

New 1:50 000 National Map Series for New Zealand

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In 1999 Land Information New Zealand introduced a new globally consistent national datum, New Zealand Geodetic Datum 2000. This was followed in 2001 by the introduction of a new national projection for mapping, New Zealand Transverse Mercator projection 2000, which replaced the New Zealand Map Grid.

The introduction of the new datum and projection resulted in a change to the coordinates of mapped features, and in 2005 a decision was made to introduce a new 1:50 000 map series to be known as Topo50. Using appropriate technologies and automation of the mapping process, the entire series of 452 maps will be released simultaneously in September 2009, less than three years after the project commenced. This article will discuss the development and introduction of the new Topo50 map series in New Zealand.

Historic national topographic mapping in New Zealand

Fundamental to the development of our country is the need for medium scale map coverage. As early as 1884 the then Department of Lands and Survey began to issue inch to a mile topographic maps for parts of New Zealand.

It was in 1935, and driven by war and fears of invasion, when planning began for a national inch to a mile map series, the NZMS 1 1:63 360 series. The first sheet in this series (Napier) was completed in 1939 and during the 1940s 160 provisional sheets were published. This was before any uniform standards or specifications were agreed upon.

With the introduction of New Zealand Geodetic Datum 1949 (NZGD49) and separate transverse Mercator map projections for the North and South Islands, standards and specifications were established upon which the mapping progressed. The final sheet in this series was completed in 1975, some 36 years after the first sheet was issued. In parallel with the NZMS 1 series was the NZMS 177 cadastral map series which stopped in 1960.

During the early 1970s decimalisation and metrication was introduced into New Zealand. In 1973 a decision was made to metricate mapping and a new single mapping projection covering all of New Zealand, the New Zealand Map Grid (NZMG) was introduced. This was also in terms of NZGD49. A new series of 1:50 000 maps, the NZMS 260 series, was introduced and the first sheet was published in 1977. The last sheet in this series was completed 20 years later in 1997. During the 1990s the data used to produce

the NZMS 260 maps were digitised to form a seamless digital topographic database known as the NZTopo database.

Rationale for a New Topographic Map Series

In 1999 LINZ introduced a new geodetic datum, New Zealand Geodetic Datum 2000. One of the effects of the move to this datum is that the geographical position of points – latitude and longitude – will move by about 190 metres north and 10 metres east. The key features of the new datum over NZGD49 are –

- Increased accuracy
- It is a geocentric datum with its origin at the centre of mass of the earth
- It is compatible with international systems such as the global reference system WGS84 which is used as the GPS reference frame
- It is a three dimensional datum
- Effects of crustal deformation are managed through the inclusion of a deformation model in the datum definition.

Subsequent to the introduction of New Zealand Geodetic Datum 2000 (NZGD2000), a decision was made in 2001 to introduce a new projection for national mapping, New Zealand Transverse Mercator 2000 (NZTM2000). A fact sheet on the NZTM2000 projection can be found on the LINZ web site at www.linz.govt.nz/surveypublications. The false origin of the new projection was moved by about 900 km east and 550 km north so that there could be no confusion between coordinates read off maps using the old NZMG and new NZTM2000 projections. The key features of the new projection over NZMG are –

- Transverse Mercator is a standard projection used internationally
- It is consistent with some other mapping carried out in New Zealand.

The change to the new datum and projection result in the geographic positions and grid coordinates of features changing. This necessitated consideration of re-mapping and changes to the NZMS 260 map series. Other considerations taken into account were –

- Printing technologies are making it increasingly difficult to print large format and non standard map sheets, a number of these exist in the NZMS 260 series
- Plate making used to produce the NZMS 260 series from traditional film positives is becoming difficult and expensive

- The majority of production tasks for the new series will be brought in house
- Digital images of the new Topo50 maps in tiff and geotiff format will be made available from date of launch
- The maps will be produced from digital data that already existed in the NZTopo database.

Topo50 sheet layout

A new map sheet layout was designed for the Topo50 maps with the following characteristics –

- Maps will be in standard A1 portrait format in contrast to the existing series which is in landscape format and sheets are a variety of sizes
- Sheets will have new numbers and some new names, for example the current Queenstown sheet E41 would be renumbered CC11
- There will be no half sheets, all sheets will be full size A1, although 40 sheets with little land cover will be printed with a third overlap from the adjoining sheets.

Map layout

Each map in the new series will cover a different area to the NZMS260 map. There have been a number of improvements to map layout these include –

- Grouping warning notes together.
- Providing additional information on the datum and map projection used.
- On the front cover of the map –
 - Redesigning it to clearly distinguish it from the existing NZMS260 series.
 - Showing adjacent sheet names.
 - Providing an awareness panel stating that these maps are used by Emergency Services.
- On the back cover of the map –
 - Displaying a locality indicator map.
 - Showing a number of important warnings.
 - Referring to the LINZ web site which will show the currency of the information provided on the map.
 - Providing a note inviting advice of errors to LINZ.

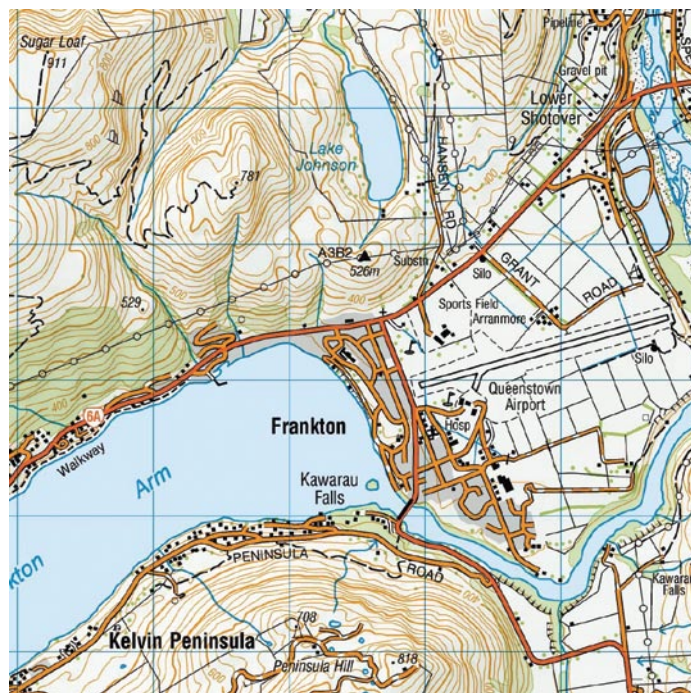
Map production

The topographic detail for the new Topo50 map series has been generated from the digital data held in the NZTopo database. Features representations and test positioning has been manipulated to make it cartographically presentable. Much of this has been automated using LAMPS software from 1Spatial in the United Kingdom. This has been a major factor in enabling the production of the new map series within a three year timeframe.

A major task has been to manually shift and place text so that it does not clash with adjacent features and is cartographically pleasing. Once text placement has been completed the digital database is updated and the placement is preserved. The updated topographic digital data is held in a Gothic database supplied by 1Spatial.

A pre-press solution has been created to enable the topographic data to be extracted from the Gothic database. This is processed into both postscript files for offset printing and tiff/geotiff files for online viewing, GIS use and plotting. The prepress workflow consists of three key steps –

- The first is a postscript server used to extract map sheet based topographic data from the Gothic database, add relief images, the map covers and generate colour separated postscript files.



NZTopo data after text placement completed

- The second, an imposition programme, is used to combine the postscript server output with other key map information such as the legend, grid, graticule, magnetic information, date, and edition number to create the full map layout. This programme also checks for, and corrects, clashes between grid and graticule labels in the map margin. The output is colour separated postscript files used for offset printing and subsequent raster image processing (RIP) processing.
- The third component is RIP software used to recombine the colour separations and produce tiff files for map plotting and geotiff files for use in GIS applications.

Communication strategy

A key feature of the Topo50 map project has been to communicate with key user groups about the proposed new map series. The user groups include –

- Emergency services agencies
- Government and commercial organisations such as lifeline utilities, power companies, telecommunication companies, and port authorities
- Industry providers
- Retailers
- Outdoor groups and associations
- General public.

While the communication message varies among the differing user groups, the overall objective of the communication strategy is 'to encourage quick uptake of the Topo50 maps by map-users to enable consistency with maps used by emergency services'

The main results of this objective are to –

- Achieve high user uptake of Topo50 maps within the first year
- Ensure large numbers of emergency services NZMS260 stocks are taken out of circulation and replenished with Topo50 maps prior to launch of the new series.

To achieve this LINZ is communicating directly with user groups and has been producing a number of resources which are available on the LINZ web site at www.linz.govt.nz/topo50.

Conclusions

The new Topo50 maps will be a modern paper based series of maps consistent with international standards. This will realise a number of significant benefits that include –

- Use of a datum and projection that conforms to international standards
- Generating the new maps directly from a topographic digital database which will enable the new map series to be produced quickly so that all sheets will be available simultaneously
- Providing an environment for potential future developments such as mapping on demand
- New standard sheet layout, A1 sheets, which will increase efficiency and cost savings and will help mapping on demand
- Consistency with some other mapping such as large scale hydrographic charting
- Enabling some aspects of the old map series to be better managed such as part sheets.

The development of the Topo50 map series to be released simultaneously in September 2009 is an ambitious undertaking by LINZ. At the time of writing the project was on schedule to meet this time frame. In the broader sense, the project is a multi-agency project involving changes by emergency services to their GIS and

call centres. Communicating the effects of the new map series to all users has been seen as an integral and important part of the project to ensure a rapid uptake of the new maps when they are released.

From a personal perspective, having been heavily involved in the development of NZGD2000 and NZTM2000 and to be involved in the Topo50 project in a technical and communication role, it has been interesting to observe the significant changes that have occurred in the geodetic and topographic areas over the past 10 years. It has been easy to focus on the achievements and advances brought about by the introduction of Landonline to the survey industry but equally important changes have occurred in the mapping area. LINZ can feel proud of these achievements and I feel privileged to have been a part of these changes.

Acknowledgements

The Topo50 project is the result of the foresight and work of many people within LINZ. I would particularly like to acknowledge Geoff Howard (Manager Specialist Processing), Fran McNamara (Topo50 Project Manager), Chris Kinzett (Senior Technical Specialist Topography), and Robyn Nichol (Topographic Product Service Owner).



MapChatting

This was first published in He Kitenga, the 2008 University of Otago research highlights

Professor Brent Hall, Head of the University of Otago's National School of Surveying, has, along with doctoral student Michael Leahy and associates, developed an internet based system combining web-mapping and instant messaging. This allows dispersed communities to come into virtual contact to discuss issues of common interest. The tool, named MapChat, was developed while the two were at the University of Waterloo, Canada, but they are now refining and customising it for practical use. Michael Leahy is now an Otago research fellow.

Professor Hall describes the technology as a geographic information system that encourages public participation by the use of the internet. As such, it enables community members to communicate in real time, online, using live maps of an area of interest. It is ideally suited to any decision-making process that requires input from a wide range of stakeholders, such as resource management issues – housing developments, water use and wind farm developments – and is particularly suitable for widely dispersed rural communities.

With secure login access to approved participants, the map interface comprises a number of layers that can be turned on and off, and is twinned with a messaging service. Tools include those for highlighting areas of concern, drawing new features on map layers,

adding new text and comments and sending messages. All comments and messages are time-stamped, threaded together and stored in a database for review and analysis. This means they can be shared live or viewed later – in much the same way as a text message or email – providing the flexibility of full and frank discussion without the need for participants to attend time-consuming meetings.

MapChat saves all chat-based comments and links them to map selections. This enables the participants and decision makers to arrive at a conclusion or solution that takes all opinions and points of view into account, to the fullest extent possible.

MapChat is user-friendly and cost effective having been written using open-sourced software. In a joint project between the School of Surveying and the Landcare Trust, it is now undergoing its first New Zealand trial using the allocation of water resources in the Upper Taieri catchment.

Farmers and others can use MapChat to create individualised irrigation strategies and requirements and then discuss these solutions within the context of a community-based management approach. The aim is to develop better relationships, smoother Resource Management Act processes, fairer community outcomes and, of course a more efficient use of water.



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