This essay seeks to contribute to the study of modern mapping history in Singapore by identifying key maps of Singapore published during the modern period from 1819 to 2014, and by tracing the origins and history of Singapore’s Survey Department and Singapore Armed Forces Mapping Unit (SAFMU). Collectively, these two government departments produced the majority of the island’s key official maps during its modern history. The Survey Department was Singapore’s most important and prolific mapping agency until 1970. It prepared Singapore’s land property boundary maps (termed cadastral maps) and topographic maps until the SAFMU, which was formed in 1970 as a department under the Ministry of Defence, took over the responsibility for Singapore’s topographic maps. While there were many other government agencies that also produced maps of Singapore, their maps were largely thematic in nature and catered to specific operational needs (e.g. aviation, urban planning, transport planning and construction) and, more importantly, relied on base maps originating from one of these primary mapping authorities.

Other government agencies of comparable mapping importance for Singapore are the Maritime Port Authority (MPA) and its predecessor, the Port of Singapore Authority (PSA), and the British Admiralty, which produced vital hydrographic charts for local sea navigation to aid Singapore’s development as a major international sea port. However, this essay will not cover the important contribution of the MPA and the British Admiralty in hydrographic charting, which deserves a more thorough treatment on their own.
Founding and Early Development (1819 to 1840)

Although there were maps depicting Singapore from as early as the 17th century, the modern mapping history of Singapore—in which maps were drawn using western scientific methods—really began when the British, under Sir Stamford Raffles, established a trading post for the British East India Company on Singapore Island in 1819. It was only from this period that maps accurately tracing the outline of Singapore Island were produced and the earliest surveyors and map-makers were either military or naval officers.

On his expedition to Singapore, Raffles had sent for the services of marine surveyors Captain Daniel Ross of the Discovery and Lieutenant J.G.F. Crawford of the Investigator. Both were surveying ships of the East India Company. Raffles’ expedition arrived in Singapore waters on 28 January 1819 and Ross and Crawford began their survey of the Singapore’s harbour on 30 January. The survey was completed by 4 February and the completed chart given to Raffles on 6 February. The treaty with Sultan Hussein and the Temenggong to establish a British trading post was signed on this same day.

Ross’ Plan of Singapore Harbour February 1819 (see page 90) was first published on 1 May 1819 in the Calcutta Journal. The chart was accompanied by a written account by Captain Daniel Ross himself. On 1 January 1820, the same chart (re-titled the Plan of Singapore Harbour by Capt. D. Ross 1819) was published by James Horsburgh, Hydrographer to the Honourable East India Company. This plan showed the earliest known survey of Singapore Harbour. It also marked the first appearance of the name “Singapore” on a map or chart. Before this plan, Singapore was spelt “Singapoora” or “Sincapore” and a few other variants.

Major William Farquhar of the Madras Engineers was appointed the First Resident of Singapore. From 1819 to 1822, Farquhar and his assistant Engineer, Lieutenant Henry Raffe from the Bengal Artillery, conducted land surveys in Singapore. In 1822, Captain James Franklin of the Bengal Cavalry was on leave in Singapore. He had been employed in surveying duties in India. When he found out that there were no good maps of the entire island of Singapore, he took it upon himself to conduct such a survey. Franklin’s survey was first published as an inset entitled “Sketch of the Island of Singapore” in William Marsden’s Map of the Island of Sumatra. It was published by James Gardner on 1 May 1829. This inset map of Singapore was later reprinted in Sir Stamford Raffles’ memoir by his widow in 1830.

Lieutenant Phillip Jackson of the Bengal Artillery began engaging in road alignment from 1822 onwards and was appointed the Surveyor and Registrar of Land in 1826. In 1822, Captain James Franklin was on leave in Singapore. He had been employed in surveying duties in India. When he found out that there were no good maps of the entire island of Singapore, he took it upon himself to conduct such a survey. Franklin’s survey was first published as an inset entitled “Sketch of the Island of Singapore” in William Marsden’s Map of the Island of Sumatra. It was published by James Gardner on 1 May 1829. This inset map of Singapore was later reprinted in Sir Stamford Raffles’ memoir by his widow in 1830.

During the same period, an Irishman trained in the arts and science of architecture and surveying had been working as a contractor in Singapore. His name was George Drumgoole Coleman. After Jackson left, the authorities in Singapore engaged Coleman to survey the land on a contractual basis. This lasted until 1833 when Coleman was officially appointed the Superintendent of Public Works and Surveyor of Lands. Coleman too resigned from service in 1840 due to ill health. He conducted the first topographical survey of Singapore in 1829, which was drawn and printed in 1836 as the Map of the Town and Environs of Singapore by J.B. Tassin in Calcutta (see page 92).
Sea chart of Singapore harbour drawn up by Captain Daniel Ross in 1819.
Source: Survey Department, Courtesy of National Archives of Singapore

A reproduction of Captain James Franklin’s map of Singapore. Published in 1829, it was the first map which properly captured the outline of Singapore Island.
Source: Survey Department, Courtesy of National Archives of Singapore

The Jackson Plan for Singapore town, which was published in 1828, is the earliest known plan of the town and was based on Sir Stamford Raffles’ vision for Singapore’s development into a modern, rationally-ordered settlement.
Source: Singapore Land Authority, Courtesy of National Archives of Singapore
Coleman was succeeded by John Turnbull Thomson, who had been practising as a private surveyor in the estates in province Wellesley and Penang since 1838. Thomson was appointed the first Government Surveyor of the Eastern Settlements, with overall responsibility for surveying the three Straits Settlements. However, for reasons unknown, Thomson concentrated on his work in Singapore, making only occasional excursions to survey Malacca, and never surveyed Penang. Separate government surveyors were eventually appointed for Penang in 1846 and for Malacca in 1856.

Thomson took up his appointment in 1841 and was based in Singapore. For the next 12 years until 1853, Thomson served not only as a surveyor but also as an architect and engineer. His achievements in these latter roles would eventually surpass his work as a surveyor in both reputation and public acclaim. In 1853, Thomson took leave from the Straits to return to Britain for rest and recuperation. The years prior to this had been spent on designing and constructing the Horsburgh Lighthouse on pedra Branca, which took a great toll on him both physically and mentally. Thomson returned to Singapore in 1854, but resigned from his post early in 1855 and returned to England. Thomson migrated to New Zealand in 1856 and eventually became New Zealand’s first Surveyor General from 1876 to 1879. He died in New Zealand in 1884 at the relatively young age of 63.

From 1847 to 1852, Thomson reported to Captain Henry Thuillier, Deputy Surveyor General of Bengal for surveying and mapping matters. Before this, Thomson apparently reported directly to the Governor in Singapore on such matters. This was the only time in Singapore’s colonial history that surveying and mapping matters were referred directly to Bengal.

Thomson’s Maps (1841 to 1855)

Thomson was a prolific map-maker who created several of the most important maps of early colonial Singapore. The following are some of his important cartographic works which have survived till today:

Plan of the Town of Singapore12, surveyed in the year 1843, lithographed at the London Mission Press in Singapore. This is the earliest known map of Singapore that was printed in Singapore.

Plan of Singapore Town and Adjoining Districts13 (see page 94), two editions 1844 and 1846, published in London by J.M. Richardson. This is the most detailed map of Singapore’s town of the time that is known.

A chart showing the Survey of the Straits of Singapore14, at a scale of 1:96,000, published in London in 1846 and revised in 1855. Surveyed with Captain Samuel Congalton of the Honourable Company Steamer, Diana. Thomson’s hydrographic survey was the first detailed hydrographic survey to be conducted by a locally-based surveyor. This chart is printed in two halves (west and east) and covers the area from Pulau Pisang in the Malacca Straits in the west to Pedra Branca in the east towards the South China Sea.

Map of Singapore Island and its Dependencies, at a scale of one inch to one mile (1:63,360). This is a reprinted map that was published in London in 1852.20 It is perhaps the earliest known map during the colonial period depicting the development of the interior of the island.
Surveyors General (1855 to 1871)

After Thomson left, the Straits Settlements Government wanted a revamp of the Survey Department. It decided to appoint a central Chief Surveyor or Surveyor General who could oversee surveying operations for the entire Straits Settlements. Jules M. Moniot—the incumbent Government Surveyor in Penang (engaged in 1846)—was appointed the first Surveyor General of the Straits Settlements in 1855. Moniot stayed on in Penang until 1857, when he moved to Singapore. In 1862, Moniot became seriously ill and the Governor offered him the opportunity to step down as Surveyor General in view of his health. Reluctantly, Moniot accepted the governor’s offer and resigned from his post in June 1862 and left for Europe for rest and recuperation. Moniot died in London on 13 January 1863. He was succeeded by the government Surveyor in Malacca, Daniel Quinton, in 1862. Quinton had been the surveyor in Malacca since 1856. From 1862 to 1867, Quinton stayed on in Malacca and moved to Singapore only in 1867.

In April 1867, the Straits Settlements were removed from Indian rule and became a Crown Colony under the direct charge of the Colonial office in London. This move had important implications on the administration and execution of surveys in Singapore in the next half century. As part of the changes, it was arranged that Daniel Quinton would retire while on leave in England in 1869. The existing Survey Department lost its independence and was subsumed under the Public Works Department (PWD) headed by the Colonial Engineer, becoming the PWD’s Survey Branch. The PWD was in charge of road building, drainage, sanitation, public buildings and other such physical infrastructures in the colony. From 1 April 1870, the title of the Colonial Engineer was amended to the “Colonial Engineer and Surveyor General of the Straits Settlements” to reflect this change. Being a Crown Colony gave the Straits Settlements access to the professional expertise and services of British Army’s Royal Engineers and in 1872, four Royal Engineers were sent to Singapore to beef up the Public Works Department and the Survey Department.

As such, there were only two Surveyors General of the Straits Settlements ever appointed. As both of them were absent in Singapore for lengthy periods, and focused their energies on conducting surveys in Penang and Malacca, there were very few maps of Singapore of historical value produced between 1855 to 1869.

Moniot prepared a simplified update to Thomson’s Plan of the Town of Singapore and its Environs, likely in 1862, but this was not published until 1950. Quinton updated Moniot’s edition and published it as the Map of the Town and Environs of Singapore in 1868. The scale was reduced to 8 chains to one inch (1:6336). Moniot prepared another map entitled Singapore Residency, which was dedicated to Colonel Orfeur Cavenagh, Governor of the Straits Settlements. It included a table entitled “The Strangers’ Guide to the Environs of Singapore.” This map of Singapore was published in London, likely sometime from 1863 after Moniot passed away. Quinton updated Thomson’s Map of the island of Singapore and its Dependencies at a scale of one inch to one mile (1:63,360) and had it published in 1868 in London.
For close to 50 years, from 1872 to 1920, the Survey Department in Singapore was part of the Public Works Department, under the Colonial Engineer. The first Colonial Engineer and Surveyor General of the Straits Settlements was Major J.F.A. McNair, R.A., who was then the serving Colonial Engineer. The Surveyor General himself was based in Singapore.

In 1881, Major McNair was appointed the Acting Resident Councillor of Penang. McNair's deputy, Captain H.E. McCallum, took over and was appointed the Acting Colonial Engineer and Surveyor General. When Major McNair retired in 1884, Captain (later Major) McCallum assumed the substantive post of Colonial Engineer and Surveyor General.

Major McCallum went on leave in 1896 and never returned to Singapore. He was succeeded in 1897 by Colonel A.C. Alexander, R.E., who once served as the Commanding Royal Engineers (CRE) in Singapore. However, Colonel Alexander fell ill and returned to England in the same year. A replacement was found in Ceylon—Major Alexander Murray, MICE, who was a civil engineer by training. Major (later Colonel) Murray served from 1898 until 1909 when he retired, and tragically died the following year in 1910. Upon Murray's retirement, he was succeeded by his Deputy Colonial Engineer, Mr F.J. Pigott, who was originally from the Public Works Department in Ceylon. Mr Pigott was the last person to hold the post of Colonial Engineer and Surveyor General, Straits Settlements.

After World War I broke out in 1914, many locally-based British surveyors were released for military service for Britain in Europe. This caused a great strain on the manpower level of the Survey Departments of the Straits Settlements and that of the Federated Malay States. As a consequence, it was proposed and approved that once the war was over, the two Survey Departments would be merged to allow for greater scale and flexibility in allotting talent and manpower, and resolve the resource difficulties that had plagued the Straits Settlements Survey Department since coming under the PWD. This occurred after some delays in 1920.

Some of the most significant maps produced during the period from 1872 to 1920 included:

- Map of the Town and Environs of Singapore 1878. Signed by John F.A. McNair. Published in London.
- Map of the Town of Singapore and its Environs 1881. Surveyed and Drawn by Military Staff Clerk J.C. Woods, a member of the military garrison in Singapore. Published by Robinson & Co., Singapore.
- Map of Singapore Town shewing building allotments & registered numbers of Crown Leases (see page 98).
- Map of the Island of Singapore and its Dependencies. This series of island of Singapore maps drawn at a scale of 1 inch to 1 mile (1:63,360) was published by each succeeding Surveyor General during this period; in 1873, 1885, 1898, 1904, 1905 and 1911. The 1911 edition was published in February 1912 by the War Office, with the military map series number of GSGS 2609. It was revised in 1916.
Inter-war Period (1920 to 1939)

On 1 April, 1920, the Survey Department in the Straits Settlements became part of the new Survey Department, Federated Malay States and Straits Settlements (F.M.S. & S.S.). The head of the department was the Surveyor General, F.M.S. & S.S., who was based in Kuala Lumpur, the capital of the Federated Malay States.

The Federal department was in charge of trigonometrical surveys (also termed “geodetic surveys”), topographical surveys and mapping across the F.M.S. and S.S., while each state or settlement would retain individual control over revenue (now termed “cadastral”) surveys. With this amalgamation, the mapping of Singapore became part of the larger Malayan mapping system, leading to a reduced frequency in which new maps of Singapore were produced. However, as the maps were centrally produced, their overall quality was much improved. This lasted for another 50 years or so—with a few short interruptions—until 1970, when the British forces pulled out of Singapore.

In 1919, as part of the preparation for the merger of the Survey Departments, the state of cartography in the F.M.S and S.S. was reviewed. It was found that after one full century of British rule, there were no proper topographical maps of Singapore with contour lines depicting the island’s terrain, drawn using modern trigonometrical methods and geodetic principles.

A year after the departments merged, it was decided in 1921 to extend the primary triangulation of Malaya (1913–16) to Singapore. The primary triangulation had established a control reference network for land surveys in the Federated Malay States. This was a network of selected locations with accurate latitudes and longitudes determined over time using modern scientific surveying techniques. The geographical positions of these control points were subsequently used as reference points for other surveys, such as those done in Singapore, and substantially improved their accuracy.

It was decided in 1922 that a full topographical survey of Singapore (and all outlying islands) would be completed within two years and the results published as a series of maps. Field work was completed by 23 October 1923. By 1924, the maps were ready for publication. The series comprised 16 sheets and was published in colour, at a scale of 20 chains to 1 inch (4 inches to 1 mile or 1:15,824). This was the first modern topographic map series of Singapore based on scientific surveys (see page 100). The War Office published these map sheets as part of series GSGS 3772 at a different scale of 1:25,000, suited to their own needs.

In 1926, the first Singapore map sheet of the Standard Topographical Series of Malaya was published at a scale of 1 inch to 1 mile (1:63,360). This series was started in 1910 by the Topographical Survey Branch of the Federated Malay States Survey Department. The island of Singapore was covered in two map sheets.

Before the decade was over, the Great Depression occurred, severely affecting the budget of the Survey Department. In 1932, the entire Topographic Branch was retrenched, leaving only the head of the branch. By the mid-1930s, after the Great Depression was over, the Topographical Branch was rebuilt and decided to update the original 4-inch (1:15,840) topographical map series of Singapore published in 1924. An agreement was reached with the War Office to produce a single 1:25,000 series instead of the two separate series at different map scales. The civil edition was published in 1938 and the military edition in 1939.
The 1-inch to 1-mile (1:63,360) topographic map of Singapore Island was also updated in 1932, 1935 and 1939. From 1932, the two sheets that covered Singapore Island was merged into a larger map sheet (see page 103). This new sheet size and coverage area became the standard format until the early 1960s. Under this format, Pulau Tekong was printed in a separate map sheet.

In 1932, a Town Plan series of Singapore entitled Map of Singapore Town covering the municipal area was produced at a scale of 10 inches to a mile (1:6,336). It comprised six map sheets and was printed in colour. This series was updated in 1935 and a revised edition was published in 1938. By the time these three main series of maps were revised and published, another World War was looming on the horizon.

World War II (1939 to 1945)

World War II began in Europe in September 1939. It spread to Asia and the Pacific on 8 December 1941, when Japan attacked British Malaya, and lasted till September 1945 when the Japanese surrendered to the victorious Allied forces. wartime mapping of Singapore can be broadly divided into three main categories: local mapping agencies, Japanese mapping and Allied forces’ mapping operations.

Local mapping agencies

The headquarters of the Survey Department, F.M.S. & S.S. evacuated to Singapore from Kuala Lumpur from 5 to 7 January 1942. It set up base at Mount Sophia in the grounds of the Methodist Girls’ School. Maps required by the military forces were printed at a commercial printing press in the town area. In view of the wartime economy, the Survey Department printed a three-colour (black, brown and blue/green) edition of the sheets covering the town centre from the 1924 topographical map of Singapore.

Source: Missing

The Survey Department continued normal survey and mapping operations throughout the war. Three maps were known to have been produced by the Japanese military authorities in occupied Singapore:

The 1:25,000 scale topographical map series was reprinted using only three colours: black, blue and brown. Six map sheets were joined and re-cut into four map sheets in order to conserve paper.

The 1:10,000 scale Singapore Gazetteer Map showing the main roads in the town area of Singapore was also reprinted by the Japanese military authorities during the war. It was a monochrome reprint (see page 104).
This 1932 map updated the 1924 topographic map and was the first time the entire island was captured in topography on a single map sheet.

Source: National Library Board, Courtesy Of National Archives Of Singapore

The 1:6336 scale (8 chains to 1 inch or 10 inch to 1 mile) Town Plan series (see page 138) was also reprinted by the Japanese in monochrome. Contour lines in orange or khaki were added to the base maps.

These three maps were apparently reprinted in the same year in 1943 (Showa 18). No other maps were known to have been produced during the war. The code name for the Japanese mapping unit was 岡第一六〇一部隊 (“Oka Unit 1601”).

**Allied Forces’ Mapping Operations**

The Allied forces began mapping Singapore since the beginning of the war in 1939. After Singapore fell, mapping continued throughout the subsequent war years until 1945. During this period, global mapping responsibilities were divided between the United Kingdom and the United States of America. Singapore came under the UK’s area of responsibility.

Many of the maps of Singapore were produced in India by the Survey of India or the Survey Production Centre of the Allied Land Forces, South East Asia, which was based in Ceylon (now Sri Lanka). Mapping agencies in the UK and US also reprinted many Singapore maps throughout the war years. War-time maps of Singapore produced by the Allied forces are too numerous for them to be detailed individually. However, they can be broadly grouped into the following six categories:

1. **1:250,000/1:253,440** – for strategic planning and general purposes.
2. **1:63,360** (1 inch to 1 mile) – for use as tactical map and general administrative purposes.
3. **1:25,000** – for deliberate battle, especially for use by the Royal Artillery.
4. **Large-scale Town Maps (1:10,000 & larger)** – for targeting purposes.
5. **Small-scale Maps (1:500,000 and 1:1,000,000)** – for general reference and aviation planning.
6. **Special Reference Maps** – thematic maps such as railway stations and harbours.
WWII ended with Japan’s surrender on 15 August 1945 and Singapore was liberated on Wednesday, 5 September 1945. On 12 September, the British Military Administration (BMA) was established, lasting until 31 March 1946. Mapping during the BMA was conducted by military personnel with prior surveying experience. Lieutenant Colonel P.H. Bonnet from the British Army was placed in charge of maps and became the de facto Surveyor General during the BMA period. He had been a member of the Malayan Survey Department before the war and had returned to Singapore with the Allied Liberation forces. The end of the war marked the first appearance of a formal military mapping presence in Singapore, the Royal Engineers’ Survey Service.

The Malayan Union was formed on 1 April 1946, joining the pre-war Federated Malay States, Unfederated Malay States and the Straits Settlements colonies of Penang and Malacca into one unified entity under a British Governor. Singapore became a separate Crown Colony with her own Governor after the Straits Settlements was dissolved. The Survey Department was re-established as the Survey Department, Malayan Union and a separate Survey Department was established in Singapore. The person overall in charge was given the title of Director of Surveys, Malayan Union and Singapore. In 1948, the Malayan Union was dissolved in favour of a new entity, the Federation of Malaya. The Survey Department, Malayan Union then became the Survey Department of the Federation of Malaya (SDFM). The Director of Surveys reverted to the pre-war title of Surveyor General, Federation of Malaya and was in charge of the Survey Department, Singapore, administered by the SDFM under the new organisation.

The Federation of Malaya gained independence from the UK on 31 August 1957. But this did not affect the mapping relationship between Malaya and Singapore and the Survey Department, Singapore remained under the administration of SDFM.

On 3 June 1959, Singapore achieved self-rule from the British, which ended the long-established administrative ties between Singapore and Malaya in survey and mapping matters. From 1959 to 1963, the Chief Surveyor of Singapore was in charge of all surveys and mapping matters in Singapore, with the necessary technical and logistical support filled in by the British Army’s Royal Engineers. Nonetheless, there was still significant cooperation between Singapore and the Federation of Malaya’s Survey Department.

On 16 September 1963, Singapore merged with Malaya to form Malaysia. With the formation of Malaysia, the Survey Department, Singapore again became a part of the Federal survey and mapping establishment. Maps produced during the post-war to merger period comprised the following five main types:

- The 1:10,000 scale Singapore Gazetteer Map published during the Japanese Occupation shows the roads and landmarks in Singapore’s town centre renamed in Japanese script.

Source: Port of Singapore Authority, Courtesy of National Archives of Singapore

In the same year (1948), the Malayan Emergency began and raged for over a decade until 1960. Surveys and mapping priorities changed, affecting the mapping of Singapore as critical resources were now channelled into supporting anti-Communist military operations.

Aerial photography was introduced after the war to facilitate and hasten the process of mapping in Malaya and Singapore, which became particularly important to support military operations against communist insurgents. Singapore was one of the first areas to be mapped using air surveys and the Royal Air Force’s No. 81 (Photographic Reconnaissance) Squadron provided most of the air photos required for mapping purposes. The Federation of Malaya gained independence from the UK on 31 August 1957. But this did not affect the mapping relationship between Malaya and Singapore and the Survey Department, Singapore remained under the administration of SDFM.

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1:25,000 topographical map series
Three of these series were produced:

1953: Provisional Issue, twelve sheets covering all of the off-shore islands of Singapore. First new map series to be produced after the war, with new surveys and redrawn contours. Compiled using air photography. Printed in four colours: black, blue, brown and red.

1958: Standard Mapping 1st Edition, recast into eight sheets covering all of the off-islands of Singapore. This was the first series to be based on the new Malaya topographic map series design and sheet layout. Printed in multiple colours.

1961: Singapore 1961, only six sheets, without Pulau Tekong and the Southern Islands. This was the only map series to be produced when Singapore was under self-rule. Printed in multiple colours.

1:63,360 (1 inch to 1 mile) topographical map series
This series was produced as part of the following Pan-Malayan series: HND 1033 (1947), GSGS 4690 (1953) and L707 (1958). After Malaya’s independence, Singapore received her own number for the 1:63,360 map series: GSGS 4923. Edition 1 was published in 1958, followed by Edition 2 in 1963.

1:10,000 topographical map series
In 1959, the first 1:10,000 topographical map series of Singapore was published. This was part of the Malaya-wide topographical town plan series, L905, consisting of four map sheets and covering Singapore’s city area. It was produced and printed in multiple colours by the Royal Engineers, and was published between February and May just before Singapore achieved independence on 3 June 1959.

1:6,336 Town Plan/Photomap
In 1950, a Photomap series of 20 sheets was produced as an interim measure to aid government planning for the post-war rehabilitation of Singapore. These black-and-white photos were printed at a scale of 1:6,336 (see page 109). Photography was by the RAF’s No. 81 Squadron and the maps were produced by the No. 2 Air Survey Liaison Section of the Royal Engineers.

After Singapore was declared a City on 22 September 1951, the pre-war 1:6,336 Town Plan series was updated and published in 1954 as the Map of Singapore City in six sheets (see page 109). This was the last edition in this series, and one of the first maps that recorded Singapore’s new city status. It was printed in multiple colours by the Survey Department of the Federation of Malaya.

Street directory with sectional maps
The first modern Singapore Street Directory was published in November 1954 by the Survey Department of Singapore. The new series included sectional maps compiled in a compact atlas format and an index of road names. The Street Directory is still in commercial publication and is updated with increasing frequency to keep up with the rapid developments in Singapore. The Singapore Land Authority has stopped publishing their version of the Street Directory since 2010.
Segment of the Singapore 1961 1:25,000 topographic map series, covering Tampines, Changi, Punggol and Pulau Ubin.
Source: Survey Department, Courtesy of National Archives of Singapore

An aerial map of Keppel Harbour from the Singapore Town Photomap series, 1950.
Source: Singapore Maritime Museum, Courtesy of National Archives of Singapore (20130020014 – 0000)
Post-independence (1966 to Present)

Singapore achieved independence on 9 August 1965 after separating from Malaysia. After independence, Singapore relied on the British Army’s assistance for mapping requirements until its own capabilities were developed. The Survey Department of Singapore was nominally in charge of national mapping, but lacked the necessary skills and equipment for map production until the late 1960s.

The last map of Singapore published by the Malaysian Survey Department was a 1:63,630 topographic map produced by the Directorate of National Mapping, Malaysia in 1966.\textsuperscript{61} This map was prepared in 1964 when Singapore was part of Malaysia. A metric edition of this map was published in 1968.\textsuperscript{62}

The first order of the day for the post-independence Survey Department of Singapore was to produce an updated topographic map of Singapore. This was published as Singapore Series 1 in 1969, at the standard scale of 1:63,360.\textsuperscript{63} The map was produced by the 84 Survey Squadron of the Royal Engineers, on behalf of the Chief Surveyor of Singapore.

In the same year, a comprehensive air survey of Singapore was conducted with the aid of a British private surveying company, Fairey Surveys Ltd. A series of 401 topographic map sheets covering the entire Singapore and all off-shore islands was produced in 1970–1, compiled using air photos. The map sheets were produced at a scale of 1:2,500 and carry the words “Instrumental Plot”.

The Singapore Armed Forces Mapping Unit (SAFMU) was established in 1970 and based at the former British army map depot at Dover Road, where the 84 Survey Squadron and the 556 Field Survey Depot of the Royal Engineers were previously quartered.\textsuperscript{64} To help set up the SAFMU, the British government lent Singapore an advisory team of four Royal Engineers, who arrived in December 1970 and left in June 1973.\textsuperscript{65} The formation of the SAFMU marked the beginning of a division of labour in surveys and mapping in Singapore. Henceforth, the Survey Department of Singapore was in charge of cadastral surveys and mapping, while the SAFMU was responsible for topographic surveys and mapping. The SAFMU was also the national mapping agency responsible for the bulk printing and publication of Singapore national maps, and has produced several important map series in the past 44 years. The agency’s first task was to update the 1-inch to 1-mile Singapore topographic map, which was accomplished with the publication of the Singapore TOPO 1 series in 1971 (see page 114).

In the early 1970s, Singapore began the process of metrication, the nation-wide conversion to the metric system of weights and measures used today. In 1974, the SAFMU published Singapore’s first metric topographic map series, SMU 075, at a scale of 1:75,000 (see page 115).\textsuperscript{66} Edition 2 of this series was enlarged to 1:50,000 in 1978.\textsuperscript{67} In 1988, the SAFMU adopted the 1:5,000 topographic maps as the base maps for subsequent updates, which were started in the mid 1970s and first derived from the Fairey survey sheets at a scale of 1:2,500.\textsuperscript{68}

Another significant development was the progressive computerisation of the SAFMU’s services from the 1980s. In 1982, the Civil Service Computerisation Programme was launched and in 1990, a computer-aided mapping system was installed. The first topographic map produced with this system was Edition 5 of SMU 075 in 1993.\textsuperscript{69} In 2002, the first topographic map of Singapore based on a GPS-compatible (Global Positioning System) mathematical reference system, Edition 7 of SMU 075, was published.\textsuperscript{70} The most current edition of SMU 075 is the ninth, which was published in 2011.\textsuperscript{71}
The following major map series have been produced and maintained by the SaFMU since its inception:

Topographic map series
- 1:5,000 topographic map series
- 1:10,000 topographic map series (SMU 010)
- 1:25,000 topographic map series (SMU 025/L802)
- 1:50,000 and 1:75,000 topographic map series (SMU 075/L702)

Road map series
- 1:10,000 road map series (SMU 1168)
- 1:25,000 road map series (SMU 1169)

Other map series
- Outline map: 1:50,000 & 1:100,000
- Locality map: 1:50,000
- Recreation map: 1:50,000

Future Trends: The Singapore Land Authority (SLA) and National Mapping

The landscape of mapping in Singapore has changed significantly over this past decade. Digital mapping technology has accelerated with time and increased the flexibility and range of uses of maps and geo-spatial data. Today, such applications cover a gamut of research, policy and operations planning possibilities, including outcome and scenario planning and real-time views of ongoing business operations.

By way of a conclusion, the following is a summary of key events that have taken place since the beginning of the present millennium. The SLA was formed on 1 June 2001 and the Survey Department was placed under the SLA as one of its key divisions. In 1990, the government set up the Land Data Hub, a common platform facilitating the cross-sharing of digital map data across government agencies, in response to the growing use of digital survey and mapping technology by the public sector. Like the Survey Department, the Land Data Hub has also been placed under SLA management.

In 1995, the Integrated Survey Network (ISN) was established across Singapore. The ISN allows for greater survey accuracy with 70 primary markers and over 4,000 secondary markers laid out across Singapore to aid surveying work. These control points are set up using GPS technology and form the base for conducting land surveys under the new system.

To complement the ISN, the SLA gradually implemented a more accurate GPS-compatible cadastral survey system, called the SVY21 (a survey system for the 21st century), which was officially launched in 2004. Since then, all surveys and maps produced by the Singapore government are based on and compatible with this advanced system.

To further improve the accuracy of absolute positioning and the ISN system, the SLA implemented the Singapore Satellite Positioning Reference Network (SirenT) in September 2006, which updated the original technology (dating from the mid-1990s) used to implement the ISN.

To better capture three-dimensional (3D) space, the SLA initiated the establishment of a Geoid Model in 2005, which was completed in 2009. The model was named SGEOID09, and enabled the use of GPS technology to obtain very accurate measurements of elevations across Singapore. Building on this technology, the SLA began developing a high resolution Digital Terrain Model (DTM) of Singapore in early 2012 and led the initiative to develop and maintain a large-scale national level 3D topographic map, the National Digital Terrain Model, created in June 2013.

To harmonise the various geospatial data collected in Singapore, the SLA officially announced efforts to develop a National Spatial Data Infrastructure (NSDI) in 2009. A major effort towards this end was a collaboration between the SLA and the Info-communications Development Authority (IDA) called SG-Space (Singapore Geospatial Collaboration Environment), which began development in 2008.

In March 2010, the SLA launched OneMap.sg, a web-based platform for the general public to access government agencies’ location-based services and information. In April 2011, it launched GeoSpace, a portal for government agencies to share and access geospatial data.

Finally, as an indication of how the future would look like for the history of mapping in Singapore, the SLA made all 23 editions of the historical street directory maps from 1954 to 2009 available to the public for free viewing and download on OneMap.sg from 1 September 2014.

These developing trends provide some indication that the responsibility for national mapping might one day return to the SLA, as the modern successor of the Survey Department. Since its formation in 2001, the SLA has developed its capability to take the lead in developing government policies and IT infrastructure with regard to mapping. In the future, historians studying Singapore maps may have to study digital maps, data files and digital copies of historical paper maps.
The first Singapore map produced in metric measures, SMU 075, in 1974.
Source: Singapore Land Authority, Courtesy of National Archives of Singapore

The first map produced by the SAF Mapping Unit, the 1971 1-inch to 1-mile topographic map of Singapore.
Source: Singapore Land Authority, Courtesy of National Archives of Singapore
Notes

2 The British Library holds a copy of this map.
3 The British Library holds a copy of the draft plan of Singapore from 16 October 1819.
4 The Library has an original copy of this map.
5 Sophia Raffles, Mem:or of the Life and Public Services of Sir Thomas Stamford Raffles, John Murray, 1830.
6 An anecdotal history of old times in Singapore. The Singapore Free Press and Mercantile Advertiser archives of UK collection. It is a hand-drafted copy meant for a report, not an original printed copy.
7 The National Archives of Singapore has a copy of this 1848 edition.
8 The National Archives of Singapore has a rare hand-coloured copy of the western half of the chart.
10 This map was known simply as the Singapore Series, although it was actually a Reference source.
12 The National Archives of Singapore and the National Library of Singapore hold this map.
13 The list of SaFMU maps was compiled from: Working experience and personal communication, information on SaFMU compiled from personal collection.
14 Both the national archives of Singapore and the National Library of Singapore have copies of this map.
15 Both the National Archives of Singapore and the National Library of Singapore have copies of this series of maps. Of the four sheets printed, sheet 1 (Kroos area) is missing in both collections.
16 Both the National Archives of Singapore and the National Library of Singapore hold copies of this series of maps. Of the four sheets printed, sheet 1 (Kroos area) is missing in both collections.
17 Details from this section are compiled from the Annual reports of the Survey Department of the Federated Malay States and Straits Settlements.
18 The National Archives of Singapore has copies of this series of maps.
19 Both the National Archives of Singapore and the National Library of Singapore have a copy of this map.
20 Both the National Archives of Singapore and the National Library of Singapore have this map.
21 Both the National Archives of Singapore and the National Library of Singapore have this map.
22 Personal collection.
23 The only known copy of this map exists in The national archives of Singapore.
24 The National Archives of Singapore has the maps published in 1975, 1985, 1988 and 1992. 1991: edition map can be found in the National Museum of Singapore’s collection. The 1904 map is also published in Straits calendar and directory: between 1892-64, it was published as Royal almanac and directory: from 1865-69, it was published as Straits calendar and directory. More information for the accurate measurement of elevation on the surface of the earth.
25 The geoid is the imaginary and hypothetical surface of the earth that coincides with mean sea level. It is used as the reference surface for the accurate measurement of elevation on the surface of the Earth.