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Country Report on SDI Activities in Singapore*

* Prepared by Singapore

COUNTRY REPORT ON SDI ACTIVITIES IN SINGAPORE

(2006 – 2009)

(SUBMITTED BY SINGAPORE)

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1.0 INTRODUCTION

Generally, three main agencies are responsible for the survey, mapping, cartographic and geospatial information activities in Singapore. The geodetic control infrastructure and cadastral surveying tasks are undertaken by the Singapore Land Authority (SLA). The topographical mapping is the responsibility of the Singapore Armed Forces Mapping Unit (SAFMU) and hydrographical surveys is conducted by the Maritime and Port Authority (MPA) of Singapore. The Singapore Land Authority also is responsible for the development of National Spatial Data Infrastructure (NSDI) that supports the sharing of geospatial data across government agencies. Other thematic mapping such as road network, buildings etc. are being carried out by the relevant authority like the transport and building authority.

2.0 SURVEY AND MAPPING CONTROL INFRASTRUCTURE (GEODETTIC)

The Singapore's national survey control network infrastructure known as the Integrated Survey Network (ISN) was established since 1999. At present, the ISN consists of about 65 first order markers and about

4000 second order markers. The second order network markers are situated along major roads with good accessibility. These second order control points are used as survey control for all cadastral and engineering survey.

The Singapore Satellite Positioning Reference Network, SiReNT system was implemented by Singapore Land Authority (SLA) in September, 2006. This CORS system has been in operation for almost 3 years and has gained much recognition as the authoritative Differential GPS (DGPS) infrastructure in Singapore. SiReNT is a nation-wide system that serves as the national geographic reference frame and provides homogeneous coordinates system for various positioning and geospatial needs. The user base has grow to more than one hundred for applications such as land surveying, mapping, GIS data acquisition and engineering positioning.

There is an increased reliance of satellite positioning technology in everyday applications and businesses such as navigation, vehicle and assets tracking, monitoring of structural deformation and weather prediction. The SiReNT has become the key component in providing accurate and reliable services in these areas. In order to meet the users needs, SiReNT must be flexible in delivery of it services and dynamic in the management of the infrastructure. It must be able to keep up to the pace of GNSS and ICT developments.

The national height datum of Singapore consists of about 500 precise levelling benchmarks located at an interval of about 1 km. A project was initiated in mid-2008 to re-level and re-adjust the precise levelling benchmark network. A tender was called for private registered surveyors to carry out the precise levelling survey of about 450 benchmarks. The surveying work was completed early 2009 and the height adjustment was carried out

by a consultant. The newly adjusted height value for the all the benchmark will be officially adopted before the end of this year.

SLA started on a project in March 2005 to create a Geoid Model for Singapore. The project aims to produce a mathematical conversion factor to allow GPS users to use their GPS equipment to determine height above the national height datum. The Geoid Model ultimately allows GPS users to measure heights based on the Survey Department's datum which is the national height datum as reference. The initiative will shorten the time used in height determination significantly as compared to the conventional height determination method, hence quickening the process surveyors take to conduct their land surveys. This project involved precise levelling exercise of about 50 benchmarks and DGPS survey on the same benchmarks. The Geoid Model will be finalised by the end of this year.

3.0 CADASTRAL SURVEY

The cadastral survey in Singapore is conducted based on the SVY21 cadastral survey system. The new system is based on coordinated cadastre concept and was in place since August 2004.

Presently, there are 67 practising registered surveyors (registered with the Land Surveyors Board) in Singapore. Over the past 3 years, the output of cadastral survey work was as follows:

Year	Subdivision of land (No. of lots)	Subdivision of buildings (No. of units)
2006	2,330	35,973
2007	2,447	19,892
2008	2,422	16,792

4.0 TOPOGRAPHICAL MAPPING

Topographic mapping updates are carried out with the aid of aerial photography and supplemented with field surveying using Differential GPS receivers and Total Stations. Since the last conference in 2006, the following are the new editions:

- a. A new edition of the 1:25000 topographic map of Singapore (Series L807, Edition 11 SMU) was produced in 2008.
- b. A new edition of the 1:10000 topographic map of Singapore (Series SMU 010, Edition 4 SMU, covering SAFTI Live Firing Area only) was produced in 2008.
- c. A new edition of the 1:25000 road map of Singapore (i.e. Series SMU1169, Edition 9 SMU) is scheduled to be printed in early 2010.

In our efforts to deliver consistent and high quality products, the Unit adhere to a well planned and documented Quality Management System. We have successfully transited to ISO 9001:2008 certification in Mar 2009. The certification covers the provision of mapping and geospatial support for the SAF and other government agencies.

5.0 DEVELOPMENT OF NATIONAL SPATIAL DATA INFRASTRUCTURE

Many countries have realised the vast potential of geospatial information and recognised it as a critical element underpinning analysis and decision making for environmental, social and economic development. Hence, Spatial Data Infrastructure (SDI) is developed in many countries to provide for efficient and effective usage of geospatial data. The SDI policies also ensure that geospatial data are made available in high quality, interoperable and timely manner.

The Singapore's NSDI initiative is known as the SG-SPACE (Singapore Geospatial Collaboration Environment). This initiative was launched in April 2008. The SG-SPACE is a cross-agencies program spearheaded by the Singapore Land Authority (SLA) under the Ministry of Law, together with the Infocomm Development Authority (IDA) under the Ministry of Information, Communications and Arts.

The SG-SPACE aims to provide a platform and mechanism for government agencies to share and use geospatial data. It facilitates better policy, decision-making and governance. Beyond data-sharing, SG-SPACE aims to create a sustainable environment where geospatial data is interoperable, accessible and usable by agencies in day-to-day operation. This geospatial data will eventually be extended to enterprises and citizens for value and knowledge creation. The ultimate outcome of SG-SPACE is "a spatially enabled nation".

Developing a spatially-enabled nation is ongoing and multi-disciplinary. Achieving the vision will draw on a wide range of experiences and disciplines from surveying and mapping, land administration, GIS, information and communications technology, computer science, legal and public administration and many more.