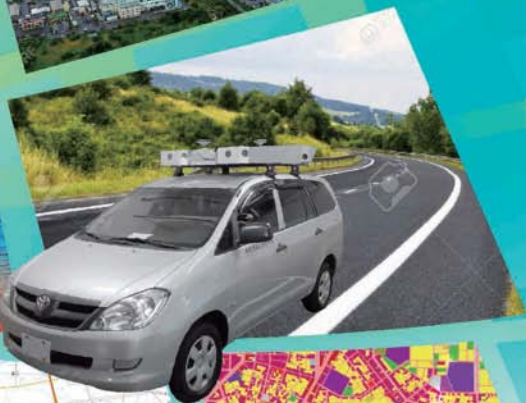




內政部國土測繪中心

National Land Surveying and Mapping Center,
Ministry of the Interior



簡介

Introduction

前言

Preface

舉凡交通、電力、水利建設、土地政策、國土規劃利用、災害監測預報及環境保護等，均有賴實施測量，繪製各類地圖，以建立完整的土地資訊，是以測繪工作是國家建設及人民產權保障之基礎。內政部國土測繪中心為中央測繪專責機關，掌理全國性測繪業務，包含測繪方案、測繪法令及測量基準之研擬；平面、高程及重力等基本測量之執行及成果管理維護；衛星基準站即時定位系統之規劃、建置、營運及管理維護；全國性地籍測量、地形測量、海洋測量之執行及成果管理維護；國土測繪資料庫之規劃、建置、管理維護與整合流通，及其他有關國土測繪事項。

隨著空間資訊蓬勃發展及測繪技術的進步，本中心亦積極致力於結合國內產、官、學界的力量與資源，於專業測繪技術上勇於突破與創新，發展多元圖資雲端管理及加值應用，提升測繪成果內容之豐富性及使用之便利性，使全民共享國土測繪與空間資訊成果，奠定智慧國土之根基。

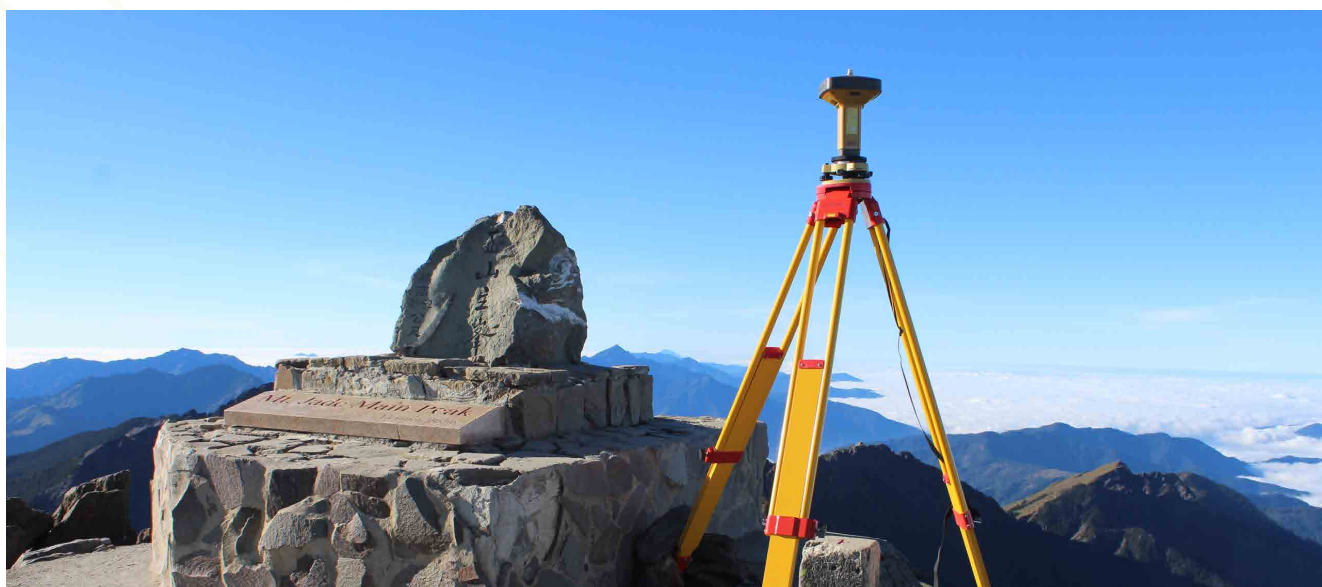
為使國內外各界能瞭解本中心各項業務發展概要及成果，爰編印出版本中英文簡介，分就「國土測繪中心現況與發展」、「核心業務」及「系統服務」3部分進行重點介紹，期盼各界不吝鞭策指教，讓我國國土測繪空間朝向更好的方向發展。



Transportation, electricity and water infrastructure, land planning and use, disaster monitoring and forecasting as well as environmental protection all rely on the surveying and mapping that provide comprehensive land information. Surveying is therefore fundamental to national development and the protection of property rights of its people. The National Land Surveying and Mapping Center (NLSC) is the central governmental organization with authority of national surveying and mapping policies. Missions of NLSC include the formulation of surveying and mapping proposals, rules & regulations, and datums of surveying; the implementation, management and maintenance of basic horizontal, vertical and gravity surveys; the planning, implementation, operation, management and maintenance of real-time kinematic positioning stations; the execution and maintenance of national cadastral, topographic and hydrographic surveys; the planning, construction, development, maintenance, integration, and distribution of national geospatial information database, and other matters relating to land surveys.

Along with rapid advances in geospatial information and surveying technology, the NLSC is now actively combining domestic surveying industry, governmental organizations, and academic resources to realize further breakthroughs and innovations in professional surveying techniques. The development of diverse cloud map management and value-added applications has boosted the convenience and versatility of survey results. It is now possible for all citizens to share in the land survey and geospatial information results hopefully to build an intelligent Taiwan.

This bilingual brochure was prepared to help domestic and foreign visitors understand the history, general purpose, and accomplishments of the NLSC. It focuses on three areas: "NLSC Developments", "Core Activities" and "Information Services". Your feedback is welcome to better direct the national geospatial development.



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國土測繪中心現況與發展

Current Status and development of NLSC

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>> 沿革及組織

History & Organization

■ 中心沿革 | History

民國 36 年
(1947)

成立「臺灣省行政長官公署民政處地政局荒地勘測總隊」。

Established as Wasteland Survey Headquarter, Land Administrative Bureau, Department of Civil Affairs, Chief Executive Office, Taiwan Province.

民國 36 年
(1947)

更名為「臺灣省政府民政廳地政局荒地勘測總隊」。

Renamed as Wasteland Survey Headquarter, Land Administrative Bureau, Department of Civil Affairs, Taiwan Provincial Government.

民國 42 年
(1953)

更名為「臺灣省政府民政廳地政局測量總隊」。

Renamed as Survey Headquarter, Land Administrative Bureau, Department of Civil Affairs, Taiwan Provincial Government.

民國 52 年
(1963)

更名為「臺灣省地政局測量總隊」。

Renamed as Survey Headquarter, Land Administrative Bureau, Taiwan Province.

民國 68 年
(1979)

升格為「臺灣省地政處測量總隊」。

Promoted as Survey Headquarter, Land Administrative Office, Taiwan Province.

民國 70 年
(1981)

更名為「臺灣省政府地政處測量總隊」。

Renamed as Survey Headquarter, Land Administrative Office, Taiwan Provincial Government.

民國 81 年
(1992)

改制為「臺灣省政府地政處土地測量局」。

Reorganized as Land Survey Bureau, Land Administrative Office, Taiwan Provincial Government.

民國 88 年
(1999)

改隸為「內政部土地測量局」。

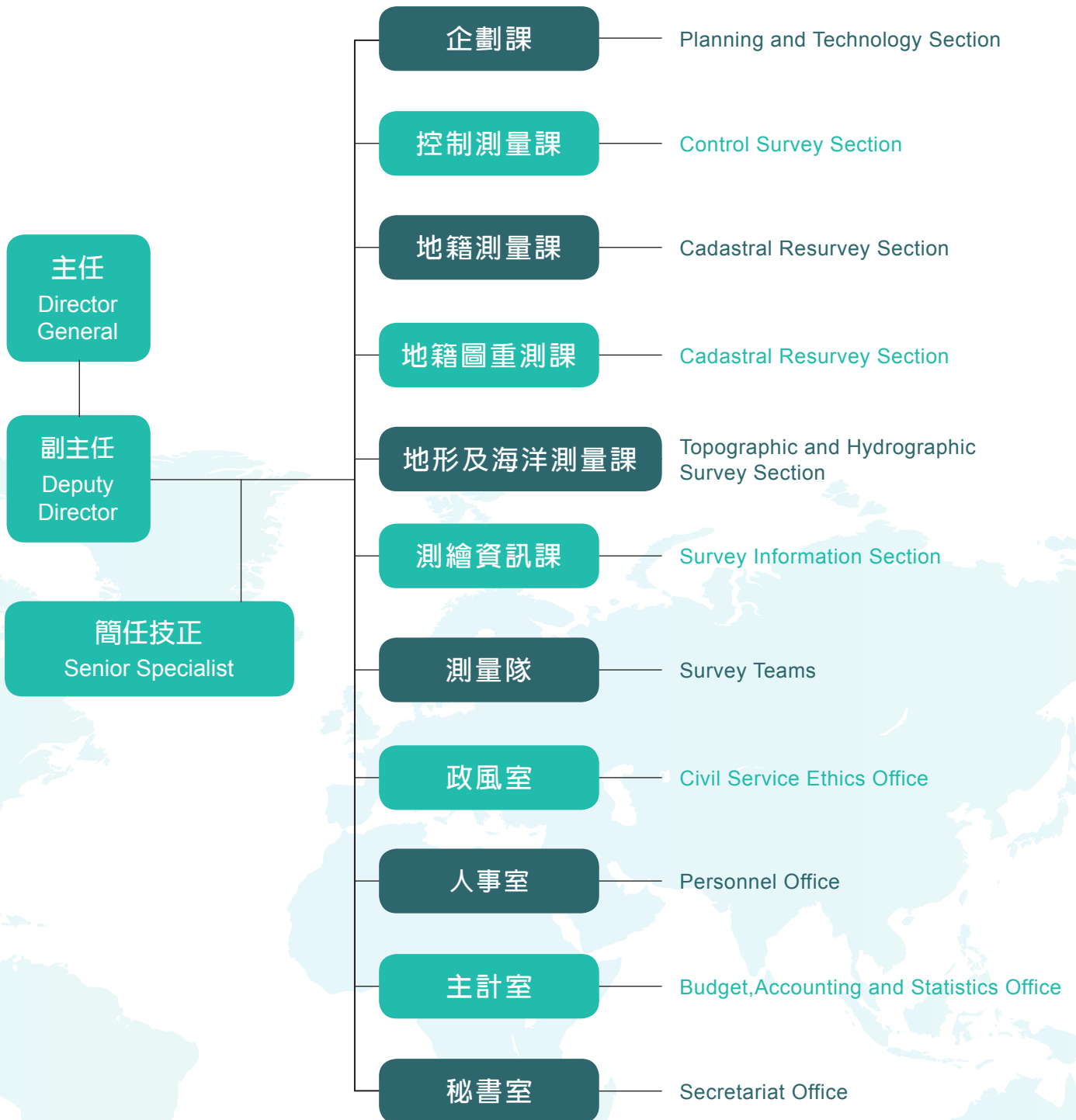
Reorganized as Land Survey Bureau, Ministry of the Interior.

民國 96 年
(2007)

改制為「內政部國土測繪中心」。

Reorganized as National Land Surveying and Mapping Center, Ministry of the Interior.

行政組織 | Organization



業務職掌

Duties

企劃課 | Planning & Technology Section

- ▶ 測繪施政計畫之研擬、管制考核及成效評估
Planning, supervision and evaluation of survey implementation.
- ▶ 測繪技術研究發展之規劃、推動及管制考核
Planning, promotion and evaluation of survey technology research and development.
- ▶ 測繪政策之研擬
Formulation of surveying and mapping policy.
- ▶ 測繪業及人員管理制度之研擬
Compiling regulations on survey industry and survey personnel.
- ▶ 國際測繪業務交流合作
Survey service exchange with foreign countries.
- ▶ 測繪儀器檢校制度之規劃及推動
Planning and implementation for calibration of survey instruments.
- ▶ 本中心法制作業及法規資料庫管理維護
Developing rules & regulations regarding the NLSC's operation and management & maintenance of database.
- ▶ 測繪成果統計
Compiling statistics of survey results.
- ▶ 測繪人員培育及訓練
Conducting education and training of survey personnel.
- ▶ 其他有關企劃事項
Other services related to planning.





| 控制測量課 | Control Survey Section

- 水準原點及潮位站水準點高程檢測
Vertical survey on level origin and tide gauge benchmark.
- 平面控制網之設立、維護及管理
Setup, maintenance and management of horizontal control network.
- 跨越直轄市、縣(市)範圍加密控制測量計畫之規劃、推動及督導檢查
Planning, promotion, supervision and inspection of survey projects on cross-county (-city, or -municipal) control network densification.
- 衛星即時定位系統之規劃、建置、維護及營運
Planning, implementation, operation, maintenance and management of real-time kinematic positioning system.
- 高程控制網之設立、維護及管理
Setup maintenance and management of vertical control network.
- 重力控制網之設立、維護及管理
Setup, maintenance and management of gravity control network.
- 控制測量成果審查及建檔管理
Supervision and document management of control survey results.
- 測量標遷移補建及測量標用地管理
Movement and repair of survey markers and land management.
- 控制測量制度及法規之研擬
Development of laws and regulations on control survey system.
- 其他有關控制測量事項
Other services related to control survey.

地籍測量課 | Cadastral Survey Section

地籍測量制度及法規之研擬

Development of laws and regulations on cadastral survey system.

司法或檢察機關囑託鑑測案件之處理

Processing boundary survey designated by judicial or prosecuting organs.

未登記土地測量之規劃、推動及督導檢查

Planning, promotion, supervision and inspection of unregistered land survey.

政策性地籍測量業務之規劃、推動及督導檢查

Planning, promotion, supervision and inspection of policy-based cadastral survey.

跨越直轄市、縣(市)範圍地籍測量計畫之規劃、推動及督導檢查。

Planning, promotion, supervision and inspection of survey projects on cross-county (-city, or -municipal) cadastral survey projects.

圖解地籍圖數化成果整合套疊都市計畫地形圖之規劃、推動、督導及考核

Planning, promotion, supervision and evaluation of digitized analog cadastral maps overlaid with urban planning topographic maps.

其他有關地籍測量事項

Other services related to cadastral survey.



地籍圖重測課 | Cadastral Resurvey Section

地籍圖重測計畫之研擬

Formulation of cadastral resurvey plan.

地籍圖重測業務之規劃及執行

Planning and implementation of cadastral resurveys.

地籍圖重測制度及法規之研擬

Development of laws and regulations on cadastral resurvey system.

地籍圖重測業務督導及成果檢查

Supervision and inspection of cadastral resurvey.

地籍圖重測區都市計畫樁清理補建及聯測

Cleaning, repairing and connecting survey of urban planning pillars in cadastral resurveys area.

其他有關地籍圖重測事項

Other services related to cadastral resurvey.





地形及海洋測量課 | Topographic and Hydrographic Survey Section

- ▶ 地形及海洋測量之規劃
Planning of topographic and hydrographic surveys.
- ▶ 基本圖測製及成果管理維護
Surveying, mapping and management & maintenance of basic topographic maps.
- ▶ 全國性地形圖測製及成果管理維護
Surveying, mapping and management & maintenance of national topographic maps.
- ▶ 全國性電子地圖測製及成果管理維護
Surveying, mapping and management & maintenance of national electronic maps.
- ▶ 全國性數值地形模型建置及成果管理維護
Establishment and management & maintenance of national digital terrain model.
- ▶ 海域基本圖測製及成果管理維護
Surveying, mapping and management & maintenance of base chart in marine area.
- ▶ 潮間帶地形圖測製及成果管理維護
Surveying, mapping and management & maintenance of topographic maps in intertidal zone.
- ▶ 電子海圖測製及成果管理維護
Surveying, mapping and management & maintenance of electronic navigational charts.
- ▶ 國土利用調查之規劃、推動及成果管理維護
Planning, implementation and management & maintenance of national land use investigation.
- ▶ 其他有關地形及海洋測量事項
Other services related to topographic and hydrographic surveys.



測繪資訊課 | Survey Information Section

▶ 國土測繪資訊整合流通系統之規劃、建置及管理維護

Planning, implementation, and management & maintenance of the integrated distribution system of national land surveying and mapping information.

▶ 國土測繪資料庫之規劃、建置、管理維護及加值應用

Planning, implementation, management & maintenance, and value-added application of the national land surveying and mapping database.

▶ 測繪知識網之規劃、建置及維護

Planning, implementation and maintenance of surveying and mapping knowledge web.

▶ 國土測繪資訊流通供應

Distribution and provision of national land surveying and mapping information.

▶ 本中心資訊安全政策與防護機制之規劃、推動、通報及管理

Planning, implementation, announcement and management of the NLSC's information security policy and protection mechanism.

▶ 本中心資訊設備與應用系統之規劃、調配、維護及管理

Planning, allocation, maintenance and management of the NLSC's information devices and application systems.

▶ 本中心資訊作業之規劃、推動及督導考核

Planning, promotion, supervision, inspection and evaluation of the NLSC's information operation.

▶ 其他有關測繪資訊事項

Other services related to survey information.



| 測量隊 | Survey Teams

- ▶ 執行各項測繪工作
Conducting field surveying and mapping tasks.

| 政風室 | Civil Services Ethics Office

- ▶ 政風事項
Ethics management of civil servants

| 人事室 | Personnel Office

- ▶ 人事管理事項
Personnel management.

| 主計室 | Budget, Accounting and Statistics Office

- ▶ 歲計、會計及統計事項
Budget, accounting and statistics.

| 秘書室 | Secretariat Office

- ▶ 文書、總務、研考、公關及其他支援服務事項
Document management, general affairs, R&D & evaluation, public relations, and miscellaneous supports.

>> 願景目標

Visions and Operational goal

本中心扮演測繪成果生產、整合及供應之角色，未來除持續引進新式測繪設備及技術，增進測繪作業效能及成果品質外，亦秉持專業效能的理念，以熱情服務的精神，推動測繪成果整合流通，積極朝下列目標邁進：

The NLSC plays an important role in producing, integrating and supplying the results of national land surveying and mapping. Apart from continuously introducing new survey equipment and techniques to enhance survey efficiency and quality, the NLSC also will actively promote the integration and circulation of professional survey data and results to realize the following goals:

1 運用高科技之測繪技術

獲得高精度之空間地理資訊，更新各項基本圖籍，維護完整國土測繪空間資料庫。

Use of high-tech surveying techniques to collect high-precision geospatial information, renew all kinds of basic maps and maintain a comprehensive national geospatial information database of land survey.

2 整合各類國土空間資訊

結合雲端技術，發展圖資智慧加值應用服務，提供各界多目標使用，提升應用層面的深度與廣度。

Integrate diverse geospatial information collected from various sources to provide versatile online value-added services for multi-purpose applications to increase their scope and depth.

3 推動測繪資源共享互惠

將成果產製管理模式，轉化決策支援導向服務，以國土空間資訊輔助行政決策。

Promote sharing and collaboration on surveying resources, shift from an output management model to providing decision-making support services and use national geospatial information to make administrative decision.

4 秉持簡政便民思維創新精進理念

運用 e 化及行動技術，為民衆提供全方位、便捷及貼心的服務。

Embrace the philosophy of public access and innovative improvement by using computer technology to provide the public with a full spectrum of convenient and useful services.

5 積極參與測繪與空間資訊研討會

掌握測繪科技脈動，推廣國土測繪應用成果，拓展國際能見度。

Actively participate in surveying and geospatial information conferences to stay up-to-date on developments in surveying technology, promote the results of surveying and mapping, and expand international visibility.

6 辦理測繪專業訓練強化專業知能

精進測繪人員本職學能。

Organize professional training to strengthen surveyors' professional know-how and core surveying competency.



核心業務

Core Business

- 控制測量
Control Survey
- 地籍測量
Cadastral Survey
- 地形及海洋測量
Topographic and Hydrographic Survey
- 國土測繪資訊整合流通
Geospatial Information Integration and Circulation
- 測繪科技發展
Surveying and Mapping Technology Development
- 測量儀器校正
Survey Instrument Calibration

>> 控制測量

Control Survey

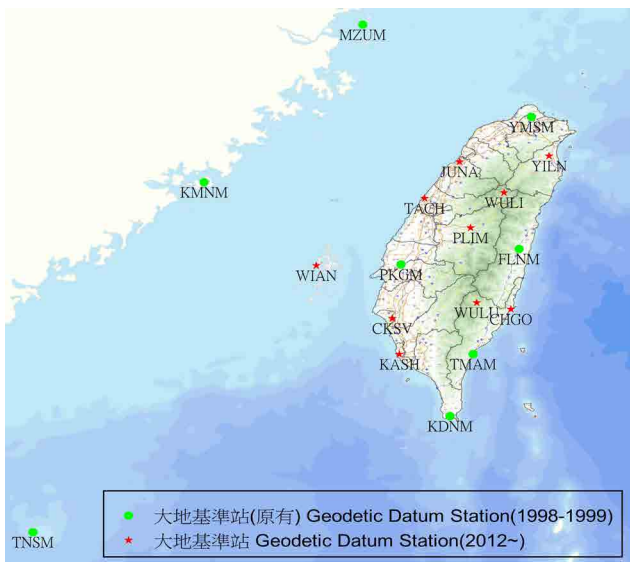
控制測量目的在建立全國統一的測量基準及基本控制點以作為測繪基準之參考依據，係實施國家建設、規劃土地利用及保障人民權利的重要依據，又因臺灣地區位處板塊活動劇烈地區，其成果應定期檢測，以維護其準確性，目前使用基準包含大地基準、高程基準及重力基準。

The purpose of control surveys is to establish a set of unified national survey datums and basic control points for surveying and mapping purposes. This provides an important reference for implementing national infrastructure, planning land use and protecting the rights of the people's property. As Taiwan is in a tectonically active region, the survey results must be regularly inspected to ensure their accuracy. Datums in current use include geodetic datum, vertical datum and gravity datum.

(一) 大地基準 Geodetic Datum

大地基準係做為大地測量坐標計算的參考依據，依據基本測量實施規則規定，選定 18 個衛星追蹤站測量成果，並以此訂定 TWD97 國家坐標系統，包含使用國際地球參考框架 (ITRF 94)、方位為國際時間局 (BIH) 定義 1984.0、參考橢球體為 GRS80 其橢球參數如下：長半徑 $a=6378137$ 公尺 扁率 $f=1/298.257222101$ ，地圖投影方式為橫麥卡托投影，經差 2 度分帶，臺灣本島地區中央子午線為東經 121 度，澎湖金門馬祖地區為東經

Geodetic datum serves as a reference for the calculation of geodetic coordinates. Under the "Fundamental Surveying Regulations", measurements from 18 satellite tracking stations were selected as the basis for the TWD97 National Coordinate System which incorporates the International Terrestrial Reference Frame (ITRF 94), the direction of 1984.0 as defined by the Bureau International de l'Heure (BIH) and the GRS80 reference ellipsoid with the following parameters: Semi-major axis (a) = 6378137 meters, and Flattening (f) = 1/298.257222101, Transverse Mercator projection with longitude difference of 2 degrees. The central meridian is 121 ° E for Taiwan proper, and 119 ° E for Penghu, Kinmen and Matsu. Origin of the projection is shifted westward by 250,000 meters, and the central meridian scale factor is 0.9999. National coordinate systems currently in use include TWD97 and TWD97[2010]. The TWD97[2010] system consists of coordinates of 3,013 control points announced on March 30, 2012.



◀ 大地基準站分布圖

Distribution of geodetic datum stations

119 度。投影坐標原點向西平移 25 萬公尺，中央子午線尺度比為 0.9999。現行國家坐標系統包含 TWD97 及 TWD97[2010]2 種，其中 101 年 3 月 30 日公告 3,013 個點位 TWD97[2010] 坐標成果。

► 金門衛星追蹤站

Kinmen satellite tracking station



(二) 高程基準 Vertical Datum

臺灣水準點高程採用正高系統；同時高程基準係定義在 1990 年 1 月 1 日標準大氣環境情況下，並採用基隆驗潮站 1957 年至 1991 年之潮汐資料化算而得，並命名為 2001 臺灣高程基準（Taiwan Vertical Datum 2001，簡稱 TWVD 2001），採用雙原點方式設計。目前已完成第 3 次臺灣本島一等水準點檢測作業，並於 105 年 4 月 12 日公告 2,715 點一等水準點成果，測量路線約 4,600 公里。

The orthometric height system has been adopted for the height of the benchmark in Taiwan. The definition of height datum was derived from the tidal information of Keelung Tide Station from 1957 to 1991 under the standard atmosphere environment of January 1, 1990. The height datum was named Taiwan Vertical Datum 2001 (TWVD2001) and the first-order benchmarks of TWVD2001 have been measured three times. The results of the third measurement at 2,715 first-order benchmarks were announced on April 12, 2016, and the length of survey lines measured approximately 4,600 km in total.



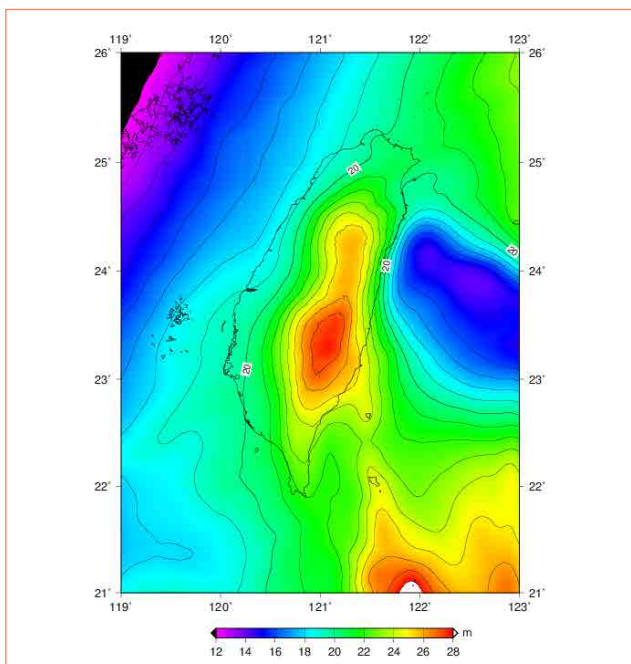
▲臺灣水準原點現場圖 The Datum Benchmark of Taiwan

(三) 重力基準 Gravity Datum

重力基準包括新竹重力基準站（HS）及其雙絕對重力點，一為新竹主點（點號：HS01）位

The gravity datum includes Hsinchu Gravity Base Station (HS) and its dual absolute gravity points, one of

於站內，一為新竹副點（點號：HS02）位於鄰近之國家度量衡標準實驗室，使用經國際重力比對（如 International Comparison of Absolute Gravimeters, ICAG）驗證之絕對重力儀，進行長期觀測分析，將其測量成果作為訂定重力系統之依據。基本控制測量之重力值計算，應依據重力基準之測量成果化算，且視精度需要進行環境改正，並命名為二〇〇九重力系統（Gravity System 2009，簡稱 GS2009）。嗣於 103 年 3 月 13 日公告絕對重力點 17 點、一等重力點 683 點、二等重力點 6,084 點，共計 6,784 點成果及在 103 年 6 月 4 日公告臺灣地區 30 秒 × 30 秒網格之混合法大地起伏模型 (TWHYGEO2014) 供各界使用。



▲ 混合法大地起伏模型
The Hybrid Geoid Model

which is the Hsinchu main point (point number: HS01) located within the station, and the other is the Hsinchu secondary point (point number: HS02) located nearby the National Measurement Laboratory. Measurements taken from long-term observation and analysis with an absolute gravimeter (with International Comparison of Absolute Gravimeters (ICAG) certification) were adopted as the basis for defining the gravity reference system. The calculation of the basic geodetic survey was based on the measurements from the gravity datum, and the environmental corrections were made if demanded for required accuracy. The results of gravity datum and system were named as Gravity System 2009 (GS2009). On March 13, 2014, the results of 17 absolute gravity points, 683 first-order gravity points and 6,084 second-order gravity points were announced for a total of 6,784 points. In addition, a 30x30 second grid Hybrid Geoid Model (TWHYGEO2014) for Taiwan was also made available to the public on June 4, 2014.



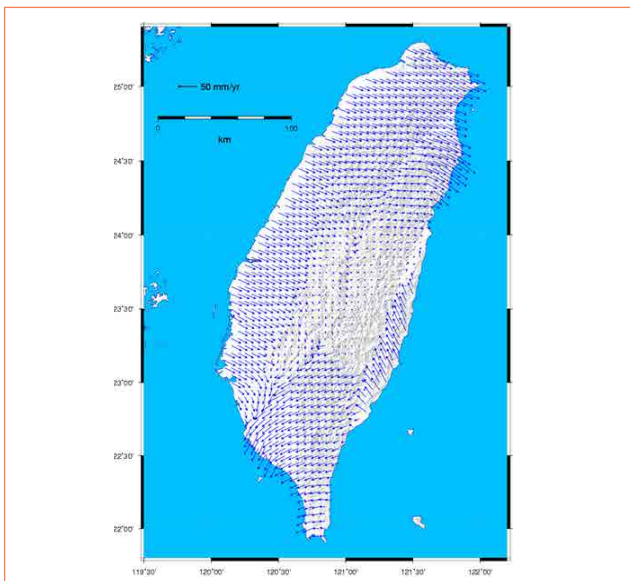
▲ 玉山重力測量作業情形
Gravity survey operation on Mt. Jade

(四) 速度場監測 Velocity Field Monitoring

臺灣位於板塊碰撞劇烈地帶，自內政部 97 年公布衛星追蹤站及各級控制點 TWD97 坐標迄今已歷經 10 餘年，部分地區點位已產生明顯位移，致

Taiwan is located in a tectonically active region and more than ten years have passed since the announcement of the TWD97 coordinates of satellite

套合引用時，無法符合測繪作業之精度要求，本中心自 100 年開始以臺灣地區約 400 個衛星連續觀測站為基礎資料，並搭配約 1,400 點點基本控制點 6 小時衛星測量成果，定期分析其點位水平及垂直方向位移情形，提供後續各項基本框架及坐標系統變動分析使用，朝建立半動態國家坐標系統努力。



tracking stations and control points at all levels by the Ministry of the Interior in 2008. There were clear signs of displacement in some regions, making the announced TWD97 coordinates unable to meet the accuracy requirements of surveying work. Since 2001, NLSC has been using around 400 continuously operating reference stations (CORS) in Taiwan as the base data together with the results of satellite measurement over 6 hours at 1,400 basic control points for analysis of the horizontal and vertical displacements which were useful for change analysis of basic frameworks and coordinate systems and deemed as part of the initiative to establish a semi-dynamic national coordinate system.

◀ 臺灣地區 TWD97 國家坐標系統變位模式
National coordinate system displacement model under TWD97 for Taiwan

(五) e-GNSS 即時動態定位系統維運

Operation and Maintenance of e-GNSS Real-Time Kinematic Positioning System

e-GNSS 為本中心建構之高精度之電子化全球衛星即時動態定位系統名稱，基本定義為架構於國際網路通訊及無線數據傳輸技術之衛星即時動態定位系統，其中字母“e”係具有「電子化」及「網路化」之含意，GNSS 代表著多星系的衛星導航定位系統 (GPS+GLONASS)。目前系統有 78 主站及超過 70 個備援站，提供 24 小時不間斷公分級精度即時定位服務，主要提供服務包含：即時性衛星動態定位服務 (e-GNSS 及 DGNSS)、衛星觀測資料後處理動態定位服務及衛星觀測資料電子檔供應服務。

e-GNSS is the name of real-time kinematic positioning system established by NLSC, which is based around Internet communications and wireless data transmission technology. The letter 'e' represents "electronic" and "network-enabled". GNSS refers to multi-constellation global navigation satellite systems (at present, GPS and GLONASS). The system currently consists of 78 primary stations and over 70 backup stations that provide 24-hour continuous centimeter-precision real-time positioning services. The main services it provide of e-GNSS include: Real-time kinematic positioning service (e-GNSS and DGNSS), GNSS observation data post-processing service and provision of GNSS observation data.



>> 地籍測量

Cadastral Survey

地籍測量係依據法定程序實施地籍調查及測量土地界址，並計算面積、繪製地籍圖供土地登記管理使用。臺灣地區目前使用之地籍圖依測繪方法分為圖解法測繪、數值法測繪及數化轉繪 3 類。本中心為提升測量成果品質，促進資料流通共享，全面採用數值法辦理地籍測量，規劃推動地籍圖重測計畫、圖解數化地籍圖整合建置及都市計畫地形圖套疊計畫，並受理法院囑託辦理土地鑑定測量，協助解決土地爭訟事件，確保民衆土地財產權益。

Cadastral surveys investigate and survey land boundaries in accordance with the law. The land area of each lot is also calculated and a cadastral map is produced for land registration and management. Currently, the cadastral maps being used in Taiwan can be divided into three major categories by the aspect of mapping methods, named graphic mapping, numerical mapping, and digitalization from original graphic maps. To improve the quality of survey results as well as promote information sharing and communication, the numerical method is exclusively used by the NLSC for all cadastral surveys. Current projects include cadastral resurveying, integration and overlaying of digitized analog cadastral maps and urban planning topographic overlays. The NLSC also undertakes court-ordered land surveys to help resolve land disputes and protect the property rights of the general public.

(一) 地籍圖重測 Cadastral Resurvey

臺灣地區在日據時期所測繪之地籍原圖，於第二次世界大戰時遭炸毀，光復後係以日據時期依地籍原圖描繪裱裝而成之副圖辦理地籍管理。此類地籍圖因年代久遠，受圖紙自然碳化、伸縮、使用頻繁不斷展疊等因，致破損嚴重，且因土地分割、天然地形變遷及人為界址變動等影響，常有圖、地、簿不符情形，影響公私財產權益甚鉅。

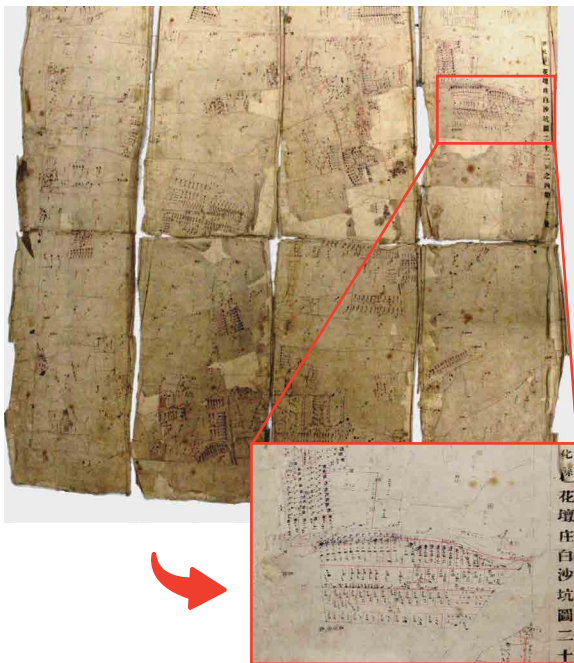
而所謂地籍圖重測係依據土地法及地籍測量實施規則等有關規定辦理，土地所有權人應於地政機關通知之限內，自行設立界標並到場指界。作業人員則依土地所有權人指界之界址，應用高精度數值測量儀器與技術測定各宗土地位置、形狀及計算面積，或對於無法指界之界址，參考舊地籍圖及其他可靠資料辦理協助指界。並依計算之成果辦理重測結果公告、土地標示變更登記及繪製地籍圖。

The originals of cadastral maps for Taiwan produced during the Japanese Occupation Period were destroyed by air raids in World War II. Cadastral management after the war was therefore based on framed copies of the originals. This type of cadastral maps became badly worn due to natural carbonization, shrinkage, frequent use and repeated folding of the paper over a long period of time. Lot sub-divisions, natural topographic changes as well as interference with boundary markers led to frequent inconsistencies among maps, land and registration that had a severe impact on private and public property rights.

Cadastral resurveys are conducted in accordance with the relevant rules of the "Land Act" and "Regulations Governing the Implementation of Cadastral Survey". The land owner upon being notified by the land administration agency should mark

本中心為確實釐整地籍、杜絕經界糾紛，推動地籍圖重測作業，經歷 62 至 64 年試辦、65 年至 77 年 3 期 13 年計畫、78 年年度計畫、79 至 94 年臺灣省地籍圖重測後續計畫及 95 至 103 年地籍圖重測計畫，累計完成 757 萬餘筆土地；104 至 112 年實施地籍圖重測後續計畫，預計辦理 143 萬筆土地重測作業。

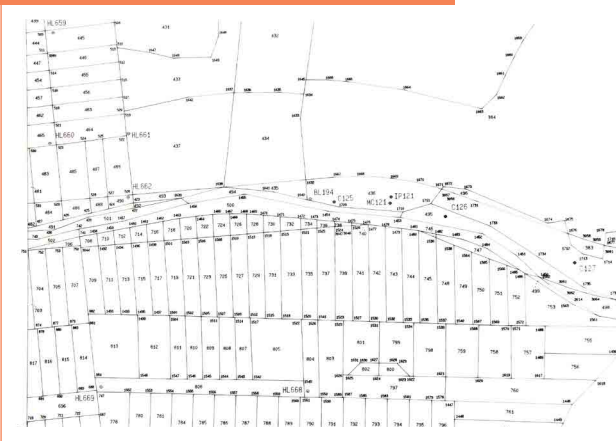
重測前地籍圖 Before



▲局部放大 Local amplification

重測後地籍圖 (以電子檔案儲存)

After(Save as an electronic file)

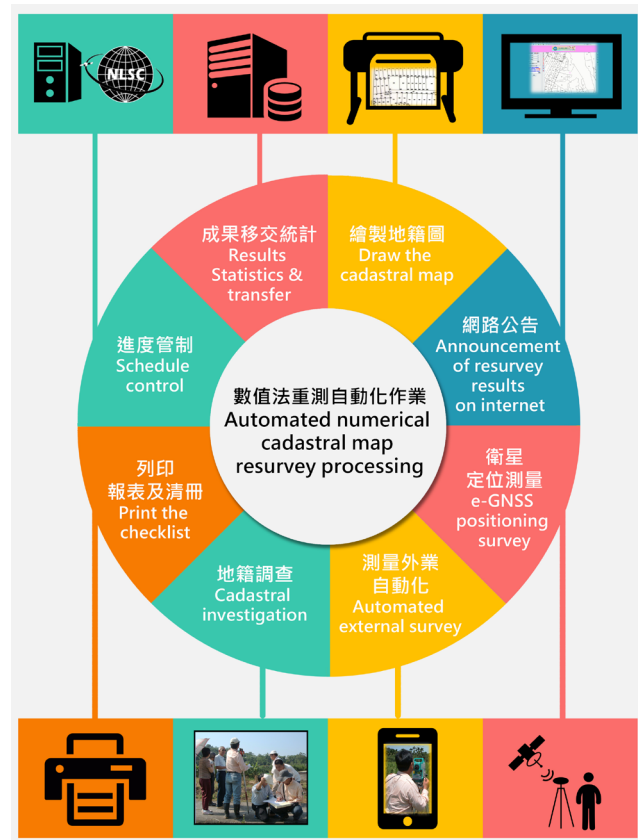


▲ 重測後地籍圖成果示意圖

Result of cadastral resurvey

out their own boundaries by the given deadline and be present to point out the boundaries. The resurvey operators then use the above mentioned markers, other reliable features, and other cadastral information as evidences to continue succeeding operation works. High precision surveying equipment are utilized to determine the locations and shape of land parcel. Parcel area will be calculated accordingly. All the results will be proclaimed publically. The description changes of land parcels and the new cadastral maps drawing will therefore be followed.

For clarifying land registration and elimination of boundary disputes, the NLSC has unceasingly made every effort to support the implementation of cadastral resurveys. The initial trial between 1973 and 1975, the three phase program over 13 years between 1976 and 1988, the yearly program in 1989,



▲ 數值法地籍圖重測自動化作業示意圖

Figure of automated numerical cadastral map resurvey processing

the cadastral resurvey follow-up program for Taiwan Province between 1990 and 2005, as well as the cadastral resurvey program between 2006 and 2014 have successfully completed cadastral resurveys

for more than 7,570,000 lots in total. The cadastral resurvey follow-up program to run from 2015 to 2023 is expected to resurvey 1,430,000 lots.

(二) 圖解數化地籍圖整合套疊

Integration and Overlaying of Digitized Analog Cadastral Maps

臺灣地區自 78 年起全面採用數值法辦理地籍圖重測，以數值資料型態儲存地籍資料，惟數值法地籍整理之面積及筆數仍占臺灣地區少數之比例，大部分地區尚以圖解地籍圖管理，考量地籍圖使用頻繁，圖紙破損日益嚴重，為保持圖解地籍圖現況，避免圖紙繼續破損，影響民衆權益，並建立完整地籍測量資料庫，於 94 年底完成全部臺灣省圖解地籍圖數值化作業。

圖解地籍圖經過數值化後，並未能同時解決潛存於圖解地籍圖長久以來所累積之內部誤差及圖幅無法銜接等問題。本中心自 96 年起展辦圖解數化地籍圖整合套疊作業，以數值化之地籍圖為基礎，藉由測設 TWD97 控制點、參考地籍調查表記載界址及實地檢測，在圖解地籍圖容許誤差範圍內，修正地籍圖經界線及進行圖幅整合；並經由聯測都市計畫樁及地形圖之共同圖徵點，將地籍圖、都市計畫樁位圖及地形圖等三種圖籍整合建置到相同坐標系統，建立整合式空間資料。96 至 104 年合計辦理 44 萬 6,329 筆。105 至 109 年廣續規劃每年辦理 7 萬 5,000 筆土地，共計辦理 37 萬 5,000 筆。

本作業內容包含資料清查蒐集核對、外業測量（含加密控制測量、圖根測量、都市計畫樁聯測及現況測量）、地籍圖分幅套疊及接圖整合、地籍都計地形三圖套疊作業，主要係藉由實測方式，改善圖地不符情形，解決圖幅接合問題，達成整段地籍

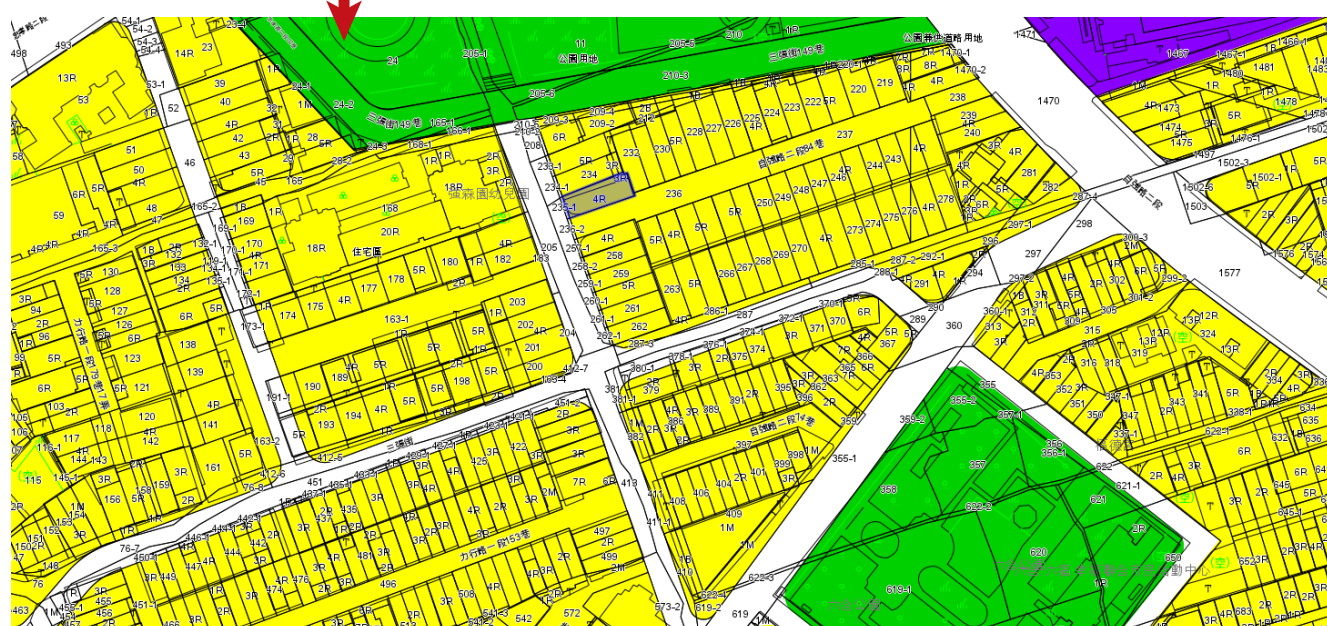
The numerical method for all cadastral resurveys in Taiwan has been adopted since 1989 and cadastral information with numerical data has then been digitally stored. Yet, before 1998, land parcels and areas where had been resurveyed with numerical method were still of minority. Most cadastral maps were managed with the consideration basing on the character limitation of graphic maps drawn on paper media. On the other hand, as the paper maps became increasingly worn due to frequent use. To preserve the graphic maps against further damage that might compromise the rights of the public, all graphic cadastral maps in Taiwan were converted to the numerical format through projects of digitization to establish a complete cadastral survey database. The cadastral resurveyed maps drawn on paper media in the earlier years which had often been used were inspected for the first conversion contents. Then the other years' maps and the maps not ever resurveyed were planned in sequence. The digitalization project was completed by the end of 2005.

The numerical conversion of graphic cadastral maps was to cautiously keep the situation at that time. However, the conversion left the longstanding issues such as accumulated internal errors and mismatches between map sheets unsolved. The NLSC commenced the integration and overlaying of digitized graphic cadastral maps with other maps in 2007 by using TWD97 control points, boundary markers recorded on cadastral surveys and field surveys to amend the boundary lines to the extent allowed by the tolerances

圖整合及管理之目標，並作為全面推動以數值方式辦理土地複丈作業之基礎及提供其他多目標應用。

in graphic cadastral maps. Basing on the common feature points, cadastral maps, urban planning stake maps and topographic maps were integrated and overlaid onto the same coordinate system to create a composite geospatial database. A total of 446,329 lots had been processed in this manner between 2007 and 2015. Planning now calls for 75,000 lots to be processed every year from 2016 through to 2020 for a total of 375,000 lots.

The main processes include data investigation, collection and verification, field surveys (including densification work of control points, skeleton survey, urban planning stake joint-surveys and survey of present utilization), integration of separate cadastral map overlays, and cadastral/urban planning/topographic map overlaying. The above mentioned tasks were carried out by field surveys to correct mismatches between map and real site and to resolve differences existing between adjacent map sheets for realizing the integration and management of all cadastral maps within land sections. The initiative also serves as a basis for promoting the use of the numerical method for land resurvey and to support other multi-purpose applications.



▲三圖合一套疊示意圖 Schematic diagram of overlaying

(三) 司法、檢察機關囑託鑑測

Boundary Survey Designated by Judicial & Prosecution Organs

本中心依民事訴訟法、刑事訴訟法及地籍測量實施規則之規定，受理法院、檢察機關囑託土地界址鑑定測量，並製作鑑測書圖提供法院、檢察機關作為審判或偵辦之參考，協助解決人民土地爭議，平均每年受理法院（含檢察機關）囑託鑑測案件約300件。

辦理項目如下：

➤ **法院囑託土地鑑定測量：**包含土地界址鑑定測量（確認界址、共有物分割、確認通行權存在、拆屋還地、返還土地、無權占有、排除侵害及損害賠償…）及土地使用現況地形測量（地形圖測製、土方計算…）。

➤ **法院囑託協助執行測定界址：**法院執行處囑託依法院判決結果至實地測定界址。

The NLSC undertakes boundary surveys designated by courts and prosecutors in accordance with the Code of Civil Procedure, Code of Criminal Procedure and Cadastral Survey Regulations. Survey reports and maps are also produced to provide the reference for judgments or investigation. There are around 300 survey cases each year.

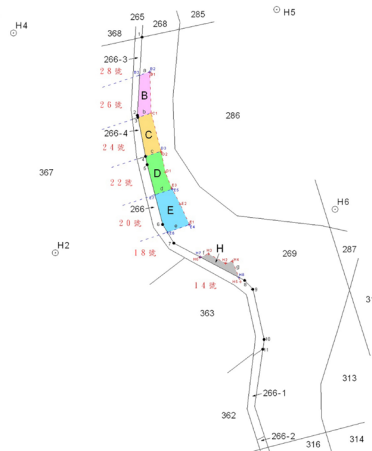
Services include:

➤ **Land parcel surveys:** Includes land boundary survey (confirmation of boundary markers, division of shared object, confirmation on right of passage, building demolition for return of land, return of land, squatting, elimination of infringement and compensation for damages, etc.) and survey of current land utilization (topographic map survey, earthwork computation etc.).

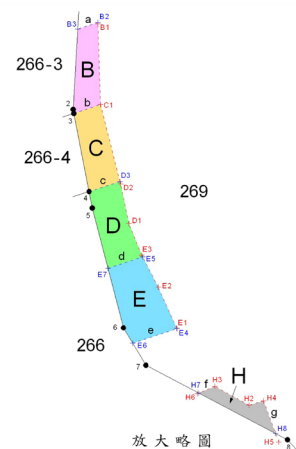
➤ **Boundary point setting survey:** Establish on-site boundaries at the direction of the enforcement department.

▼ 鑑定圖 Survey map

土地坐落	臺北市文山區 ○○段○○小段 269地號等土地
囑託法院及文號	臺灣臺北地方法院○○年○月○日先民受○○99年度訴字第○○○○○號函。
囑託事項	詳見鑑定書
收件日期及文號	○○年○月○日第○○○○○號
鑑測日期	○○年○月○日
附記	本鑑定圖僅供法院參考，不得發給土地所有權人。
說明	<ul style="list-style-type: none"> ○ 圖示小圖係圖根導線點位置。 — 實線係地籍圖境界線。 ● 黑點係系爭土地間地籍圖境界線界址點位置。 --- 紅色虛線係被告現場指界位置。 黃色區域B、C、D、E及H係被告所有建物遮蓋使用269地號土地範圍。



面積分析表					
圖示	B	C	D	E	H
坐落地號	○○段○○小段269地號				
門牌及現況	26號	24號	22號	20號	14號
面積	18.36	22.25	24.19	32.28	10.01
單位：平方公尺。					



線段	a	b	c	d	e	f	g
距離	2.05	2.70	3.14	3.51	4.50	1.67	3.36

單位：公尺。

鑑定機關：內政部國土測繪中心

中華民國 ○○ 年 ○ 月 ○ 日

比例尺：1/500

>> 地形及海洋測量

Topographic and Hydrographic Survey

地形及海洋測量係利用航、衛照影像、遙測及 LiDAR 技術對海陸地形、範圍、利用情形等進行調查及勘測，藉以獲取基礎且核心之國土空間資訊，並透過各項測量成果處理及加值，產製出豐富主題圖，除可作為國土規劃管理及各項工程建設之用外，亦可拓展至民間提供生活導航、旅遊規劃等應用。

Topographic and hydrographic mappings are made by using aerial and satellite imagery and employing remote sensing as well as LiDAR technologies to investigate and survey the topography, scope and utilization of sea/land. Such surveys acquire basic and fundamental geospatial information that can be used to produce a wide variety of thematic maps through further value-added processing of survey results. Apart from having applications in land use planning, management and construction, these maps can also be extended to the private sectors for lifestyle navigation and travel planning.

(一) 基本地形圖修測

Topographic Maps Revising

基本地形圖係指中央主管機關所定基本比例尺測繪之地形圖，內容包括地貌、地物及基本地理資料，其製圖比例尺訂為五千分之一、二萬五千分之一、五萬分之一及十萬分之一。

內政部自 84 年起推動以數值航測法測製基本地形圖，持續辦理基本地形圖修測工作，95 年起將本項工作交由本中心執行。本中心為提升基本地形圖修測效率，降低修測成本，自 104 年起利用臺灣通用電子地圖與國土利用調查成果及以光達產製之數值地形模型（DTM）成果，整合轉製更新基本地形圖地物、地類、等高線、獨立標高點及數值地形模型，並應用 e-GNSS 即時動態定位系統精進基本地形圖控制測量作業。

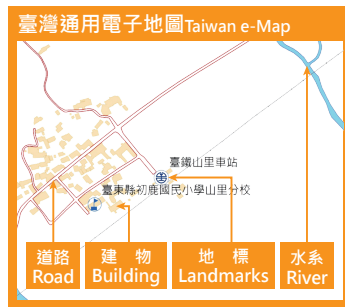
為確保圖資之時效性及實用性，基本地形圖將定期每 5 年辦理更新，以滿足政府施政及民間加值應用需求。

Basic topographic maps are maps drawn at scales defined by the central supervisory administration detailing land surface form, features and basic geographic data. The map scales include 1:5,000, 1:25,000, 1:50,000 and 1:100,000.

The Ministry of the Interior began promoting the digitally aerial photogrammetric mapping for producing and updating topographic maps since 1995. Responsibility for this task was transferred to the NLSC in 2006. For improving the efficiency of topographic map survey updates and reducing survey costs, the NLSC began integrating the existing resources. The integration was successful to contain Taiwan Electronics Maps, National Land Use Investigation results and LiDAR-compiled Digital Terrain Model (DTM) to update the features, land types, contour lines and spot elevations on the topographic maps and digital terrain models. The e-GNSS real-time kinematic positioning system was also used to further refine the control survey for topographic mapping.

To ensure that the maps are practical and up-to-date, the topographic maps will be updated every 5 years to satisfy the requirements for government

administration and private-sector value-added applications.



▲ 整合主要圖層



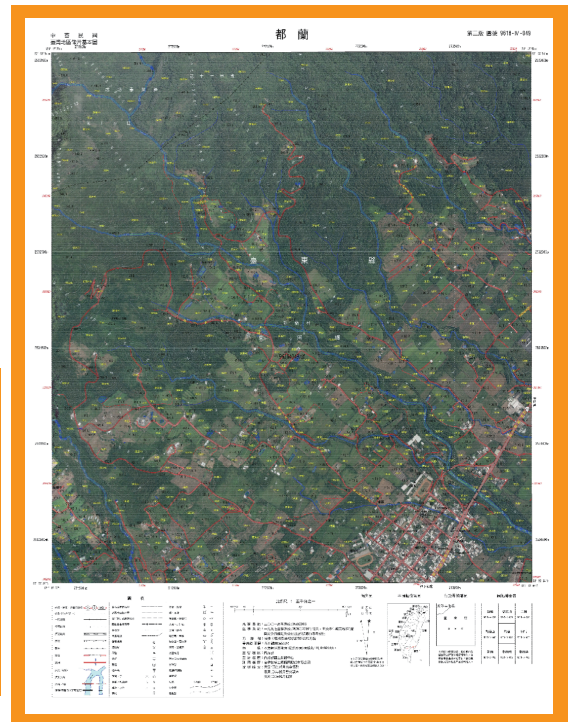
▲ 補繪地物、地貌及地類



▲ 萃取等高線



▲ 縮短控制測量時間



▲ 五千分之一基本地形圖修測精進作為 Refinement of the 1:5,000 topographic map

(二) 臺灣通用電子地圖測製及更新

Production and update of Taiwan Electronic Maps

臺灣通用電子地圖為政府機關唯一產製的全國性電子地圖，內容涵蓋貼近民衆生活的各類空間資訊，包括道路、鐵路、水系、行政界、區塊、建物、重要地標、控制點、彩色正射影像等，同時兼具測繪精度高及更新速度快，已為各界廣泛使用。

The Taiwan Electronic Maps (Taiwan e-Map) is the only national electronic map produced by the government to cover the whole national territory including Kinmen and Matsu. Taiwan e-Map covers all kinds of geospatial information used in daily life containing roads, railways, waterways, administrative boundaries, blocks, buildings, landmarks, control points and color orthophotoes. Due to its high accuracy and fast updates, Taiwan e-Map is now in widespread use.

臺灣通用電子地圖於 96 年試辦，97 年開始辦理，100 年建置完成，101 年起持續辦理成果更新。又為營造國際友善環境，於 104 年完成英文版電子地圖，建置英文版電子地圖查詢系統，除提供英文操作介面、中英文地圖即時切換及簡單的定位查詢功能外，亦提供經緯度坐標與英文圖例說明資訊，便利非華語系人士使用。105 年後建立跨單位協作方式，依本中心與交通部共同規劃之臺灣地區交通路網數值圖架構，由本中心辦理通用電子地圖更新時，一併產製及更新臺灣地區交通路網數值圖，避免資料重複測製。

為符合各界對圖資時效性殷切需求，103 年起將圖資更新週期由 5 年提升為 2 年，並針對全國重要道路、重要地標、重大工程及使用者反映局部區域變動部分進行更新，並以政府機關間協作及公眾參與等層面，結合移動測繪系統（車載移動式測繪系統及無人飛行載具系統）及地理資訊系統技術，提升圖資更新效率，以達成動態更新之目標。

The first edition of the Taiwan e-Map was compiled between 2007 and 2011 by the NLSC and continued to be maintained and updated since 2012. An English version of Taiwan e-Map was produced in 2015 to provide international accessibility. Apart from the addition of an English interface, instant switching between English and Chinese maps, and simple locating function, map coordinates and an English legend are also available for the convenience of non-Chinese speakers. An across organization collaboration was set up after 2016 between the NLSC and the Ministry of Transportation and Communications to jointly develop a digital map framework for the transportation network in Taiwan. When the NLSC updates Taiwan e-Map, the digital map for Taiwan's transportation network will also be produced and updated to eliminate duplicate mapping works.

Due to the strong demand for a up-to-date Taiwan e-Map, the map update cycle was shortened from 5 to 2 years since 2014 with an emphasis on important roadways, landmarks, projects and user reports of local changes. The collaboration of government agencies and public participation is combined with mobile surveying systems (mobile mapping systems (MMS) and unmanned aircraft systems (UAS)) and geographic information system (GIS) technologies to improve the efficiency of map updates and realize the goal of dynamic updates.

▼臺灣通用電子地圖 Taiwan e-Map



(三) 海域調查與圖資整合

Hydrographic Survey and Map Integration

臺灣是典型的海洋國家，除了陸域國土之外，環繞臺灣四周海域的國土範圍更為遼闊，若要掌握海洋環境資源，並有效地管理及應用，海域調查與相關圖資的建置為相當重要的工作，鑑此，內政部自 92 年起陸續推動相關計畫，交由本中心辦理臺灣週邊海域基礎調查工作，以透過水深測量技術，測繪海底地形，掌握海床特徵物及有礙航安疑義資料。相關計畫包括「國家基本測量發展計畫」、「基本測量及圖資測製實施計畫」、「臺灣地區行政區域界線檢測及更新工作」及現階段正辦理之「我國海域調查與圖資整合發展計畫」。

Taiwan is a maritime nation. The actual terrestrial territory is far smaller than the maritime territories that surround the island. Hydrographic surveys and charts are therefore essential to effectively identify, manage and use these maritime resources. The Ministry of the Interior began introducing related programs in 2003 with the NLSC directed to conduct basic surveys of the waters around Taiwan. Bathymetric survey techniques are now used to map the sea bottom in order to identify seabed features and navigational hazards. Related programs include the "National Fundamental Survey Development Project", "Plan for Fundamental Surveying and Mapping", "Taiwan District Administrative Boundary Inspection and Update Project", as well as the currently conducting "National Maritime Investigation and Map Integration Development Plan".



◀▼ 水深測量作業情形

Bathymetric survey operations

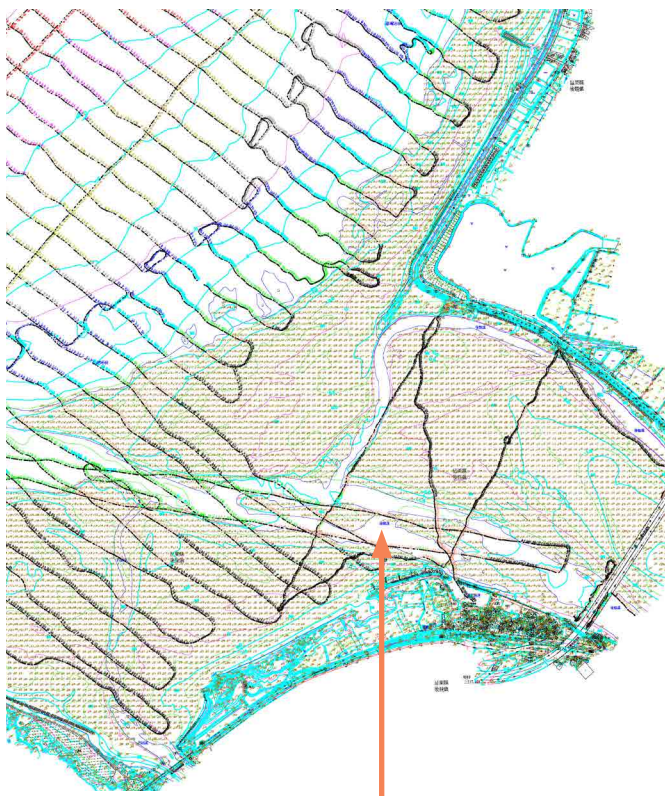


92 年至 104 年辦理範圍為臺灣本島西部近岸海域（基隆至嘉義）及澎湖本島週邊近岸海域，計完成海域地形測量面積約 4,944 平方公里、繪製 1/5,000 比例尺海域基本圖 663 幅及 1/25,000 比例尺海域基本圖 80 幅。預計於 108 年底完成環繞臺灣本島近岸範圍內之海域調查與相關圖資的建置。

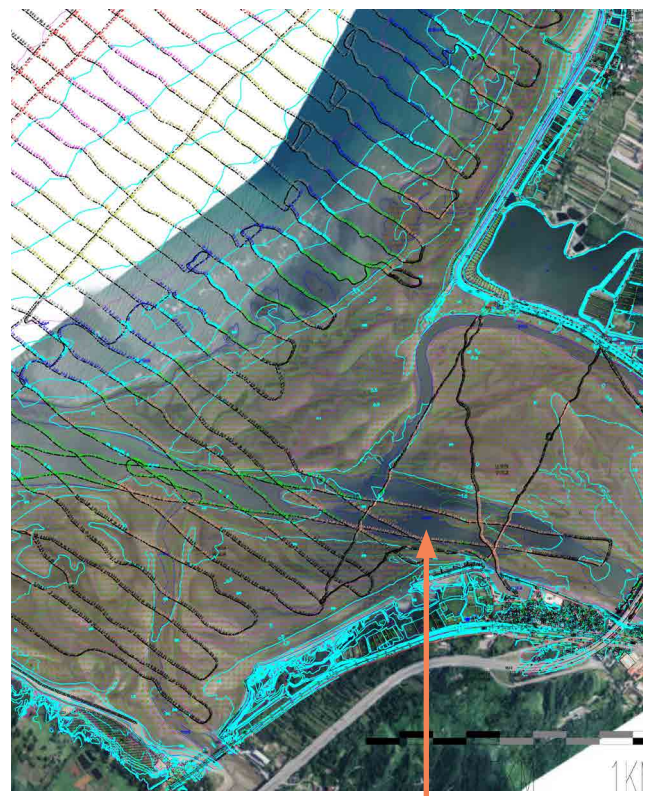
隨著航運及漁業發展，海上航行安全日益受到重視，電子航行圖 (ENC) 為目前世界各國航船參考的通用圖資，前述海域基本圖除提供海底地形資訊外，亦將加值轉製成 ENC，提供航行於我國海域船隻參考，確保航船安全。

Between 2003 and 2014 the coastal waters of western Taiwan (from Keelung to Chiayi) and Penghu were surveyed. A total of 633 marine topographic chart sheets at the scale of 1:5,000 and 80 sheets at the scale of 1: 25,000 have been completed with a total area of approximate 4,944 square kilometers. The hydrographic survey along Taiwan's coastal waters will be completed by the end of 2019.

Navigation safety has become increasingly important with the continued development of the shipping and fishery industries. Electronic navigation charts (ENC) is now in general use among international shipping. The previously mentioned marine base charts provide not only information about the undersea topography but also be value-added and converted into ENC for ensuring shipping and sailing safety within our waters.



空載光達測點 Airborne LiDAR point



水深測點 Bathymetric survey point

▲ 海域與陸域地形測量資料疊合示意圖 Joining of maritime and topographic survey data

(四) 國土利用調查 Land Use Investigation

國土利用調查作業是以航遙測影像為基礎，利用影像圖面數化方式劃定其土地使用現況範圍，並輔以外業調查獲取及記錄調查當時之土地使用現況分類屬性，其成果是各項社經建設及國土規劃重要基礎資料。

內政部於 82 至 84 年度辦理第 1 次全國性土地使用現況調查，作為土地政策國土規劃參據。為因應各界對土地使用現況資料需求，95 至 97 年內政部交由本中心辦理第 2 次國土利用調查工作，詳實記錄至第 3 級分類土地使用現況，涵蓋農業、森林、交通、水利、建築、公共設施、遊憩、礦鹽及其他等 9 大類、41 中類、103 小類分類調查成果，於 98 年 8 月全部建置完成，並由本中心持續辦理成果更新作業。為整合各機關國土利用調查資源，自 101 年起由本中心、林務局及水土保持局以資源

Land Use Investigation is proceeded by digitizing the area of current land use showing up in aerial and remote-sensing imagery. Field investigations and records are also used to establish the current category of land use. The results of land use investigation provide an important reference for socio-economic development and land use planning.

The Ministry of the Interior conducted the first national land use investigation from 1993 to 1995 to provide a reference for national land planning policy. Due to widespread demand for information on current land utilization, the Ministry of the Interior directed the NLSC to conduct a second national land use investigation between 2006 and 2008. The investigation was completed by August 2009 and continued to carry out further updates by the NLSC. The investigation of land use map is up to level 3 and covers 9 major categories, 41 sub-categories and



▲ 國土利用調查方式 National land use investigation methods

整合方式，分 3 個責任區共同維護國土利用調查成果。

為確保國土利用調查成果時效性、適用性及考量更新作業成本，105 年以後提升更新頻率以 2 年為周期，並依內政部 104 年 4 月 13 日修正頒布之土地利用分類系統表，辦理調查成果更新維護作業至第 2 級分類。

103 sub-sub categories including agriculture, forests, transportation, water, building, public facilities, recreation, mining/salt production and others. In order to integrate the land use investigation resources of all agencies, the NLSC, the Forestry Bureau and the Soil & Water Conservation Bureau began pooling their resources in 2012 to jointly maintain the results of land use investigation split across three areas of responsibility.

To ensure the timeliness and usefulness of land use investigation results while taking the cost of updates into account, update frequency was shortened to 2 years from 2016 onwards. Investigation results will also be updated to level 2 in accordance with the amended land use classification system issued by the Ministry of the Interior on April 13, 2015.

(五) 國土利用監測 Land Use Monitoring

國土利用監測是以衛星影像為基礎，將兩張不同時間點的影像進行比對，找出地表有變化且疑似違規使用的點位，如新增建物、盜採砂石、傾倒廢棄物、非法開發等，將相關資料上傳至網路查報系統並通知各直轄市、縣（市）政府及相關目的事業主管機關，派遣查報人員進行現地查報作業。

103 年起為能妥善運用跨部會行政資源，本中心整合內政部營建署、經濟部水利署及行政院農業委員會水土保持局的國土利用監測業務，將國土利用監測工作頻率增加為每 2 個月辦理 1 次，使用的衛星影像解析度從原來的 2 至 8 公尺提高為 1.5 至 2.5 公尺，並整合網路查報系統，便利各機關網路通報作業，除了常態性衛星監測工作外，並配合相關機關業務需求辦理加值應用。

因應現今國土整體規劃發展趨勢，除持續且定期辦理土地利用監測工作外，將結合應用大數據技

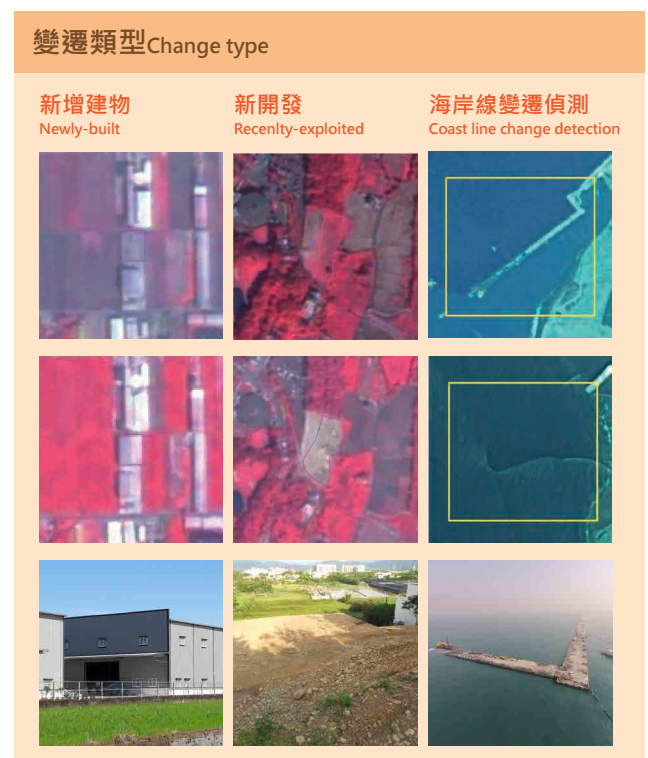
Land use monitoring refers to the detection of variation of land use nationwide by interpretation from satellite imageries with technology of the geographic information system (GIS). The information of suspect variation points will be sent to all relevant agencies for them to dispatch personnel for onsite inspection.

To make effective use of administrative resources between government departments, the NLSC consolidated the national land use monitoring operations of the Construction and Planning Agency, the ministry of the Interior, the Water Resources Agency, the Ministry of Economic Affairs, and the Soil & Water Conservation Bureau, the Council of Agriculture, to increase the land use monitoring frequency to every 2 months. The resolution of satellite imagery was also upgraded from 2 ~ 8 meters to 1.5 ~ 2.5 meters. The online notification system was also integrated as well to facilitate online reporting by each agency. Value-added applications are processed in response to the operational requirements of each

術，分析違規熱區，加強管控，並配合各機關相關業務需求，以衛星影像為基礎辦理加值應用工作，滿足各機關國土管理業務需求。同時持續擴充及維護整合後監測通報查報系統，便利各機關網路通報作業，並積極邀請義務志工與民間團體共同參與，讓各界一同為家園齊盡心力，減少土地違規使用情形，達成國土永續發展的目標。

agency in addition to routine satellite monitoring.

In response to the current trend towards land use master planning, the NLSC not only continues to conduct regular national land monitoring but also makes use of big data analytics to analyze high-risk infringement zones for enhanced enforcement. The NLSC also cooperates with the operational requirements of other agencies by developing value-added applications based on satellite imagery for land use management. The integrated monitoring and notification system is continuously being expanded and updated to facilitate online reporting by all agencies. Volunteers and non-government organizations are also invited to help reduce illegal land use and realize the goal of sustainable land development.



▲國土利用監測示意圖 Provisioning of national land use monitoring

>> 國土測繪資訊整合流通

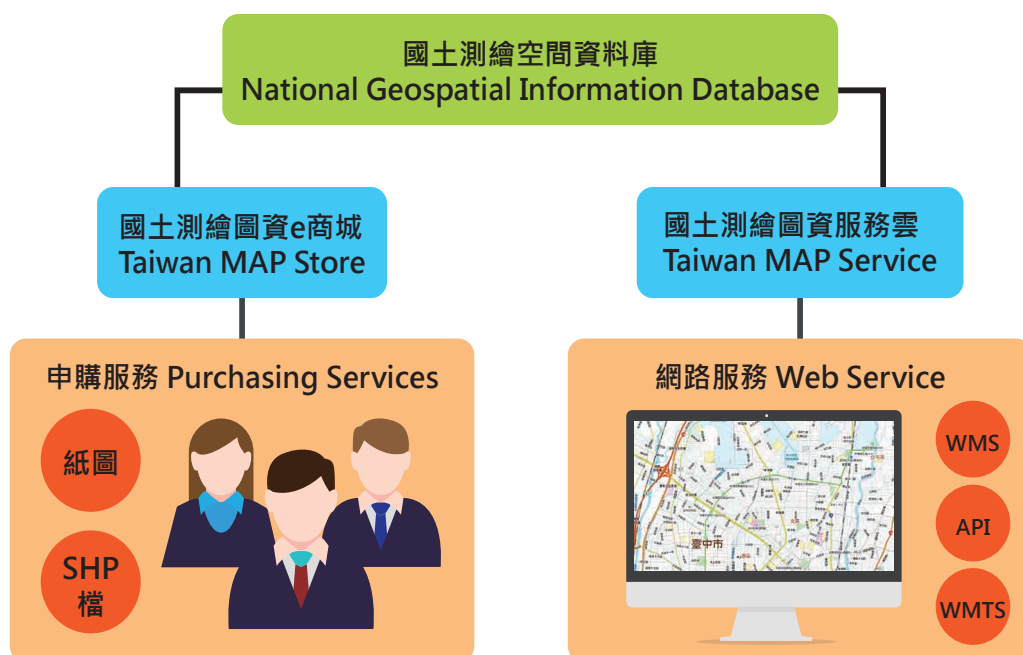
Geospatial Information Integration and Circulation

國土測繪資料為國土資訊系統之核心及共用性資料，圖資種類多元且涵蓋不同時期成果，為滿足各界對測繪資料之需求與應用，本中心運用資料倉儲、地理資訊系統及 Open GIS 等技術，建立國土測繪空間資料庫，整合陸測、海測、空照、衛照等三維空間測繪資料。

為促進測繪成果之流通與資源共享，擴大國土測繪空間資料庫運用層面，本中心除制訂測繪資料流通供應機制及授權加值規定外，並建置「國土測繪圖資 e 商城」(<http://whgis.nlsc.gov.tw/>)，提供圖資及註釋資料瀏覽與查詢，開發完成「國土測繪圖資服務雲」（網址 <http://maps.nlsc.gov.tw>）提供管有圖資全面開放符合 OGC 標準之網路地圖服務 (WMS)、圖磚 (WMTS) 服務及 Web Map API 服務。

Geospatial information forms the core, common information of the National Geographic Information System (NGIS). The wide variety of geospatial information covers results from different periods. NLSC uses data warehousing, GIS and Open GIS technologies to set up a national geospatial information database that integrates 3D spatial information from topographic and hydrographic surveying as well as aerial and satellite imagery.

To promote the circulation and resource sharing of surveying and mapping results and expand the applications for the national geospatial information database, the NLSC formulated a mechanism for communication and value-adding of geospatial information. In addition, the "Taiwan Map Store" (<http://whgis.nlsc.gov.tw/>) was set up to provide browsing and querying of maps and metadata data. A "Taiwan Map Service" (<http://maps.nlsc.gov.tw>) was also



▲ 國土測繪資訊整合流通系統架構

National geospatial information service structure

「國土測繪圖資 e 商城」涵蓋測繪成果有基本地形圖、國土利用調查成果圖、臺灣通用電子地圖、段籍圖、地籍圖、控制點、航空正射影像、衛星遙測影像及典藏地籍圖掃描影像等項，並結合測繪圖資申購及電子收費平臺，提供使用者線上檢索、瀏覽及申購圖資，有效輔助使用者快速掌握、獲得所需圖資。

「國土測繪圖資服務雲」研發運用伺服器圖磚優化儲存、圖磚動態放大及屬性快速查詢機制等特有技術，讓使用者可在各種電腦系統及可攜型行動裝置（Mobile）上，快速進行 Web2.0 地理定位、全文檢索定位、門牌定位等多種應用。此外，系統亦可依 WMS 需求範圍及比例尺，重組發布 EPSG:3857，EPSG:4326，EPSG:3826 等 3 種 WMS 服務，大幅減少資料儲存空間，提高地圖服務層面。

developed to provide OGC-compliant Web Map Service (WMS), Web Map Tile Service (WMTS) and Web Map API services for all managed data.

The surveying and mapping results available from the "Taiwan Map Store" include topographic maps, land use investigation maps, Taiwan e-Map, cadastral district maps, cadastral maps, control points, aerial orthoimages, remote-sensing satellite imagery and archives of digital cadastral maps. This system that integrated with data purchasing and electronic payment allows users to efficiently search, browse and purchase map information online.

The "Taiwan Map Service" developed proprietary technologies for map tile storage optimization, dynamic map tile zooming and fast attribute searching. Users can use different types of computer systems and mobile devices for rapid Web 2.0 geographic positioning, full text and address searching. The system can also recombine and publish three WMS

The screenshot displays the 'Taiwan Map Store' interface. The main search results area shows four map entries for '國土利用調查圖_95211093_東勢'. Each entry lists the map's production date, update date, scale, and coordinate system. To the right, a 'Metadata' section provides detailed information about the selected map, including the provider's name, contact details, and the map's title. Below the metadata, a 'Browsing' section shows a thumbnail of the map, and a '3D Map' section displays a 3D visualization of the terrain.

註釋資料 Metadata

查詢資料 - Google Chrome	whgis.nslsc.gov.tw:8081/Query/MetadataView.aspx?id=TW9130008840
國土利用調查圖_95211093_東勢	檢閱此資料 XPS
選擇資料	聯絡人所屬單位: 內政部國土測繪中心測繪資訊課
提供單位聯絡資訊	聯絡人姓名: 聯絡人電話: +886-4-22522966
	聯絡人電子郵件地址: ma@mail.nslsc.gov.tw
	建置時間: 2014-12-20
選擇資料	標準名稱: TWSMP

圖資瀏覽 Browsing

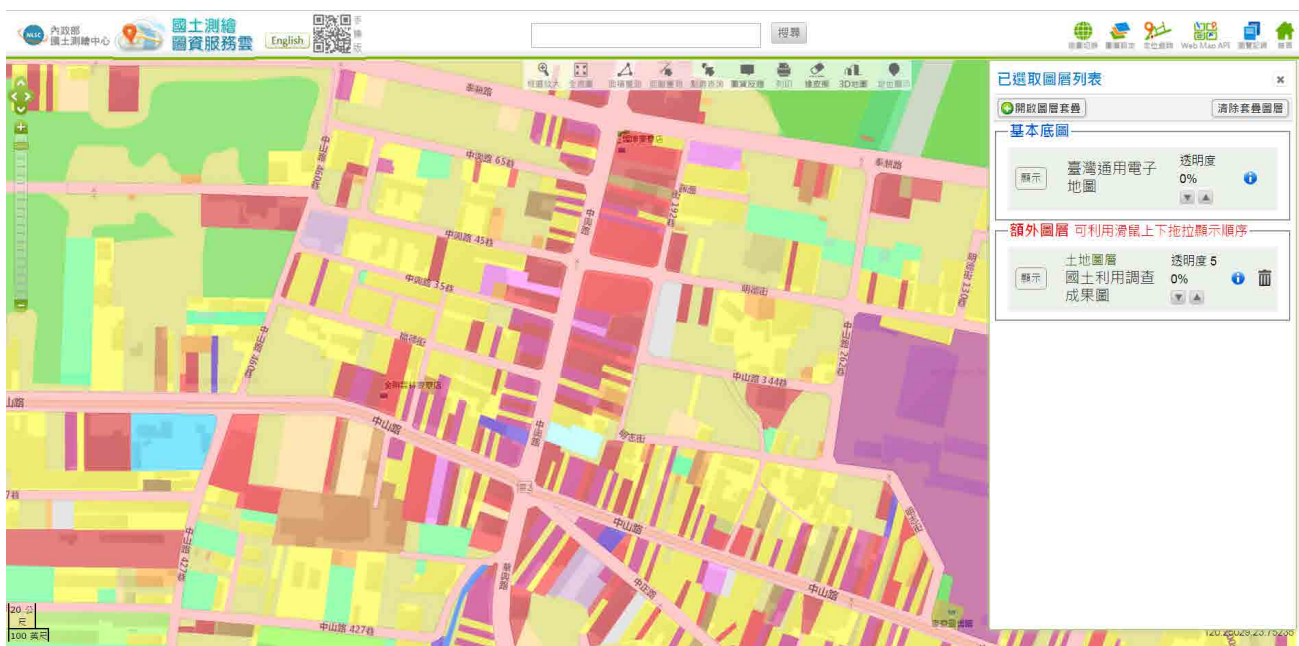
3D 地圖展示 3D MAP

▲ 國土測繪圖資 e 商城查詢畫面 Taiwan Map Store query diagram

「國土測繪圖資 e 商城」每年瀏覽查詢約 7 萬人次，「國土測繪圖資服務雲」每月平均服務超過 70 萬人次，推動國土測繪資料流通成效受各界肯定。本中心未來除持續擴展國土測繪資訊流通，建置開放式、整合式及創新式之國土測繪資訊整合流通平臺外，因應未來大數據、時態資料等迫切需求，亦規劃建立巨量空間資訊雲儲存中心，朝向巨量資料雲端化，並發展專業測繪圖資智慧雲端加值服務，開發各界高度需求之 OGC 網路圖徵服務 (WFS)，擴展圖資服務層面。

services (EPSG:3857, EPSG:4326, EPSG:3826) based on the requested WMS scope and scale, greatly reducing the amount of data storage needed and enhancing the standard of map services.

The "Taiwan Map Store" currently attracts 70,000 visitors per year, and the "Taiwan Map Service" serves around 700,000 visitors average monthly. The achievements on the promotion of geospatial information circulation have received widespread recognition from all parties. In response to the urgent demand for big data and temporal data, a professional geospatial information value-added service and OGC Web Feature Service (WFS) is being developed. Meanwhile, a massive geospatial information cloud storage center is planned to build. The NLSC will continue to expand the circulation of geospatial information and applications by establishing an open, integrated and innovative platform.



▲ 國土測繪圖資服務雲系統畫面—臺灣通用電子地圖套疊國土利用調查成果圖

Taiwan Map Service screen shot — Taiwan e-Map overlaid on land use investigation map

>> 測繪科技發展

Surveying and Mapping Technology Development

臺灣位處地殼變動及颱風侵襲頻繁地區，確保穩定的測量基準及維持各類基本控制點精度是一項重要但困難度高的課題。為擴大提供國土永續規劃管理、防救災、測繪工程、海洋等研究及民生建設應用，本中心於 104 年執行現代化測繪科技發展計畫，引進新的測繪科技，提升國土測繪的精度與效率。

Taiwan experiences frequent tectonic changes and typhoons. Maintaining stable survey benchmarks and precise control points is therefore an important but challenging mission. To expand our support for research and domestic infrastructure applications such as sustainable land planning and management, disaster prevention and response, mapping and maritime services, the Modern Surveying and Mapping Technology Development Program was launched by the NLSC in 2015 to boost surveying technology as to enhance the precision and efficiency in national land surveying and mapping.

該計畫內容主要分為發展現代化基本控制框架作業、高程現代化作業、國家控制點成果整合應用、無人飛行載具系統測繪作業、車載移動測繪系統及推動航遙測感應器系統校正作業等 6 項作業，目前成果如下：

The program consists of 6 key items: the development of modern basic control framework operations, vertical control modernization, integration and application of national control point results, UAS surveying and mapping operations, mobile mapping systems, and calibration of aerial and remotely sensed systems. Current accomplishments are as listed below:

- 1 完成全國性 2001 臺灣高程基準 (Taiwan Vertical Datum 2001, 簡稱 TWVD 2001) 及高精度玉山正高高程檢測工作。



▲ 臺灣地區最高之玉山北峰 GNSS 衛星連續觀測站
The GNSS satellite continuously operating reference station on the north peak of Mt. Jade.

- Completion of the Taiwan Vertical Datum 2001 (TWVD 2001) and high-precision orthometric height inspection of Mt. Jade.

- 2 定期辦理基本控制點及 e-GNSS 站管理維護，維護國家框架及坐標系統成果，提供後續各項應用測量使用。

Regular maintenance of basic control points and e-GNSS stations to keep the national framework and coordinate system up-to-date for further applications and surveys.

3 整合全國性控制點成果資料庫，促進各機關控制測量成果流通，並建立自動化動態定位成果解算系統、控制測量 APP 系統、三維網形平差計算及精度檢核程式、線上大地起伏計算服務等數種相關應用工具，可處理、分析及計算大量測量觀測資料，快速提供平面及高程定位成果，或輔助外業測量工作執行。

Integration of national control point databases and promoting the communication about control survey results between government agencies. Application tools such as automated kinematic positioning resolution systems, control survey APP system, 3D network adjustment calculation and precision verification program, online geodetic undulation calculation services were also developed for processing, analyzing and calculating large amounts of observation data to quickly supply horizontal and vertical positioning results, or to support the execution of field surveys.

4 100 年建置政府機關第 1 架定翼型無人飛行載具系統，辦理局部區域圖資更新、特定區域監測及提供防救災緊急應變圖資，藉此提升圖資更新與防救災圖資供應效率，解決衛星影像及傳統有人機航拍能量不足之困境。



▲無人飛行載具

Unmanned Aircraft System (UAS)

The first fixed-wing UAS for the use of governmental affairs was acquired in 2011 to carry out updates of regional maps, monitor designated areas and provide geospatial information for disaster prevention and rescue. The new system makes up for shortfalls in satellite imagery and traditional manned aerial photography, improving the efficiency of map updates as well as the supply of maps for disaster prevention and emergency response.

5 104 年建置政府機關第 1 臺車載移動測繪系統，該系統可不受天候影響，加速地面空間資料蒐集，減少外業成本及發生意外風險，同時拍攝的影像可永久保存，提供相關應用。未來車載移動測繪系統將與無人飛行載具系統相互搭配，以達到快速提供災區所需空間資訊、國土利用調查、臺灣通用電子地圖及基本地形圖局部圖資更新需求。

The first government owned mobile mapping system was acquired in 2015. The system accelerates the gathering of terrestrial spatial information and is immune to the effects of weather. It also reduces the risks of field surveys and the captured imagery can be permanently preserved for the use of related applications. In the future, the mobile mapping system will be used in conjunction with the UAS to provide



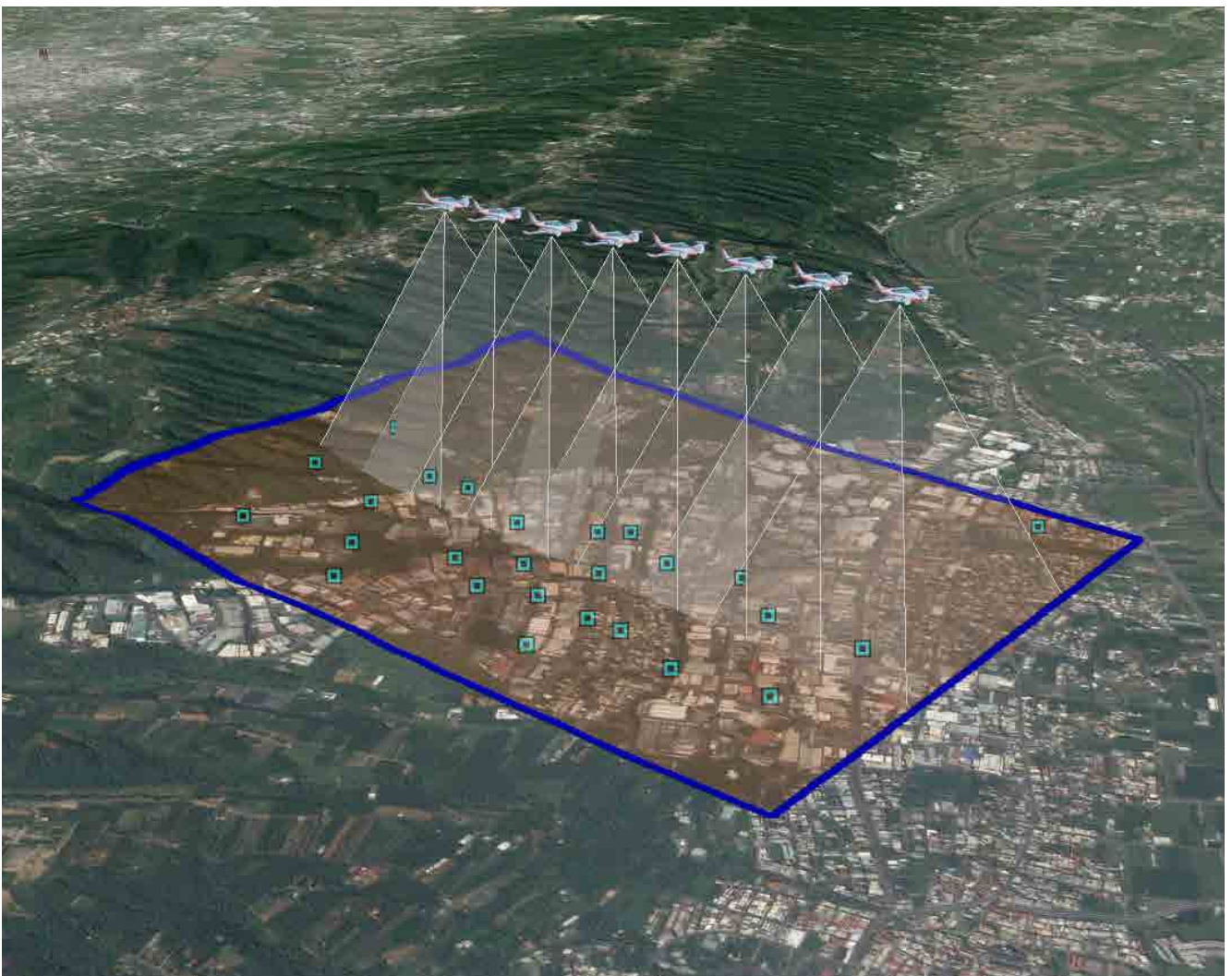
▲車載移動測繪系統 Mobile Mapping System (MMS)

the geospatial information updates needed by disaster area rapidly, and meet the update requirements of land use investigation map, Taiwan e-Maps, and topographic maps in real time.

6 為確保航拍影像品質，本中心積極發展航遙測設備校正技術，於 105 年 2 月 16 日通過全國認證基金會（TAF）認證，並同時取得國際實驗室認證聯盟（ILAC）認可，成為我國第 1 家具有航測攝影機校正能力之實驗室。透過航測攝影機校正作業，由公正第三方驗證其空拍影像品質及精度，除有效確保測繪成果品質外，更能提升民眾對於圖資使用的信賴度。

的信賴度。

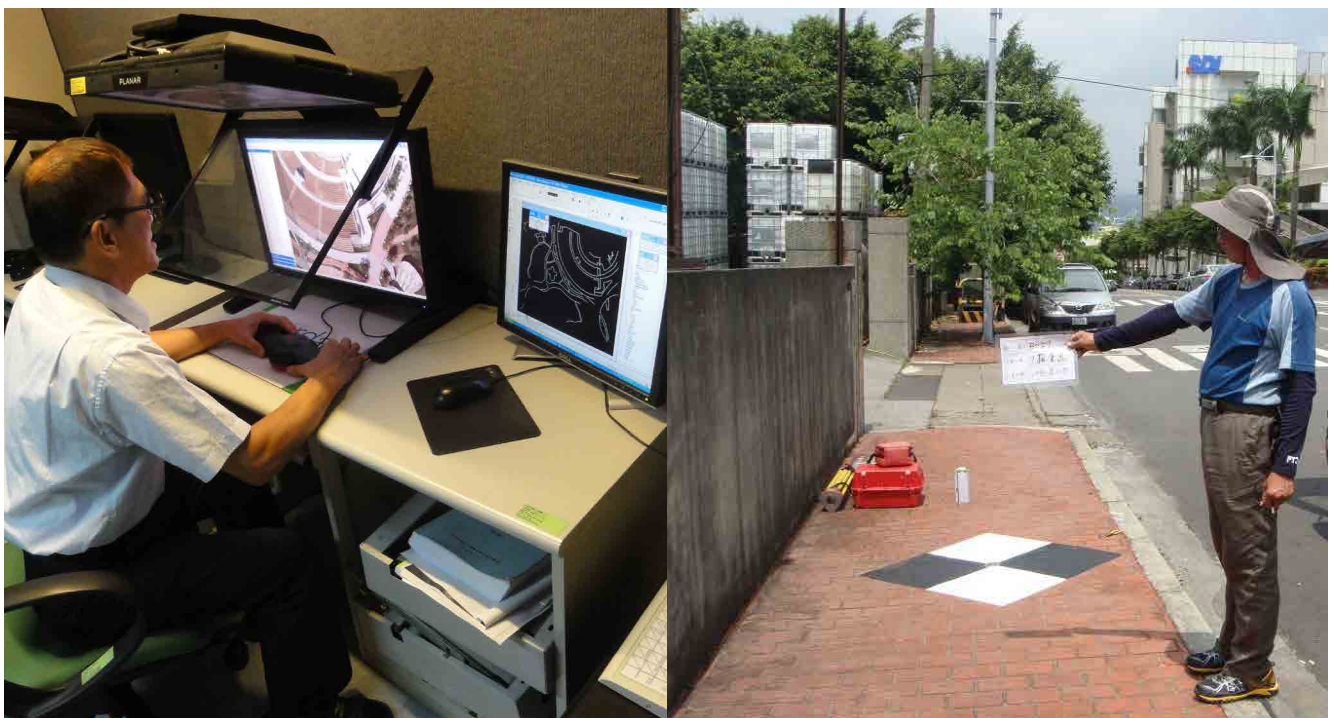
The NLSC is actively developing calibration technology for aerial and remote-sensing equipment to guarantee the quality of aerial imagery. On February 16, 2016, the NLSC was certified by both the Taiwan Accreditation Foundation (TAF) and International Laboratory Accreditation Cooperation (ILAC), making the NLSC the first laboratory providing the calibration of aerial and remotely sensed systems in Taiwan. Calibration certification for the aerial and remotely sensed systems by the independent third-party will not only provide an effective guarantee of mapping results but also increase public faith in maps.



▲ 航空測量攝影機校正作業示意圖 Calibration of aerial and remotely sensed system

未來本中心規劃辦理 e-GNSS 基準站及全國 GPS 連續站資料處理、辦理玉山正高測量及下陷區一等水準點正高測量工作、開發控制測量作業規劃及成果檢核系統、研究測試搭載多元化感測器獲取空間資訊、研修 MMS 輔助圖資更新處理標準作業流程、辦理 UAS 小像幅攝影系統校正飛行測試及分析等作業，以快速獲取空間資訊，創新測繪成果產能。

Planning the future work, the NLSC will process the data from e-GNSS base stations and national continuous GPS observations, orthometric height survey of Mt. Jade and first-order benchmarks in subsidence regions, control survey planning and verification system, research and testing of multiple sensor usage to acquire geospatial information, studying the MMS-assisted map update procedure, as well as testing and analysis of calibration flights for UAS small-format camera system. These projects are aimed to achieve the rapid acquisition of geospatial information and new levels of mapping output.



▲校正作業情形 Operation of calibration

>> 測量儀器校正

Survey Instrument Calibration

(一) 測量儀器校正實驗室

Survey Instrument Calibration Laboratory (SICL)

96年3月國土測繪法公布實施後，其子法「基本測量實施規則」即明訂，辦理基本控制測量之儀器應定期送至國家度量衡標準實驗室或通過簽署國際校正實驗室聯盟相互承認辦法之機構所認可之實驗室校正，而國內簽署國際校正實驗室聯盟相互承認辦法之機構即為財團法人全國認證基金會（Taiwan Accreditation Foundation, TAF）。本中心為落實儀器校正制度並符合相關法規規定，97年成立「測量儀器校正實驗室」，並導入國際校正實驗室認證規範 ISO/IEC 17025，99年3月10日初次通過財團法人全國認證基金會（Taiwan Accreditation Foundation, TAF）校正實驗室認證（實驗室編號 2218），101年4月2日起正式對外提供校正服務，並依 TAF 規定，每3年辦理延展認證，2次延展認證間至少辦理1次監督評鑑。

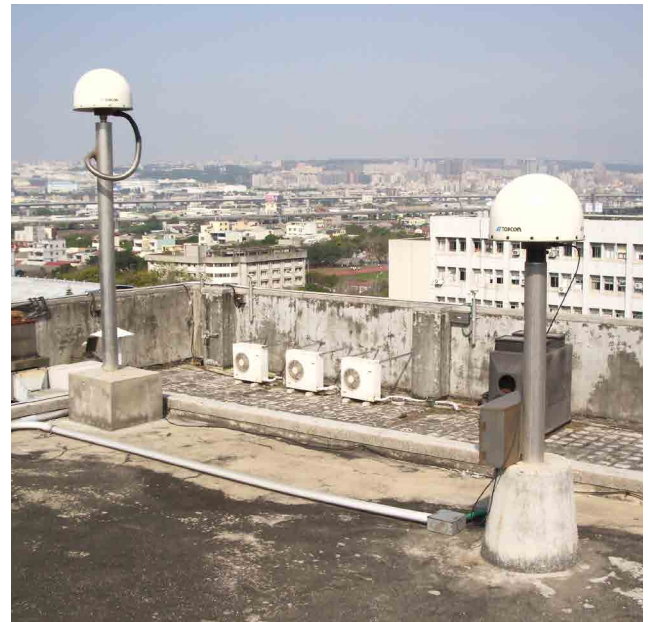
After the Land Surveying and Mapping Act took effect in March, 2007, its sub-law "Fundamental Surveying Regulation" explicitly requires instruments used for control surveys to be regularly calibrated by the National Measurement Laboratory or a laboratory accredited by an organization with International Laboratory Accreditation Cooperation (ILAC) membership. The Taiwan Accreditation Foundation (TAF) is a recognized member of the ILAC. The "Survey Instrument Calibration Laboratory (SICL)" was established by the NLSC in 2008 to enforce the instrument calibration regime and conform to the relevant regulations. The ISO/IEC 17025 international standard for calibration laboratories was also introduced. On March 30, 2010, SICL received its first calibration laboratory certification (Laboratory ID: 2218) from the TAF and formally began offering calibration services on April 2, 2012. TAF regulations require the certification to be renewed every 3 years with at least one supervisory assessment for every 2 renewals.

The laboratory currently offers calibration services for electronic distance measuring device (EDM), theodolites, GNSS receiver and aerial photogrammetric cameras. To improve service efficiency and calibration quality, the laboratory has set up the "Survey Instrument Calibration Laboratory Service Website" (<http://sicl.nlsc.gov.tw/>) to process online applications for instrument calibration, calibration progress inquiries, calibration report downloads and an online management platform



目前本實驗室提供校正項目包括電子測距儀、經緯儀、衛星定位儀及航空測量攝影機。為提升服務效率及校正品質，本實驗室建置「測量儀器校正實驗室服務網」(<http://sicl.nlsc.gov.tw/>)，提供顧客線上申請儀器校正、校正進度查詢、校正報告下載及測量儀器線上管理平臺等功能；此外亦開發「測量儀器線上管理平臺」，提供服務網註冊會員線上管理儀器使用履歷，並提供 QR-Code 服務，使用單位可依業務需要，設定公開的儀器使用履歷表，讓一般使用者及民衆即可透過系統提供的 QR-Code，於智慧型裝置顯示儀器使用履歷表。

for survey instruments. The "Survey Instrument Online Management Platform" was also developed that registered members can use for online management of their instruments' usage record. Through this system, users can use the QR-Code to set a usage record to the public based on their operational requirements. General users and the public can also use the QR Code to realize the instrument usage record on smart



▲ 本中心測量儀器校正實驗室 Survey Instrument Calibration Laboratory

(二) 測量儀器簡易校正

Simple Calibration of Survey Instruments

本中心為維護電子測距經緯儀精度，除由各測量隊每 3 年將儀器送至中心本部測量儀校正實驗室辦理 TAF 認可之實驗室校正外，並於各測量隊轄區內設置簡易距離校正場，定期以經校正合格之電子測距經緯儀測定標準距離後，要求各測量隊每月定期將儀器攜至簡易距離校正場檢測，並使用野外校正法辦理簡易角度校正作業，確保測量成果品質。

本中心已於測量儀器校正實驗室服務網登錄各地政單位建置之簡易距離校正場，並於該服務網開發線上「距離校正處理」及「角度校正處理」功能，協助各機關辦理儀器簡易校正作業；又為推廣儀器應定期校正觀念，落實測量儀器校正制度，目前校正實驗室服務網已將上述校正功能上線提供各界使用，使用者除定期將儀器送本實驗室校正外，平時亦可依作業規範，將儀器攜至本中心及各地政單位建置之簡易距離校正場及使用野外校正法辦理儀器測距及測角功能校正，服務網址：<http://sicl.nlsc.gov.tw/Member/CorrectHandle>，歡迎各機關多加利用。

devices.

To maintain the precision of EDM and theodolites, the NLSC survey teams must send their instruments to the TAF-accredited NLSC calibration laboratory for calibration once every three years. A simple distance calibration field has also been set up within each survey team's jurisdiction area. The standard distances at all fields are regularly checked by certified EDM and theodolites. All survey teams are required to bring their instruments to the fields for testing every month. And the field calibration method for angle calibration is used to ensure the quality of survey results.

The NLSC lists the simple distance calibration fields set up by local land administration units on the SICL website. Online "distance calibration" and "angle calibration" functions have also been added to the website. They are free of charge to offer other agencies for basic instrument calibration. To promote awareness on the need for regular instrument calibration and enforce the survey instrument calibration regime, the relevant information and regulations about SICL's various calibration functions are now available online. Users can therefore send their instruments to the SICL for periodical calibration. They also can follow the operating procedures by bringing their instruments to the simple calibration fields setup by NLSC and/or local land administration units to calibrate instrument's distance and angle measurement functions. The website is at: <http://sicl.nlsc.gov.tw/Member/CorrectHandle>. All agencies are encouraged to make use of this service.

內政部國土測繪中心
National Land Surveying and Mapping Center

最新消息 校正實驗室簡 會員專區

測量儀器校正實驗室
Survey Instrument Calibration Laboratory

縣市: [台北市] 基線場類別: [全部] 搜尋

縣市	簡易基線場	類別	設置地點	照片	狀態
台北市	臺北市中山地政事務所(臺北市中山區49M)	95M	[MAP]		良好
台北市	臺北市士林地政事務所(臺北市士林區49M)	95M	[MAP]		良好
台北市	臺北市大安地政事務所(臺北市大安區49M)	95M	[MAP]		良好
台北市	臺北市中正地政事務所(臺北市文山區49M)	95M	[MAP]		良好
台北市	臺北市地政局土地開發處及松山地政事務所(臺北市信義區49M)	99M	[MAP]		良好
台北市	臺北市建城地政事務所(臺北市建城區49M)	95M	[MAP]		良好
台北市	內政部國土測繪中心(文一路部49M)	99M	[MAP]		良好

最新消息 News

- 測量儀器校正實驗室服務暫停服務公告 2016/10/24
- 本中心已完成金門縣及連江縣簡易基線場標準距離檢測,歡迎各界多加利用 2016/10/14
- 本實驗室自105年1月1日起將增設北區、南區及東區3處收件點,歡迎多加利用。 2015/12/18
- 有關法務部推動及宣導兩公約重要成果,請參閱法務部人權大步走專區。 2015/2/5
- 本中心提供電子測距儀校正參數調整服務 2014/7/25

會員登入 儀器校正申請流程 收件及辦理情形 校正時程說明 會員享有的服務 留言版專區

▲測量儀器校正實驗室服務網簡易基線場查詢畫面

Simple distance calibration field query diagram on the SICL website



系統服務

Online Services

➤➤ 系統服務
Online Services

**國土測繪圖資 e 商城**

Taiwan Map Store

<http://whgis.nlsc.gov.tw/>**國土測繪圖資服務雲**

Taiwan Map Service

<http://maps.nlsc.gov.tw>**測量儀器校正服務網**

Survey Instrument Calibration Laboratory Service

<http://sicl.nlsc.gov.tw/>**臺灣通用電子地圖服務網**

Taiwan e-Map Service

<https://emap.nlsc.gov.tw/>**NGIS 基本地形圖分組網站**

NGIS Basic Topographic Map Website

<http://bmap.nlsc.gov.tw>**e-GNSS 即時動態定位系統入口網**

e-GNSS Real-time Positioning System Service Portal

<http://www.egnss.nlsc.gov.tw/>**全國衛星追蹤站暨基本控制點查詢系統**National Continuously Operating Reference System
and Basic Control Point Inquiring System<http://track.egnss.nlsc.gov.tw/>

內政部國土測繪中心 / 簡介

National Land Surveying and Mapping Center, MOI / Intro

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