was launched in late 1998 with an aim for opening up the opportunities to business sectors to develop various types of Geographical Information System applications or products using the LandsD digital map data. HK - Explorer Map is an example of VAR product.

The procedure and the condition to purchase, update and renew the licence of digital map are same as the private sector and the general public. An agreed royalty is charged by LandsD on the selling price of the VAR product.

In year 2002/03, there were 4 VARs.

v. IMP

The IMP Services was launched in early 2001. IMP can make use of LandsD digital map data to develop Map Information applications for delivery on its Internet Web Site and the Internet Map Redistribution Users' (IMRU) web site. Centamap Co. Ltd. is an example of the IMP.

The procedure and the condition to purchase, update and renew the license of digital map are the same as the private sector and the general public. A quarterly IMP fee / Internet Map Redistribution (IMR) fee based on the number of map sheets purchased and quarterly royalty (per location indicator, or page view of map or both) are charged by LandsD.

In 2002/03, there were 11 IMPs.

1.1.4 Computerized Land Information System (CLIS)

The CLIS was established in SMO for the maintenance of digital topographic and land boundary record mapping databases. Currently the system has produced the following types of products:

- Digital Topographic Map Database
- Digital Land Boundary Database
- Geo-Reference Database (G1000)
- GeoCommunity Database (GeoCom)

1.1.4.1 Digital Topographic Map Database

The Digital Topographic Map Database contains topographical digital map data in the scales of 1:1000, 1:5000, 1:10000 and 1:20000 which are extensively used by LandsD and other Government departments, public utility companies, real estate agents, engineering consultants, GIS solution providers/developers and the public.

1.1.4.2 Digital Land Boundary Database

The Digital Land Boundary Database contains various land records and land boundary information. To retain the confidentiality, only layers containing current land ownership boundaries are available to the general public – no details on proposed boundaries are made available. In additional, some special layers such as Sites of Special Scientific Interest and Village Environ are only for internal use.

1.1.4.3 Geo-Reference Database (G1000)

The Geo-Reference Database provides geographic reference information for location enquiry and spatial analysis. The database consists of textual information of Building Polygon, Site Polygon and Road Centre Line. The Geo-Reference Database is jointly maintained by LIC and the DSOs and the complete set of textual G1000 database is stored at the LIC HQ.

1.1.4.4 GeoCommunity Database (GeoCom)

GeoCommunity Database (GeoCom) is a set of geo-coded community information embedded with spatial reference in textual database format. It is a collection of community facilities such as school, clinic, library, indoor game hall, etc. It provides comprehensive address information, contact details and other related service information of various public and leisure facilities in the community. It can be used to carry out location search function for various facilities in a non-map based environment. Alternatively, it can also be used with other SMO's digital map bases for developing community-oriented GIS applications through the use of the Geographic Reference Number.

1.1.5 Additional Information Supporting the Dissemination Process

1.1.5.1 Scale of Digital Map and Data Format

Data scale and format of digital map products available are tabulated below:

Types of Product	Product Name	Scale	Data Format	Category of Users *
Digital Topographic Map Database	B1000	1:1000	• Arc/Info Export(E00) • ASCII(Arc/Info Ungenerate) (not available for B10000 & B20000) • Microstation Design File Format (DGN) • AutoCAD Data Exchange Format (DWG & DXF) • Tagged Interchange File Format (TIFF) for B10000 & B20000 only	a,b,c,d,e,f
	B5000	1:5000		a,b,c,d,e,f
	B10000	1:10000		a,b,c,d,e,f
	B20000	1:20000		a,b,c,d,e,f
Digital Land Boundary Database	C1000	1:1000		a,b,c,d,e,f
Geo-Reference Database (G1000)	BG1000 Building Polygon		ASCII	a,b,c,d,e,f
	SG1000 Site Polygon		• Arc/Info Export(E00) • ASCII(Arc/Info Ungenerate) • Microstation Design File Format (DGN) • AutoCAD Data Exchange Format (DWG & DXF)	a,b,c,d,e,f
	RG1000 Road Centre Line			a,b,c,d,e,f
Digital Orthophoto	DOP5000 DOP10000	1:5000 1:10000	Tagged Interchange File Format	a,b,c,d,e,f
GeoCommunity Database	GeoCom		MS Excel	a,b,c,d,e,f

* Users are categorized as follows:
- a Other Government departments and their consultants/contractors
- b Private sector and the general public
- c Business partners
- d VAR
- e IMP
- f SMO/LAO

The Digital Topographic Map Database is derived from the Basic Mapping System (BMS). The Digital Land Boundary Database is derived from Cadastral Information System (CIS) and the building polygon layer of the Geo-Reference database is derived from BMS.

The layers detailing proposed land ownership boundaries and L20000 in CIS are not available to the public and are only available to be used by the concerned Government

department.

Currently LIC keeps one master set for each scale of digital map data. Master set of B1000, B5000 and C1000 are in Arc/Info format. A copy of B1000, B5000, B10000 and B20000 in DGN format is also updated at specific interval for the purpose of disseminating to other Government departments.

B10000 and B20000 are derived from M10000 digital map data which is maintained by the Mapping Section using MGE/Oracle. It is also converted from DGN format into Arc/Info format and stored in the central library master set of digital map dataset. The DGN data are required for map production and data dissemination whereas the Arc/Info data are for dissemination to the users.

In addition, LIC also maintains a Geo-community Database which is provided to the concerned business partners, VAR or IMP (e.g. PCCW Directories Limited and Centaline Property Agency Limited). The Special Geo-Reference Database containing detail textual information of the following areas:

(i) Transportation
(ii) Education
(iii) Recreation and Culture
(iv) Tourism
(v) Medical
(vi) Accommodation
(vii) Other Public Services

The information is geo-coded by LIC. The business partners/VAR/IMP could apply this information for development of their own database infrastructure.

DOP5000 and DOP10000 digital orthophoto data provide seamless digital aerial image rectified for image displacement in the whole territory. The ground pixels are 0.5m x 0.5m and 1.0m x 1.0m respectively.

1.1.5.2 Data Updating

The digital map data available for use by all users are the most up-to-date data available in LandsD, i.e. the latest update of the digital map data available are those uploaded from the DSOs to the LIC digital map library at the previous night. Currently about 70 sheets of updated digital map are uploaded to LIC per day. The figures are tabulated as follows:

Year 2003	**Number of Sheets Uploaded per Day**				
	BMS			**CIS**	**Total**
	B1000	G1000	B5000		
October	25	4	4	39	72
September	25	5	2	35	67
August	26	4	2	44	76
July	24	6	2	30	62
June	32	6	4	35	77
May	23	5	6	33	67
				Average	70

A set of index plan is available for distribution both in hardcopy format and in the SMO web page that indicates the revision date of each sheet in each set of digital map data. This set of index plan is updated on a monthly basis and is distributed to other Government departments in approximate 6 months basis (please refer Appendix 3.2.7 for the sample of the index plans).

The Geo-Reference database, B1000 and GeoCom data are kept regularly up-to-date and provided to the specified business partners on a monthly basis.

1.1.5.3 Data Conversion

When digital map data are ordered, appropriate data conversion is undertaken to produce the required data format for dissemination to the users. The conversion process can be classified into the following groups:

Group a - For exporting E00 and ASCII format from the master set in Arc/Info format, the process is conducted in Arc/Info environment with the support of customized program written in Arc Macro Language (AML).

Group b - For conversion to DGN and DWG/DXF formats from the master set in Arc/Info format, the data is necessary to be initially generated in E00 format. Then it is converted into DGN format by using a conversion program developed by software vendor. The symbology for the converted file was created separately in which they are predefined for use in the E00 to DGN/DWG/DXF conversion program.

Group c - For generating DXF format from the master set in DGN format, Microstation is used to export the data in DXF format.

On the other hand, Arc/Info is used to convert the master set in DGN format to E00 format.

The conversion processes are summarized and tabulated below:

Master Set Format	Product Name	Converted format			
		E00	ASCII	DGN	DWG /DXF
Arc/Info native	B1000, B5000,C1000, G1000	a*	a	b*	b*
DGN	B10000, B20000	c			c

* Not available for G1000 data

1.1.5.4 Media for Digital Map Data Delivery

The following media are used by LandsD to deliver the digital map data to the clients:

- CD Recordable (CD-R)
- 20 Gbytes 8mm cartridge tape
- Magneto-Optical (MO) disk
- 1.44 Mbytes 3.5” floppy disk

Apart from the above, the following deliverable methods are also available:

- Electronic Mail for small volume of data on ad-hoc basis
- Via the LAN in the North Point Government Offices (for PlanD only)

1.1.5.5 Data License

A non-exclusive and non-transferable Data License will be issued to a client after purchasing the digital map data. It permits the licensee to use the data for a period of 12 months.

The information related to the clients is stored in a database to facilitate the handling of license issue. Licenses are renewed every year in June or December. The license can be renewed annually by paying a License Renewal Fee (see the Appendix 3.2.8 for License Renewal form). If the client did not confirm the license renewal after 2 weeks of the expiry of the license date, a reminder will be issued from LandsD to inform the client to delete the expired digital map data.

If the client renews the license after the tolerable renewal period, LandsD will treat it as a new application in which the cost will be adjusted appropriately.

1.1.5.6 Data Security

An identification code is currently encoded in the DOP5000/DOP10000 digital orthophoto data. This identification code serves two purposes:

- Enables LandsD to identify the clients to whom the orthophoto data is disseminated
- Enables LandsD to trace the original client if the digital map data is illegally copied to other parties without prior agreement from LandsD

Since the process of embedding the identification code is very time consuming and resources demanding, it is not applied on the digital map and land boundary data.

1.1.5.7 Handling of Enquries

The Sales and Promotion Unit also provides a helpdesk service to support the technical enquiry received via either a hotline or electronic mail and handle complaint on the digital map products from the clients. Normally, an average of 30 enquiries is received per week on the request for assistance from LandsD.

1.1.5.8 Performance Pledge

LandsD digital map data in quantity of 200 or less will be supplied to the clients within 2 weeks upon receipt of their request as required by Performance Pledge of LandsD.

1.1.5.9 Map Archiving

Historical digital map data is available to the general public though it is not the regular map product available for sale. The price of the archived map data is same as the current revision product.

1.1.5.10 Map Data from Other Government Department

The Survey Intelligence Unit is responsible for handling map data provided from other Government departments. It includes, for example, the Master Layout Plan from ArchSD and design drawings from HyD. On completion of the checking, conversion and digitization process, those useful data will be uploaded to the DSOs for updating of the base maps.

1.1.5.11 Study on Object Based Geospatial Data

LandsD is currently performing a design study in "Enterprise Geospatial Database Design" to consider how the existing tile based data in B1000 base map can be converted and maintained in a seamless manner, and to propose an object based data model for Building, Lot and Road Centreline. This study commenced in Sep 2003 and will be completed in Mar 2004.

1.1.6 Hardware and Software Usage

The hardware and software supporting the data dissemination are summarized as follows:

A). For provision of digital map data to private sector, Trading Fund and Autonomous Bodies

Hardware

(i) 6 x SUN Ultra Sparc10 Workstation
(ii) 1 x SUN Ultra Sparc5 Workstation
(iii) 4 x Pentium PC on Windows NT
(iv) 1 x CD ROM (with 13 Duplicators)
(v) 1 x 4mm Tape Drive
(vi) 1 x 100mb ZIP Drive

Software

(i) 7 x Arc/Info Version 7
(ii) 4 x Windows NT
(iii) 2 x MicroStation J
(iv) 1 x AutoCAD 2000
(v) 1 x Visual Basic
(vi) 3 x Access

B). For provision of digital map data to Government departments and their consultants/ contractors

Hardware

(i) 2 x SUN Ultra Sparc5 Workstations*
(ii) 1 x Pentium PC on Windows NT + CD-R
(iii) 1 x Pentium PC on Windows NT Server* + CD-R
(iv) 2 x Pentium PC on Windows 2000 + CD-R
(v) 1 x CD ROM (with 6 Duplicators)
(vi) 1 x External CD-R

Software

(i) 2 x Arc/Info Version 7*
(ii) 2 x Windows NT*
(iii) 2 x Windows 2000
(iv) 2 x MicroStation J
(v) 2 x AutoCAD 2000i
(vi) 1 x AutoCAD2002
(vii) 1 x ArcMap 8.0 / Arc tool
(viii) 1 x Photoshop 6.0
(ix) 3 x WinZip 8.0

In general it takes 20 - 30 minutes to convert a sheet of digital map from the native format to other available format based on the hardware and software configuration described above.

* indicates that one set of the inventory is on loan from other section

1.1.7 Volumes and Frequencies

The following tables summarize the volumes and frequencies in terms of number of sheets of digital map data supplied to private sector and other Government departments:

(a) Private Sector

Financial Year	No. of Sheets Supplied	Annual Growth Rate (%)[1]
96/97	14762	
97/98	29233	98.03
98/99	17891	-38.80
99/00	62722	250.58
00/01	19273	-69.3
01/02	16031	-16.8
02/03	15140	-5.6
Average Annual Growth Rate[2]		**36.4**
Average Number of Sheets Supplied per Year[3]	**25007**	

(b) Other Government Departments

Financial Year	No. of Sheets Supplied	Annual Growth Rate (%)[1]
96/97	23894	
97/98	77451	224.14
98/99	73147	-5.56
99/00	169623	131.89
00/01	227231	34.0
01/02	290894	28.0
02/03	347476	19.5
Average Annual Growth Rate[2]		**72.0**
Average Number of Sheets Supplied per Year[3]	**172817**	

Note : [1] Annual growth rate :
(Number of sheets supplied in current year – Number of sheets supplied in previous year) / Number of sheets supplied in previous year * 100%

[2] Average annual growth rate:
Sum of annual growth rate of all the years above / number of years with annual growth rate (i.e. 6)

[3] Average number of sheets supplied per year:
Sum of number of sheet supplied in all the years above / number of year (i.e. 7)

1.1.8 Context Diagram

The Context Diagram puts the LIC in Context. By giving an overview of the system, it contains only one box, representing the system, surrounded by external entities and the data flows to and from the system.

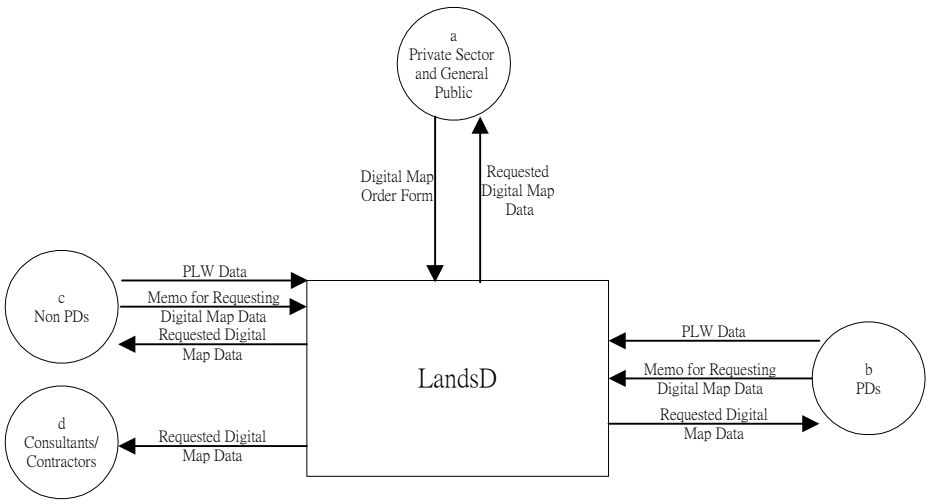
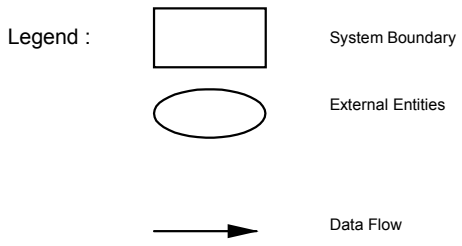


Figure 1.1.8-1 – Context Diagram



1.1.9 Current Data Flow Diagram

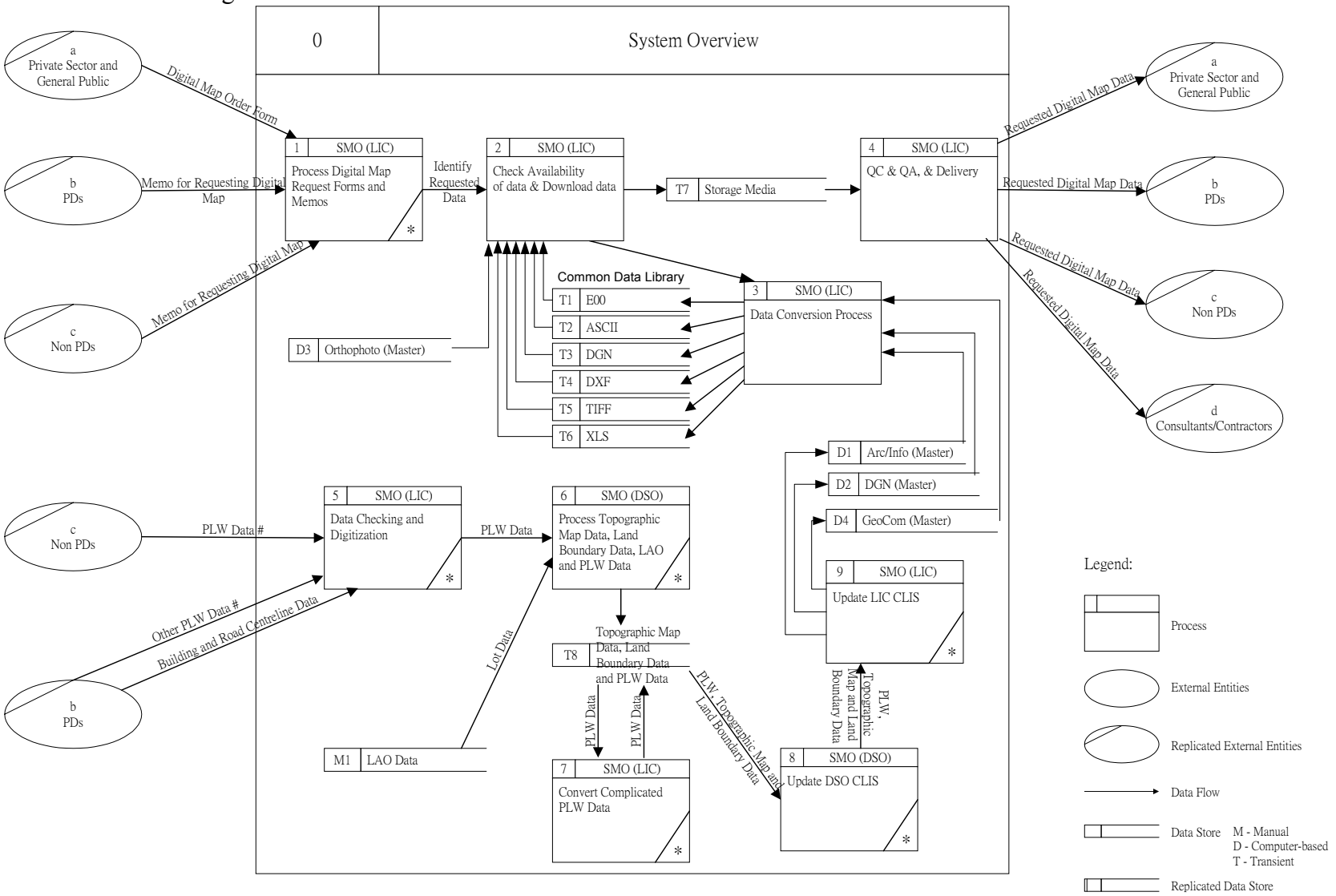


Figure 1.1.9-1 – Current DFD (level 1)

Note: The PLW data from government departments for updating the topographic maps are only a small portion

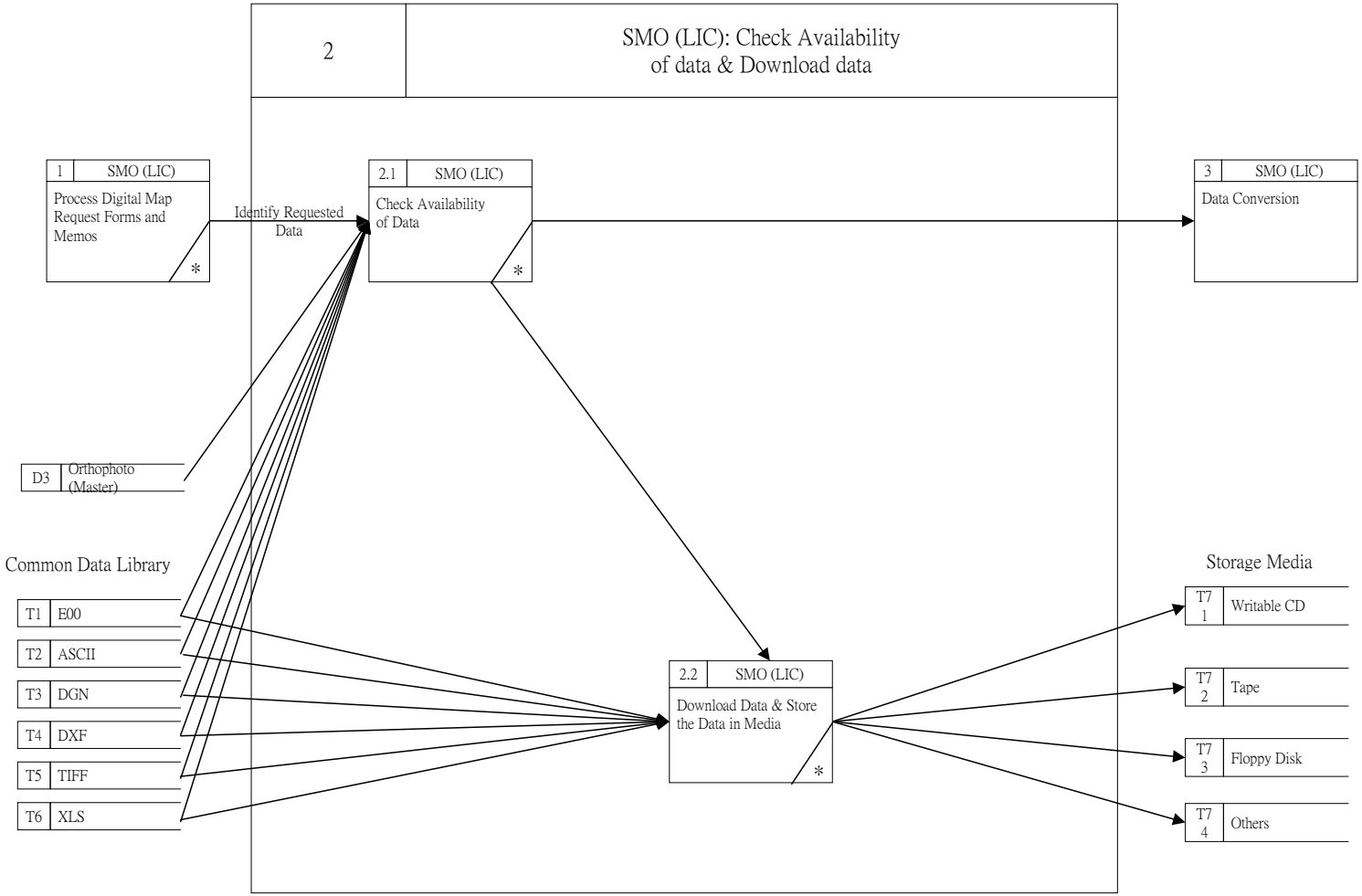


Figure 1.1.9-2 – Current DFD (level 2)

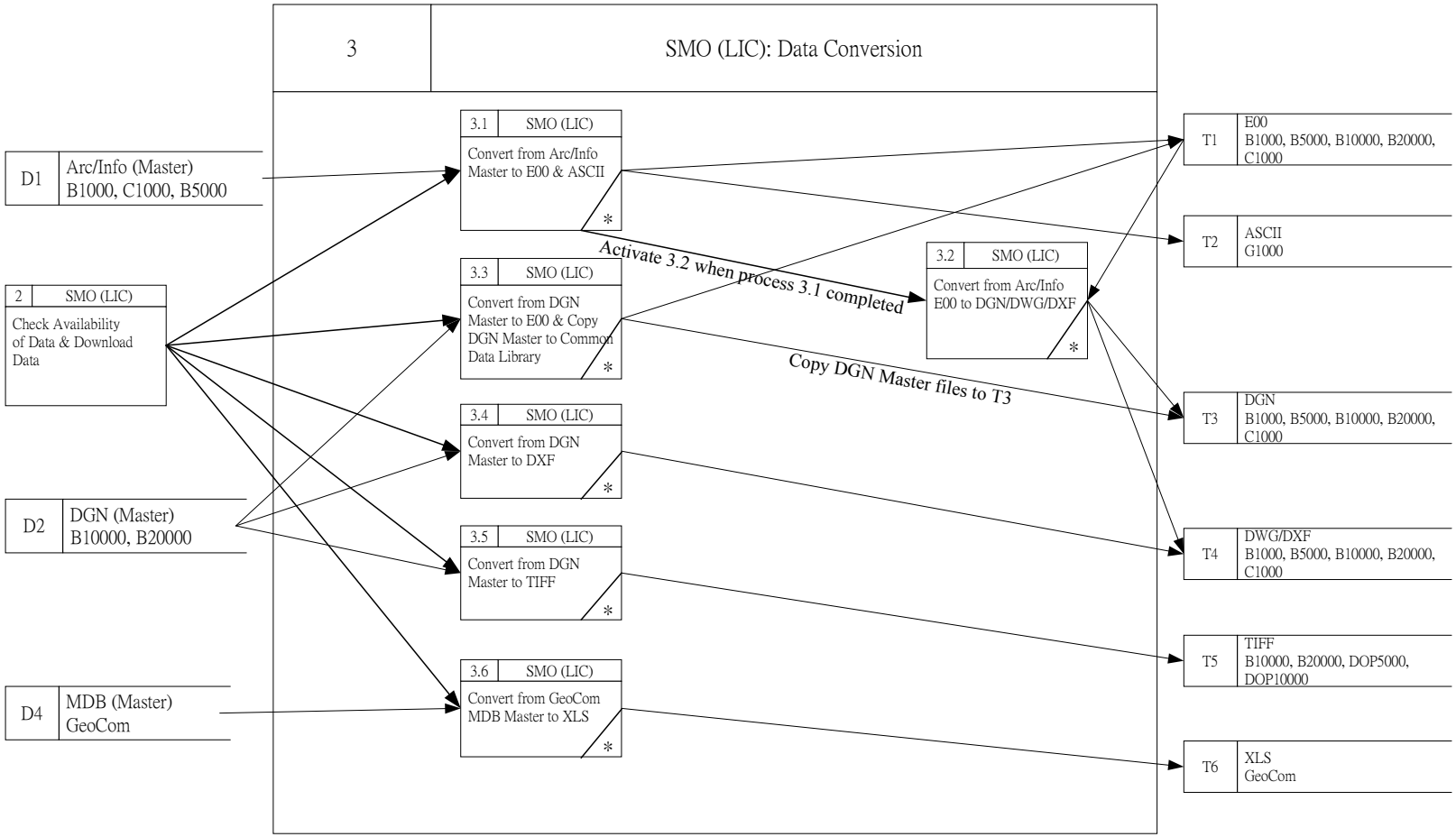


Figure 1.1.9-3 – Current DFD (level 2)

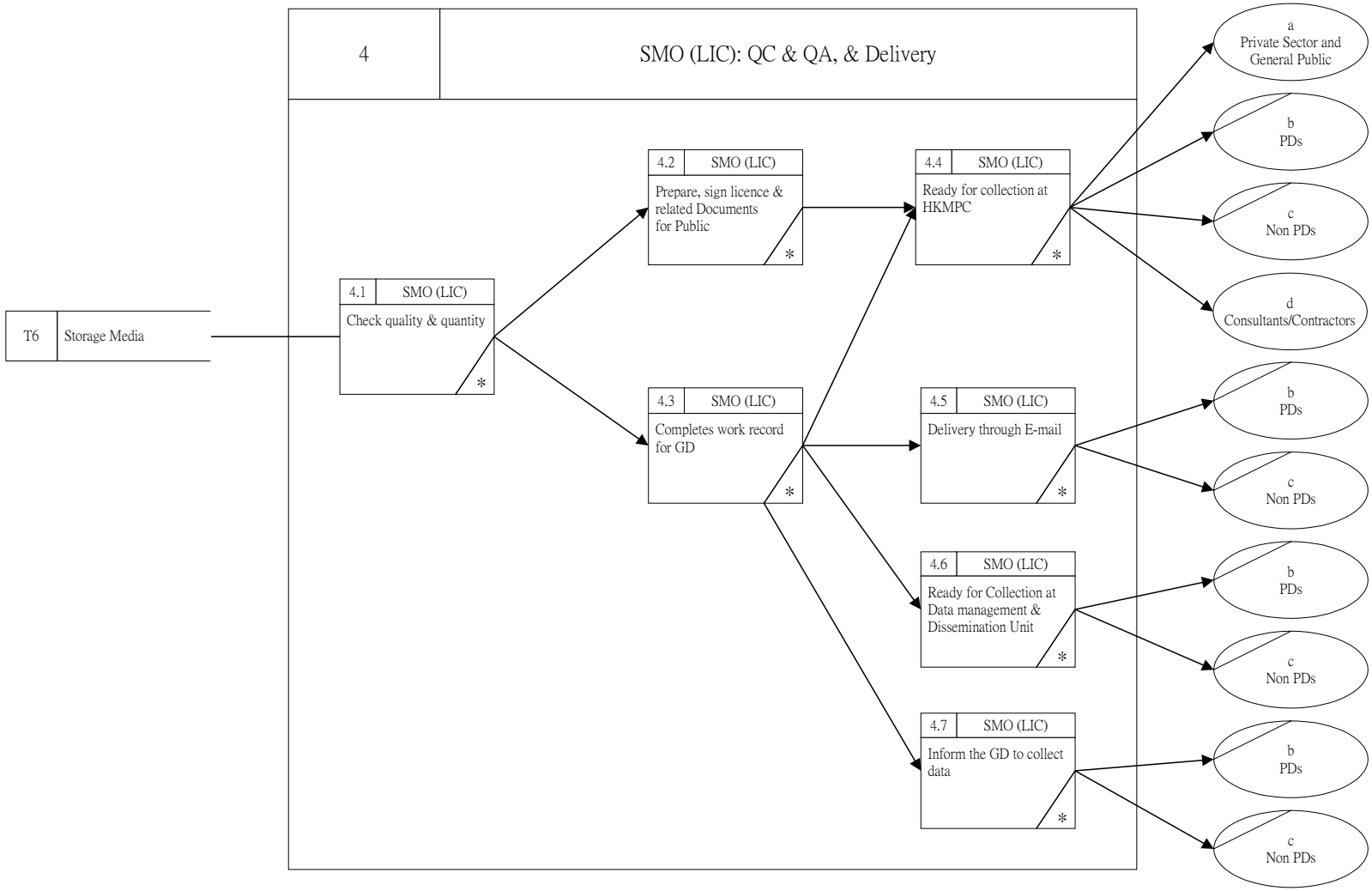


Figure 1.1.9-4 – Current DFD (level 2)

1.2 ELEMENTARY PROCESS DESCRIPTION

This Elementary Process Description supplements the Current Data Flow Diagram described in the section 1.1.9 by giving a brief description for each process.

Process ID	Process Name	Description
1	Process Digital Map request forms and memos	After the map order forms and memos have been received, the information of the users, purpose of data use, details of requested data, hardware use and media for collection are identified and recorded.
2	Check Availability of Data & Download Data	Check availability of data & Download data from the Common Data Library.
2.1	Check Availability of Data	Check availability of data in the Common Data Library.
2.2	Download Data & Store Data in Media	Download data from the Common Data Library and then store data into media as request. - Writable CD by using CD-writer drive - Tape by using tape drive - Floppy disk by using floppy drive - Others
3	Data conversion	Extract data from Master storage and converted to the user's requested format.
3.1	Convert from Arc/Info Master to E00 & ASCII	Exporting E00 and ASCII format from the master set in Arc/Info format, the process is conducted in Arc/Info environment with the support of customized program written in AML (Includes B1000, B5000, C1000)
3.2	Convert from E00 to DGN/DWG/DXF	Conversion to DGN formats from the master set in Arc/Info format, the data is necessary to be initially generated in E00 format. Then it is converted into DGN format by using a conversion program developed by software vendor. The symbology for the converted file was created separately in which they are predefined for use in the E00 to DGN/DWG/DXF conversion program (Includes B1000, B5000, C1000)
3.3	Convert from DGN Master to E00 & Copy DGN Master to Common Data Library	On the other hand, Arc/Info is used to convert the master set in DGN format to E00 format, and then copy DGN Master files to Common Data Library (Includes B10000, B20000)
3.4	Convert from DGN Master to DXF	Generating DXF format from the master set in DGN format, Microstation is used to export the data in DXF format (Includes B10000, B20000)
3.5	Convert from	Generating TIFF format from the master set in DGN

Process ID	Process Name	Description
	DGN Master to TIFF	format, Microstation is used to export the data in TIFF format
3.6	Copy DOP file from Master to Common Data Library	Copy Digital Orthophoto files from Master data set to Common Data Library
3.7	Convert from GeoCom Master to XLS	Extract data from GeoCom Master data set and convert to Microsoft Excel XLS format
4	QC, QA & Delivery	Quantity Check, Quality Assurance and deliverable products handling
4.1	Check Quantity & Quality	Quantity Check, Quality Assurance on deliverable products by Senior Technical Officer
4.2	Prepare, sign licence & related documents	Pass deliverable products to Machine Operator. Prepares licence and related documents. Checking licence and related documents by Land Surveyor and pass to Senior Land Surveyor to sign licence document.
4.3	Completes work record for GD	Completes the "Work Record Form" for Government Department (GD) by Principal Technical Officer
4.4	Ready for collection at HKMPC	Pass product and file to HKMPC wait for collection
4.5	Delivery through E-mail	Deliver the map product to GD through E-mail
4.6	Ready for collection at Data Management & Dissemination Unit	Pass product and file to Data Management & Dissemination Unit wait for collection
4.7	Inform the GD to collect data	Principal Technical Officer to inform the Government Department (GD) to collect the data
5	Data checking and digitization	After Survey Intelligence Unit received the Building and Road Centreline data, and PLW data, the data will be checked and digitization.
6	Process topographic map data, land boundary data, LAO and PLW data	DSO will carry out their own data conversion from the received PLW data for importing the data to Arc/Info platform. For complicated PLW data, the files will be uploaded to LIC for data conversion. DSO also surveys and produces the digital topographic map and digital land boundary data.
7	Convert complicated PLW data	LIC will receive complicated PLW data from DSO for data conversion. After conversion, the data will be sent back to DSO for further processing or plan production.
8	Update DSO CLIS	After further processing of the PLW data, DSO will update the PLW data into DSO CLIS.
9	Update LIC CLIS	After update DSO CLIS, LIC will update the PLW data into LIC CLIS.

1.3 CURRENT PHYSICAL DATA STORE DESCRIPTION

This section supplements the Current Data Flow Diagram described in the section 1.1.9 by giving a brief description of each data store.

Data Store ID	Data Store Name	Description/Remarks
M1	LAO Data	Storage of Lot data in LAO
D1	Arc/Info (Master)	Master storage for Arc/Info coverage
D2	DGN (Master)	Master storage for MicroStation DGN format files
D3	Orthophoto (Master)	Master storage for Digital Orthophoto in TIFF, ECW and MrSID format files
D4	GeoCom (Master)	Master storage for GeoCommunity database
T1	E00 (Common Data Library)	Converted data in Arc/Info Export (E00) format.
T2	ASCII (Common Data Library)	Converted data in Arc/Info Ungenerate (ASCII) format except G1000 data.
T3	DXF (Common Data Library)	Converted data in AutoCAD (DXF) format.
T4	DGN (Common Data Library)	Converted data in MicroStation (DGN) format.
T5	TIFF (Common Data Library)	Converted data in raster (TIFF) format.
T6	XLS, MDB (Common Data Library)	Converted data in Microsoft Excel XLS format and Access MDB format.
T7	Storage Media	For extracted data from Common Data Library and waiting for delivery.
T7-1	Writable CD	Writable CD storing the user requested digital map data.
T7-2	Tape	Tape storing the user requested digital map data.
T7-3	Floppy disk	Floppy disk storing the user requested digital map data.
T7-4	Other Media	MO disk, JAZ Drive + JAZ Disk, Notebook, Cartridge Tape etc.
T8	Topographic map data, land boundary data and PLW data	Transient data store for topographic map data, land boundary data, and building, road centreline, lot and other PLW data.

1.4 CURRENT ENVIRONMENT LOGICAL DATA STRUCTURE

The current digital map data disseminated by LIC is originated from CLIS database. This database contains digital map data and attribute data. Topological relationships between vector features are stored.

The coverage data model / geo-relational data model adopted in CLIS consists of a series of customised feature tables, attribute tables and look-up tables with layers built upon a basic map scale of 1:1000, 1:5000, 1:10000, 1:20000 for storing digital map, cadastral and georeference information. Each digital map product is discrete by itself and is uniquely defined to represent a different set of characteristics.

1.4.1 Digital Topographic Map Database

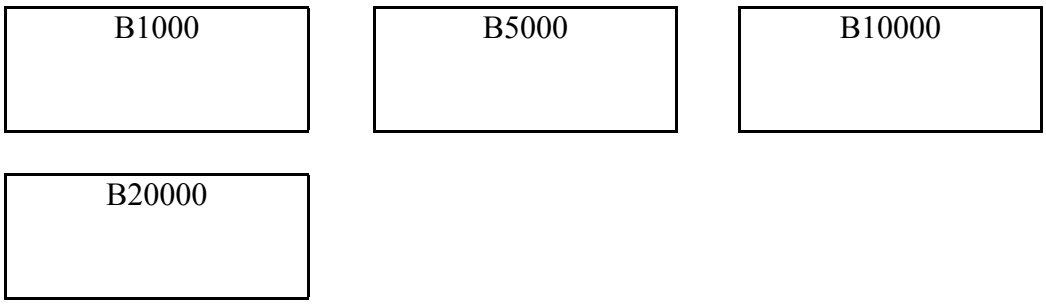


Figure 1.4-1 Digital Topographic Map Database

1.4.2 Digital Land Boundary Database

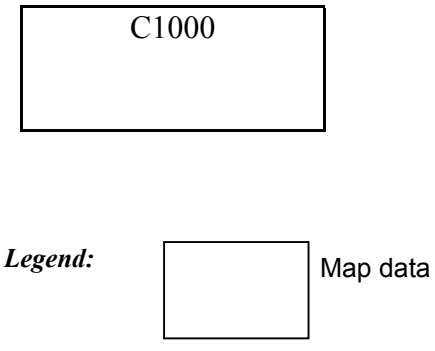


Figure 1.4-2 Digital Land Boundary Database

1.4.3 Geo-Reference Database

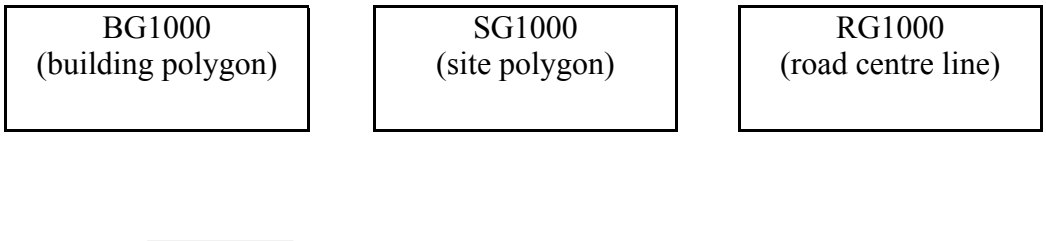


Figure 1.4-3 Geo-Reference Database

1.4.4 Digital Orthophoto

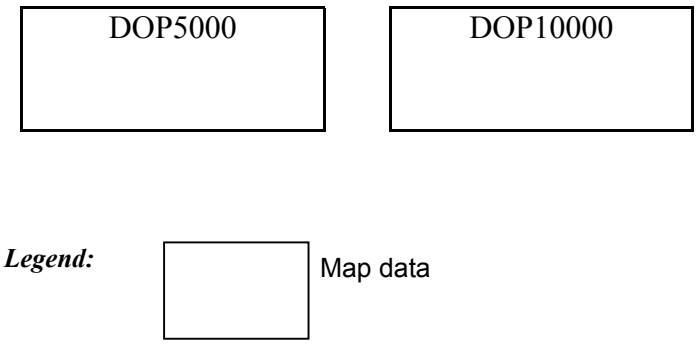


Figure 1.4-4 Digital Orthophoto

1.4.5 GeoCommunity Database

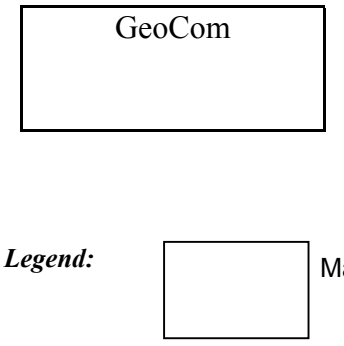


Figure 1.4-4 GeoCommunity Database

1.5 USER CATALOGUE

The user catalogue is similar to that of the proposed Lands Department Data Dissemination System (LandsD DDS). For details, please refer to Section 2.2 – User Catalogue.

1.6 CURRENT ENVIRONMENT ENTITY DESCRIPTION

1.6.1 Entity Description Part I – Volumetric for Entities

Volumetric for Entities as at the end of Nov 2003

Entity Name	Description		Occur-rence	Approximate size of data in the available formats (GB)							
				Native	E00	ASCII	DGN	DXF	DWG	TIFF	XLS
Base Map B1000 (Graphic)	Collection of the topographic maps in Lands Department		3,241 shts	4.0	10.0	10.0	6.5	16.0	10.0		
Base Map B5000 (Graphic)	Collection of the topographic maps in Lands Department		189 shts	1.0	2.0	2.0	2.0	4.0	1.5		
Base Map B10000 (Graphic)	Collection of the topographic maps in Lands Department		57 shts	0.3	0.5		0.2	4.0	1.5	1.0	
Base Map B20000 (Graphic)	Collection of the topographic maps in Lands Department		18 shts	0.2	0.5		0.2	2.5	1.0	0.3	
Land Boundary Information C1000	Collection of cadastral maps in Lands Department		4,131 shts	1.5	2.0	13	1.3	13	6.5		
Geo-Reference Database G1000	BG1000	Collection of the geo-reference data from Lands Department	53 shts	1.6		0.3					
	SG1000		53 shts		1.1		1.5	1.6	1.5		
	RG1000		53 shts								
Digital Orthophoto	DOP5000	Seamless orthophoto covering the whole territory of Hong Kong	189 Shts							26	
	DOP10000		55 Shts							7.5	
GeoCommunity Database	Collection of geo-coded community information		18 Shts								0.1

* Value to be confirmed by LandsD

1.6.2 Entity Description Part II – Data Item Description

The details of the data items for the entities described in section 1.6.1 can be referenced from the following documentation:

a) 1 : 1000 Basic Mapping System Data Dictionary (Data Sale Version - Arc/Info Export Format)
b) B5000 Mapping System Data Dictionary (Data Sale Version - Arc/Info Export Format)
c) B10000 1:10000 Digital Topographic Map Database Data Dictionary (Data Sale Version - Arc/Info Export Format)
d) B20000 Data Dictionary (Data Sale Version - Arc/Info Export Format)
e) C1000 1:1000 Digital Land Boundary Map Database Data Dictionary (Data Sale Version - Arc/Info Export Format)