

ECONOMIC AND SOCIAL COUNCIL

**Seventeenth United Nations Regional Cartographic
Conference for Asia and the Pacific
Bangkok, 18-22 September 2006
Item 6 (b) of the provisional agenda***

COUNTRY REPORTS

National Report

Submitted by Cyprus **

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** Prepared by Department of Lands and Surveys, Ministry of Interior, Cyprus

Republic  of Cyprus

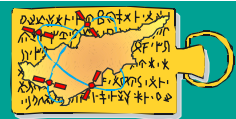
Ministry of Interior
Department of Lands and Surveys

CYPRUS - NATIONAL REPORT



**Seventeenth UN Regional Cartographic Conference
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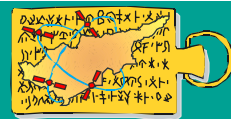
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1. INTRODUCTION

The Department of Lands and Surveys (DLS) is divided into seven branches, which independently or in cooperation are dealing with all matters related to the legal, fiscal and spatial aspects of land in Cyprus. These branches are:

- a) The *Administration Branch* responsible for all personnel administrative matters, the preparation of annual budgets and control of expenditure.
- b) The *Registration Branch* undertakes all the work associated with the investigation and registration of title etc.
- c) The *Tenure Branch* is responsible for Land Tenure matters including General Registration and Land Consolidation.
- d) *Management of State Lands* is responsible for the Management of State Lands and the steering of acquisition and requisition uses.
- e) The *Valuation Branch* is responsible for the carrying of Land Valuations for all purposes.
- f) The *Survey Branch* of the Department is in fact the Survey organization of the Republic of Cyprus. The main activities of this Branch concentrate on cadastral surveys, which effectively support the registration system. Others include the areas of geodesy, the establishment and maintenance of the geodetic and leveling networks, air survey, sea surveying and special engineering works.
- g) The *Cartography Branch* of the Department is the Mapping organization of the Republic of Cyprus. The main activities of this Branch concentrate on photogrammetry, hydrography, GIS applications, the production and maintenance of cadastral plans, topographical maps, nautical and aeronautical charts, and other thematic mapping both in manual and digital form.

In 2003-2004, the organization structure of the Department was reviewed, in relation to the development of the Land Information System and other major projects and developments. New branches and positions have been approved, which influence the current operations. The implementation of the new structure is being executed in phases.



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2. SURVEYING AND MAPPING ACTIVITIES

2.1 Resurvey

In Cyprus the Land Registration system and Cadastre operating today were introduced almost a century ago. The Land Registration system is the Registration of Title system, which is based on a series of cadastral plans of varying scale and accuracy, most of them being graphical.

Although the system has all the advantages of the Registration of Title system, it has been found deficient to the highly demanding requirements of the rapid development of the country. The two basic drawbacks are the time consuming manual procedures for property conveyancing and the poor accuracy of some of the graphical cadastral plans which cause problems as regards the rule of "unambiguous definition of boundaries".

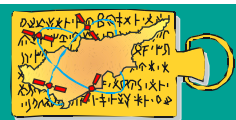
Hence, the need was felt for the creation of a system, which will allow each land parcel to be marked on the ground rapidly, efficiently and without ambiguity. The system which proposed by SAGRIC International (Australian Consultants) can be described as a Fixed Boundary Coordinated Cadastre, as the coordinates are given a strong emphasis in the cadastral definition, and they will subsequently be used for future boundary demarcation. This constitutes the main objective of the Resurvey Project currently planned and executed by the Department. This project includes a number of sub-projects namely:

- Establishment of a new Geodetic Network, and utilization of GPS technology
- Flying of large scale aerial photography
- Upgrading of the Photogrammetric Unit of the Department
- Organizing a systematic resurvey of property boundaries

2.2 Geodesy

Most of the survey and mapping operations of DLS are based on a comprehensive geodetic infrastructure established in the years 1913-1915.

Study comments on behalf of SAGRIC recommended that a new geodetic datum and a new projection system be adopted to form a new infrastructure to suit all future requirements for a fixed boundary cadastre and other mapping requirements. The WGS84 Spheroid (geocentric) and a New Local Transverse Mercator (LTM) Projection were selected to best suit the present and future mapping needs of Cyprus.



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During these studies and subsequent related operations, observations were carried out using GPS technology. All adjustments of GPS observations have been done using the WGS84 spheroid, and the geographical coordinates recorded, relate to the same spheroid.

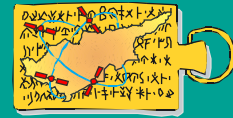
Using GPS technology, 40 control points of 1st order have been established by the static method. Their distance from each other varies from 6 to 15 km. 302 control points of 2nd order, with their in-between distances varying from 3 to 7 km, have been observed and established, using the same method. Moreover, approximately 13500 3rd order control points have been observed and established using the rapid and stop and go methods. Their respective distance is between 200 and 500 meters. It has been estimated that a total number of 60.000 to 70.000 control points have to be observed in the next eight years to support the resurvey project and other needs of the Department. Other alternative solutions are also considered such as the creation of GPS permanent stations (CYPOS).

2.3 Photogrammetry

Photogrammetry is playing an important role in the process of the resurvey project. The Department operates a small photogrammetric unit with one analogue instrument and an analytical stereo-plotter. Three digital photogrammetric workstations and a digital photogrammetric scanner were also installed in the Department.

Large-scale photography of the free part of the country at scales 1:8.000 and 1:15000, and a Digital Terrain Model have been prepared. Additionally, the free part of Cyprus has been covered with orthophotography, as well as with ortho-rectified Quickbird satellite imagery.

Presently there are plans to cover the country with new digital aerial photography which will be flown in the next few months. For 2007 there are plans to cover the major cities of Cyprus with Lidar Surveys.



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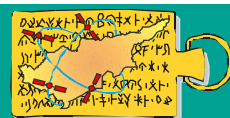
Larnaka - Ortho-Photo Map

2.4 Mapping and Map Production

The Cartographic Branch of the Department is currently working on several digital cartographic products. A number of digital maps in both vector and raster formats have been completed based on scales from 1:7500 – 1:500.000. High priority is given to the maintenance of a modern topographic database, included in the Land Information System, which has already been developed, and it is currently used in a production environment. A variety of hardware and software are being used including ArcGIS, Arc/Info, Map/Info, Arc/View, AutoDesk Map etc. Data collection and processing includes scanning and digitization of existing maps, processing of aerial photographs and satellite images, data transfer and generalization from the Digital Cadastral and the Survey Database, editing and updating, map composition, and final production including colour separation.

At present, cartographic work is confined to the creation of new maps, revision of existing thematic maps, general use topographic maps, street maps, tourist maps, and maps for a variety of applications and uses.

The Cartography Branch is also involved in the creation of the data sets of Cyprus which are included in the EuroRegional Map (ERM). For this reason, all available sources of information have been used, so that the final data is up to date and according to ERM data model and format. All final data have been tested and approved by the ERM project coordination team. The



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Cartography Branch has also completed the processing and delivery of the Cypriot Data set for use within the EuroGlobal Map (EGM) project. This data set is already included in the EuroGlobal Map database. Updates for the new EGM version have been delivered recently. The Branch has also prepared and delivered updates for SABE (Seamless Administrative Boundaries of Europe). DLS is also committed to support the INSPIRE initiative. DLS officers have already participated in various meetings in Europe for this purpose.

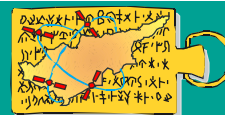


Extract from Digital (Vector) Street Map of Pafos (2005)

The standard series topographic maps, that are prepared by the Cartography Branch, exist at the scales of 1:500.000, 1:350.000, 1:250.000, 1:100.000, 1:50.000, 1:7.500, and 1:5.000.

The Cartography Branch is actively involved in providing cartographic support and products to European projects where Cyprus is involved, such as:

1. IACS – Integrated Administration and Control System for the administration of subsidy schemes to farmers
2. Natura 2000 – Definition of Nature Protection Areas
3. LIFE Program – Bicycle tracks network
4. CORINE Land Cover for Cyprus (in cooperation with the Ministry of Agriculture and Natural Resources)
5. Hazard Mapping (in cooperation with other Government Departments)
6. etc.



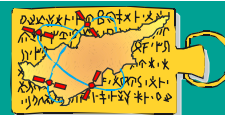
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Digital 3D Shaded Relief Map of Akrotiri (in Limassol District)

The Cartography Branch provides cartographic support and products to other Government Ministries and Departments such as:

1. Ministry of Defense
2. Ministry of Agriculture, Natural Resources and Environment
3. Ministry of Foreign Affairs
4. Ministry of Interior
5. Ministry of Education
6. Ministry of Commerce, Industry and Tourism
7. Ministry of Labour and Social Insurance
8. Department of Housing and Planning
9. Statistical Service of Cyprus
10. Planning Bureau
11. Department of Public Works
12. Department of Geological Survey
13. Cyprus Police
14. etc.



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Cadastral, Planning Zones and Satellite Image Composite (Liopetri)

2.5 Hydrography

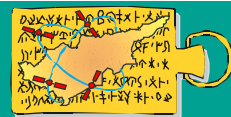
There are plans to create a National Hydrographic Committee which will deal with all matters of hydrography in Cyprus. Cyprus, being an island, has to do considerable work in this discipline, which includes near coastal waters surveys, off-shore waters surveys, preparation of approach charts to ports, harbors, marinas etc.

The committee will be comprised of representatives from several Government Departments, dealing with hydrography, and will be headed by the Department of Lands and Surveys, which will coordinate all the activities of the committee.

MEDA PROJECT 7

Due to considerable expenses and the lack of expertise in setting up a hydrographic service, DLS asked for outside aid in this respect. As a result, Cyprus is at present participating in the Euro-Mediterranean Partnership (MEDA Program), which is financed by the European Union. DLS has received assistance and financial aid in the following areas:

- a. Scholarships in (i) Nautical Cartography, (ii) General Hydrography, (iii) Port Hydrography and (iv) Data Management.
- b. Expertise and advice in setting up a hydrographic service.
- c. Financial aid in purchasing hydrographic equipment.



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EUMEDIS MEDChartNet PROJECT

The name of this initiative is EUMEDIS (Euro-Mediterranean Information Society). EUMEDIS is the largest program ever undertaken by the European Commission, in the development of global information society.

The International Maritime Academy developed and proposed a Project, judged by the European Commission as perfectly in line with the purposes of the initiative: The Mediterranean Cartographic Network, MEDChartNet.

Cyprus is participating in the EUMEDIS MEDChartNet project which is a natural development of the MEDA project 7. The aims of the project are to:

- a. Create the appropriate climate for regional and international co-operation in the capture and management of digital hydrographic data, acknowledging the ownership of the data;
- b. Give high priority to the production of data that are validated and conform to the ENC Product Specification;
- c. Promote the production of ENCs and the use of ECDIS;

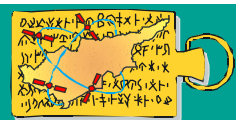
Establish mechanisms for national, regional and international distribution of ENCs.

2.6 Special Projects

EUREF connection: The Department of Lands and Surveys (DLS) in cooperation with IFAG (Institut für Angewandte Geodäsie - Frankfurt, Germany) planned and executed the connection of the New Geodetic Network with EUREF (European Coordinate System-ETRF 89). The operation required the simultaneous recording of satellite signals at 6 survey stations in Cyprus and at 6 base stations in neighbouring countries using GPS receivers.

Permanent Tracking GPS Station in Cyprus: A permanent GPS tracking station has been established in Cyprus with the help of IFAG, as a part of the above-mentioned EUREF network. It is tracking all visible satellites over Cyprus on a 24-hour basis. DLS is monitoring the station and data from this station will help to monitor crustal movements in the region, local expansion of geodetic control, EUREF connections of other countries etc.

EUROCONTROL - WGS 84 Implementation program: Following the recommendation of the Special Committee of the International Civil Aviation Organization (ICAO) on Future Navigation Systems (FANS), that WGS 84 should be adopted as a standard, and that published coordinates shall be expressed in the WGS 84 reference frame, the Civil Aviation Authority of Cyprus



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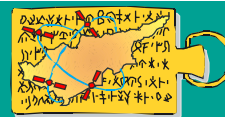
(CAA) has asked DLS to undertake this task on their behalf. DLS agreed to do so and both airports, Larnaca and Pafos, have been resurveyed. WGS84 coordinates of the Airport Navigation facilities were issued to the CAA. DLS keeps monitoring the project.

3. NATIONAL LAND INFORMATION SYSTEM

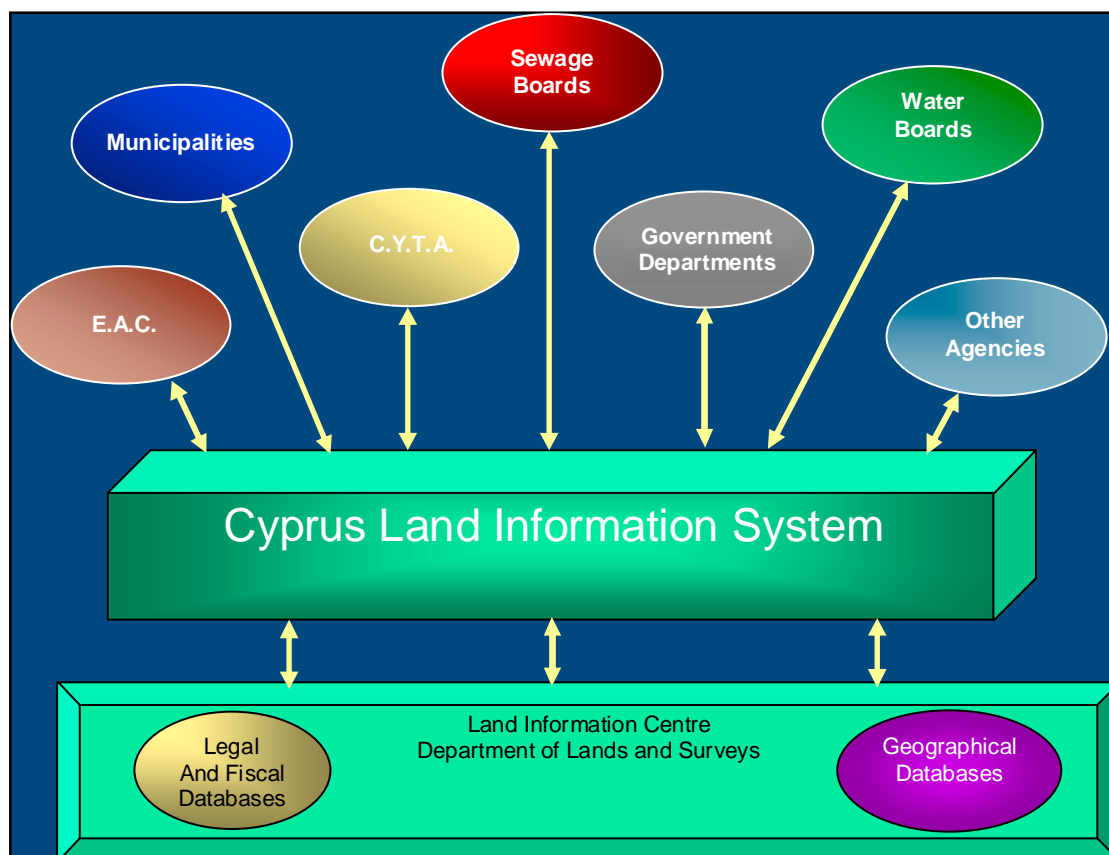
DLS operates, partially on a manual and partially on a computerized basis, a multipurpose cadastre. The Department records a considerable amount of land related data. Cadastral plans are widely used as a fundamental graphic record by a wide range of agencies. Information about development, utilities, land use, water resources, geology, and even statistical data for population, industry, agriculture and planning, are recorded on, or they are closely related to the cadastral plans.

The Government of Cyprus through the Department of Lands and Surveys (DLS), implemented a system to improve the efficiency and effectiveness of Departmental activities, taking advantage of available information technology and modern cost effective survey instrumentation and techniques.

The general strategic objective of the country is the establishment of a fixed boundary coordinated cadastral system, after a systematic resurvey, the computerization of the land records, cadastral plans, and topographical maps, the development of a number of computerized systems to support the survey, registration, valuation and management functions of the Department, and the staged development and implementation of a *National Land Information System (LIS)*, where all agencies with land related activities can share available data for the benefit of the economy of the country.



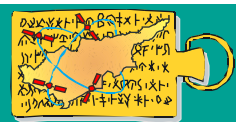
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3.1 The Cyprus Land Information System

The Cyprus LIS project is a program covering the following groups of activities:

- (a) The strengthening and re-computation of the National Grid System and the systematic resurvey, for cadastral and other purposes, of the entire island. All modern equipment and techniques such as GPS, photogrammetry and EDM tacheometry are being used, in an attempt to reach the most efficient and cost effective method.
- (b) The computerization of land transactions, the improvement and acceleration of valuation assessments, the reduction of duplication of land administration work among Government Agencies, and the increase of the ability of the Government to effectively manage state-lands, and expedite acquisition and requisition orders.
- (c) The development of a Digital Cadastral Data Base (DCDB), a Survey Data Base (SDB) and a Topographical Data Base (TDB), suitable to support an Integrated Land Information System.



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- (d) The development of a computerized system, capable of supporting all the registration, valuation and land management functions of the Department, and the development of a Legal/Fiscal Database as a substantial component of the Land Information System.
- (e) The introduction of computer-assisted techniques into the Valuation processes, to achieve optimum performance, and to enable a semi-automated general revaluation program at frequent time intervals.

The LIS in the Department of Lands and Surveys has been designed and developed having two major application components:

- a. The Survey Related Applications (Geographical Component)
- b. The Legal/Fiscal Applications (Legal/Fiscal Component)

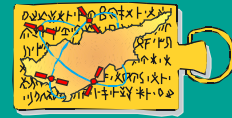
Basically, all Legal/Fiscal application systems have been developed in Cyprus using the case tools of ORACLE Relational Database Management System. The spatial applications are based on Arc/Info, ArcStorm, Arc/View and other ESRI GIS products and RDBMS technology, on surveying packages (such as LISCAD), and on CAD packages (eg. AutoCAD, AutoDesk Map, and MicroStation).

Four main databases have been developed in the Department:

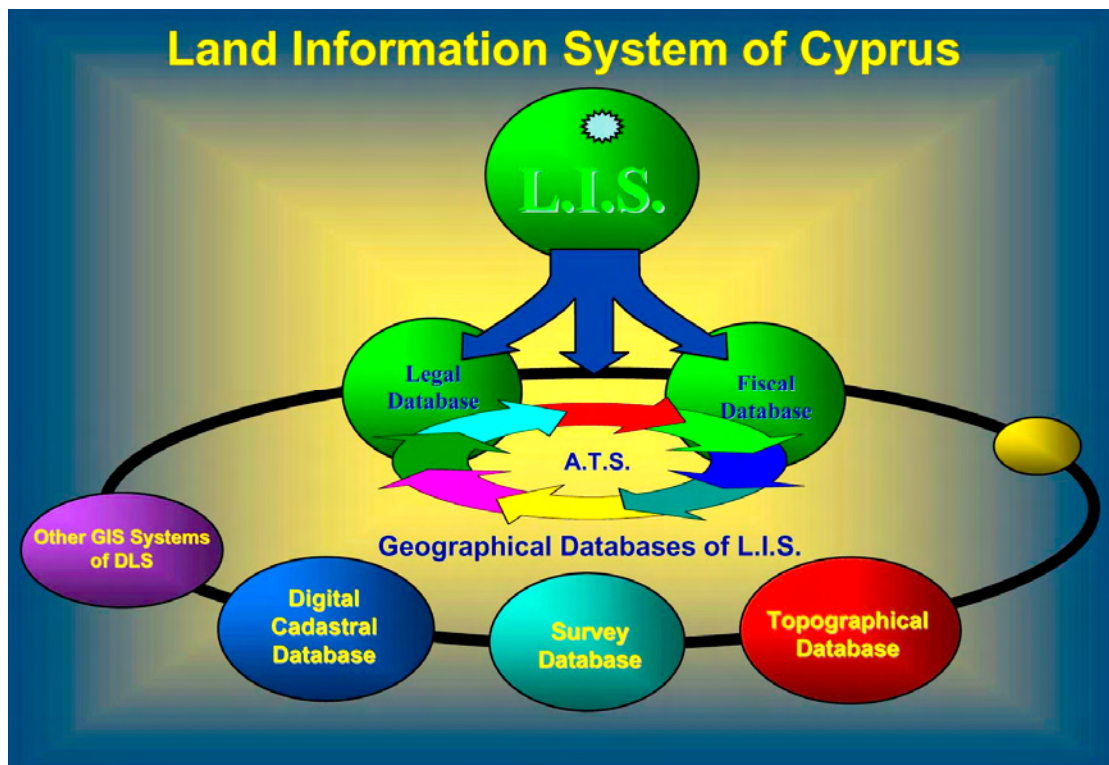
- a. The Survey Database,
- b. The Digital Cadastral Database,
- c. The Topographical Database, and
- d. The Legal/Fiscal Database.

The Survey Database, the Digital Cadastral Database and the Topographical Database constitute the spatial component of the LIS, and the Legal/Fiscal database mainly constitutes the aspatial component. The objective of the Department to operate and maintain an integrated system, where the four databases would operate as one single corporate database, has been achieved.

The corporate database contains the survey data-set, the digital cadastral data-set, topographical overlays, the legal/fiscal data-set, sales history data, and other useful information. A number of application systems have been developed around the system. These systems basically include applications for data entry, maintenance, storage, enquiry and output (displaying, reporting, plotting and printing).

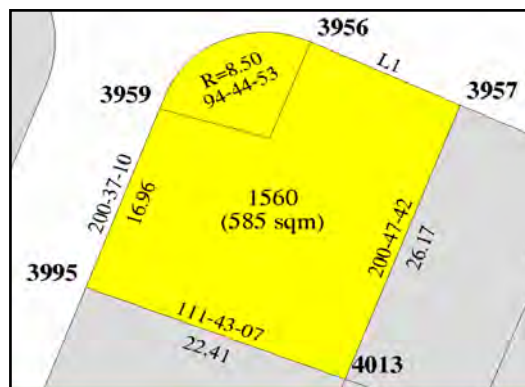


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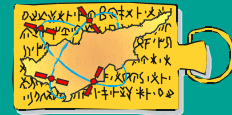
Digital Databases of the Cyprus LIS

3.2 Survey Database



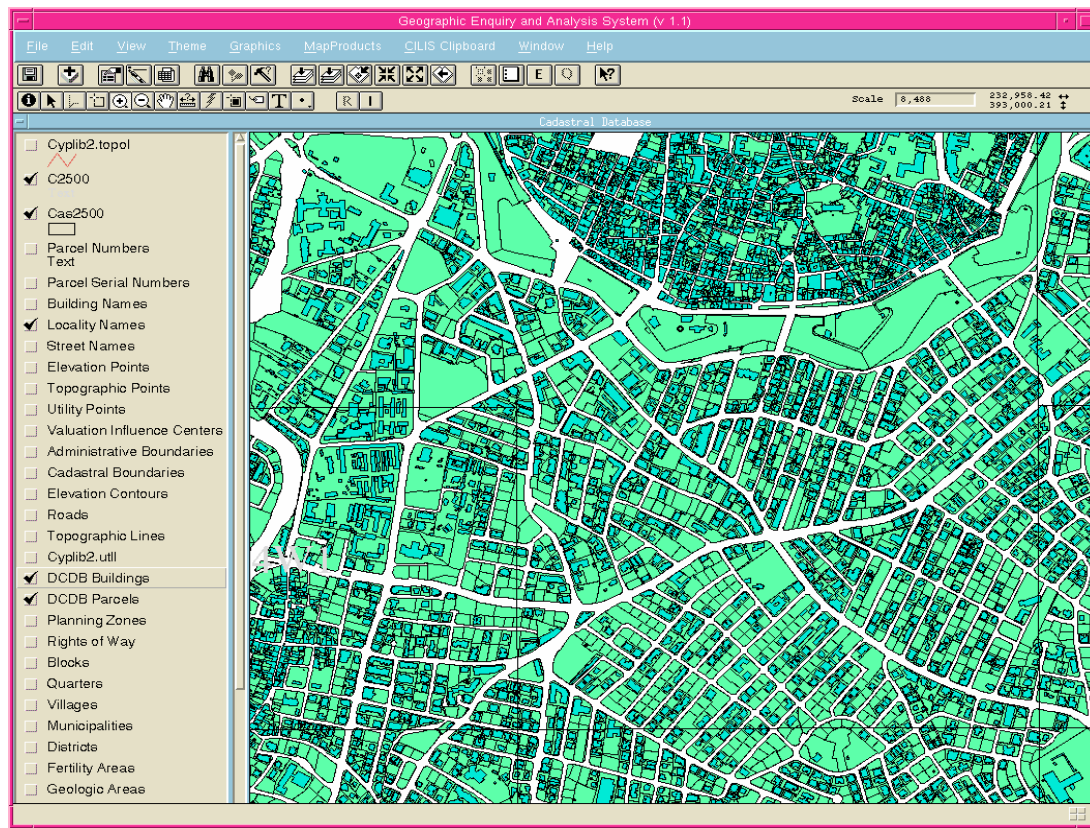
The Survey Database (SDB) stores information related to the geodetic network, current survey data, and historical records of all surveys. The SDB is the repository for detail from the original source records of the surveys that underpin the cadastral framework. It is also the reference system for applications that require dimensions or survey accurate coordinates.

The objective of the SDB is to assure that the country is supported by a system able to efficiently provide timely, accurate and comprehensive survey information. It also contains the underpinning data for the Digital Cadastral Database.



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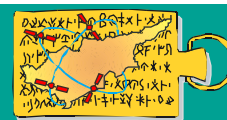
3.3 Digital Cadastral Database



The Digital Cadastral Database (DCDB) has been designed to provide an up-to-date continuous cadastral map base, to support cadastral mapping and the LIS functions. The DCDB is the database that stores the current cadastral framework, thematic overlays and topographical data in a seamless form.

The main objectives of the DCDB are:

- Replace the manual techniques associated with the creation and maintenance of the cadastral plans at various scales.
- Provide the spatial underlay for an integrated LIS.
- Ensure that the spatial underlay is correct and up-to-date for all users, both in DLS and in other organizations.



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3.4 Legal/Fiscal Database

ΠΑΗΡΟΦΟΡΕΙΣ ΓΙΑ ΑΚΙΝΗΤΗ ΠΕΡΙΟΥΣΙΑ

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Σχεδιάγραμμα
 Εκθεση Ακινήτου

Κατασταση
 ♦ Ισχύουσα
 ♦ Ιστορική
 ♦ Προσωρινή

♦ Πωλητήριο Έγγραφο
 ♦ Προσωπικές Δουλείες
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 ♦ Δουλείες
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 ♦ Σημειώσεις
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 ♦ Απαγορεύσεις
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 ♦ Επιβαρύνσεις
 ♦ Καταχωρήσεις φακέλων
 ♦ Όλες οι Συμφωνίες
 ♦ Εκτίμηση Ακινήτου
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Εντός Ορίων Αποχετευτικού

Αρ. Φακέλου	Ημερ. Αίτησης	Κατηγορία	Υποδιοκτή	Είδος Ακινήτου	Αρ.Σχεδίου	Όροφος	Μερίδιο	Ποσότητα	Βιοκτήτης Π.Ι	Εμβαδό	Ιστορικό	
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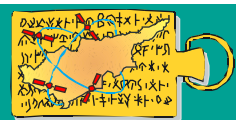
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The basic general objectives of the Legal/Fiscal component of the proposed LIS are:

- Store and maintain in digital form the land registers and other land records.
- Facilitate transactions by providing on-line access and maintenance.
- Provide administrative and statistical support.
- Provide a document tracking system.
- Support Computer Aided Valuations.

The Legal/Fiscal activities of the Department are diverse. The functional areas that are supported, and the facilities that are provided, were carefully selected during the users requirements and analysis stages. Consideration was given to the scope of the initial system and from this, the system functionality was determined. The volume of the work involved, the proposed use of the data, the complexity of some functions, and the benefits gained were among the criteria for deciding which functions should be automated.

The system provides on-line support to almost all branches of a District Lands Office, including applications, declarations, mortgages, forced sales, attachments, local enquiry, registration, checkers, tenure, land consolidation, leases, license, notations and valuations.



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3.5 Land Information System Progress

The Department of Lands and Surveys has already implemented an integrated Land Information System which serves the needs of the Department and the needs of other organizations and departments which use land related data. The implementation phases included a series of projects such as: the strategic planning and system design, the release of tenders for hardware and software, the tender evaluation, followed by an agreement which was signed between DLS and an International Consortium for the system development.

The system development started officially in September 1995, and it was followed by the system design phase. The next phase, which was the system development phase, lasted approximately 2 years. After the delivery of the customised system, a series of testing scenarios followed, which enabled the improvement of the applications.

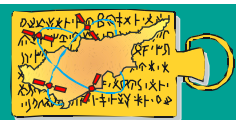
The system was officially accepted in 1999, and it is currently used in a production environment. At the same time, many projects have been initiated for collecting and preparing the data that populate the LIS databases. These projects include the re-survey of the whole island, the digitization of current cadastral plans, and the data entry of legal and fiscal data.

The progress of the LIS data collection and database population is shown in the following figures:

- Legal data 892.000 registrations (66.5%), out of 1.340.000.
- Fiscal data 244.000 sub-properties (11.6%), out of 2.106.000
- DCDB 885.000 (80.4%) land parcels digitized, out of 1.100.000, 60.000 land parcels in the occupied area (9,7%), out of 620.000.
- SDB 78.000 land parcels in database (8,0%).

It is estimated that, in approximately one year, the Digital Cadastral Database (DCDB) and the Legal Database data input and processing will be completed for the non-occupied areas, whereas the Fiscal database will be completed within the next 2-3 years. The Survey Database (SDB) is scheduled to be fully populated after the completion of the resurvey program, which is a time consuming process.

Further developments have been done on the LIS, during 2006, towards the creation of a planning zone database. The data model has been designed along with the required conversion routines. The digitization of a total of 4500 plans started in January 2005 and finished in December 2005. All vector data are currently being processed, converted and entered into the Land Information



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System. Mass updating is also carried out in parallel, for the population of all zoning characteristics and attributes of each property.

In addition to the above, extra themes were created in the LIS, providing access to ortho-photo maps and satellite images, which cover Cyprus at large scale. A new server computer has been installed, which accommodates both ortho photos and satellite images. These sets of data, along with all the rest GIS/LIS information and datasets, can be accessed by all users in an interactive environment.

3.6 Land Information System Upgrade

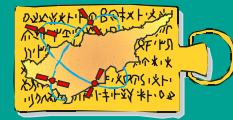
In 2004, major upgrades were implemented both for the hardware and the software environment of the Land Information System. Old workstations, servers and peripherals have been replaced by modern technology equipment. The current computer environment consists of the following:

1. Arc/GIS 8.3 and Arc/GIS 9.1 GIS software
2. Oracle 8i RDBMS
3. 17 SUN Servers
4. 489 SUN Workstations
5. 264 PCs
6. 242 printers
7. 28 HP plotters
8. 18 scanners

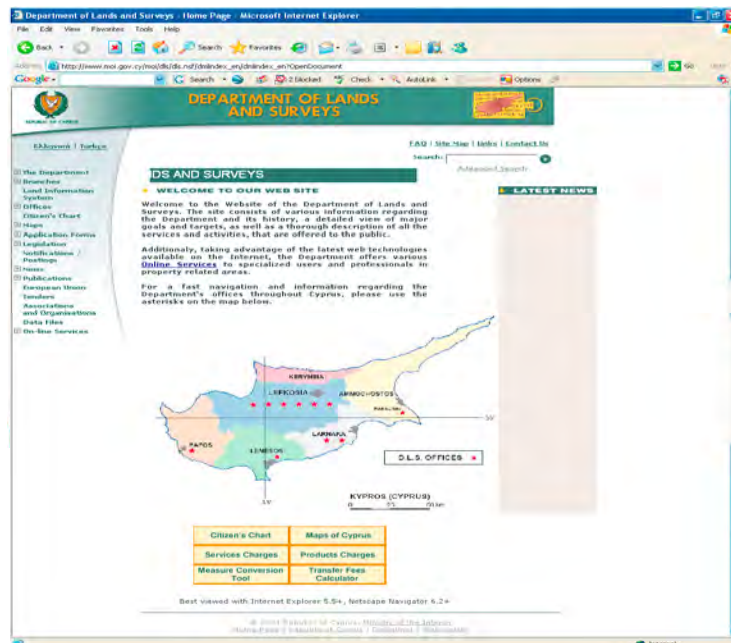
4. WEB SITE IMPLEMENTATION (<http://www.moi.gov.cy/dls>)

In year 2004, the Department of Lands and Surveys implemented a new web site. The website was designed, delivered and tested in 2004. In 2005 all the branches of the Department undertook the population of all relevant areas and sections. It is currently fully operating in an internet environment. The site provides general information regarding the history and current functions of the Department, directions to the public, online access to application forms and related laws, digital maps and data etc.

The website is designed to work in three languages namely Greek, English and Turkish. It is currently available in Greek and English, while Turkish will be available in the near future.



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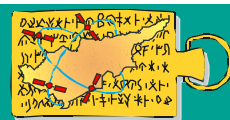


5. INTERNATIONAL ACTIVITIES

The Department of Lands and Surveys is an active member of several European and international organizations, and DLS personnel frequently participate in many conferences, seminars, and training programs that take place from time to time.

Some of the European and international bodies that DLS is a member are:

	<ul style="list-style-type: none"> • IHO - International Hydrographic Organisation
	<ul style="list-style-type: none"> • MBSHC - Mediterranean and Black Seas Hydrographic Commission
	<ul style="list-style-type: none"> • EuroGeographics - Association of the European National Mapping and Cadastral Agencies
	<ul style="list-style-type: none"> • EuroSDR - European Spatial Data Research
	<ul style="list-style-type: none"> • ISPRS- International Society for Photogrammetry and Remote Sensing



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- ICA - International Cartographic Association

In addition to the above organizations, DLS cooperates with the International Federation of Surveyors (FIG), the International Steering Committee for Global Mapping (ISCGM), and the European Permanent Committee on Cadastre.