Implementation of a New Survey Control Standard for New Zealand

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Introduction

- Optimal Regulation
- Geodetic Objectives and Sub-objectives
- Standard for survey control
- New Zealand's six survey control networks

Optimal Regulation

- LINZ has reviewed regulation in all areas of its business
- Regulatory system should encourage efficiency and innovation, while protecting public interests
- “as little as possible, as much as necessary”
- Surveyor-General responsible for geodetic standards
- Specifies ‘what’ is required but leaves the ‘how’ to others, including the private sector

Outcomes, Objectives and Sub-objectives

A2 A network of reference points across New Zealand that can be easily connected to	A2(a) The marks are spaced and located to allow easy access and visibility	A2(a)(i) Mark density enables geodetic marks to contribute to and maintain the accuracy of surveys and efficiently connect them to the geodetic system
		A2(a)(ii) Marks are in usable locations
		A2(a)(iii) Marks and any associated structures can be easily identified
	A2(b) Geodetic marks are protected and maintained to prevent physical deterioration and minimise loss or safety hazards	A2(b)(i) Marks are sufficiently stable and maintained while being used as a geodetic mark for their published coordinates to accurately reflect their current positions
		A2(b)(ii) Mark and their associated structures are stable for their effective life
		A2(b)(iii) Marks and their associated structures are safe and do not pose a hazard to people and property

Survey Control Intervention

- Standard for the New Zealand survey control system
- Guideline for the provision and maintenance of the New Zealand survey control system
- These specify requirements for:
  - Location, accuracy and access of control marks
  - Providing information about control networks and marks
  - Monitoring official datums for surface deformation
- Standard identifies six control networks

Previous Hierarchical Networks

Network	Accuracy Order
International Control Network	0.050m – Order 0
National Control Network	0.071m – Order 1
Regional Control Network	0.087m – Order 2
Local Control Network	0.100m – Order 3
Urban Control Network	0.112m – Order 4
Cadastral Control Network	0.123m – Order 5

Survey Control Networks

Network	Purpose
National Reference Frame	Connect national datums to international reference frames
Deformation Monitoring Network	Monitor surface deformation at national, regional and local scales
Cadastral Horizontal Control Network	Ensure cadastral surveys can efficiently connect to the official datum
Cadastral Vertical Control Network	Ensure cadastral surveys with height data can efficiently connect to official datums
Basic Geospatial Network	Support government-directed geospatial activities
National Height Network	Protect and maintain existing benchmarks

National Reference Frame

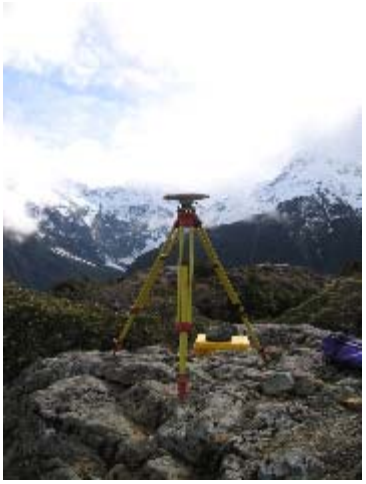
- Connects NZGD2000, NZVD2009 and international datums
- Geodetic Datum Reference Marks (GDRM)
- Vertical Datum Reference Marks (VDRM)
- At least one mark on each tectonic plate

Deformation Monitoring Network

- National Network – monitors tectonic plate movements
- Regional Network – provides denser network to monitor deformation more finely
- Local Network – set up where regional network has identified localised movements

Deformation Monitoring Network

- Will be developed in partnership with GNS Science
- Combination of CORS and campaign stations
- Most of the marks are already in place and have been surveyed as part of previous campaigns

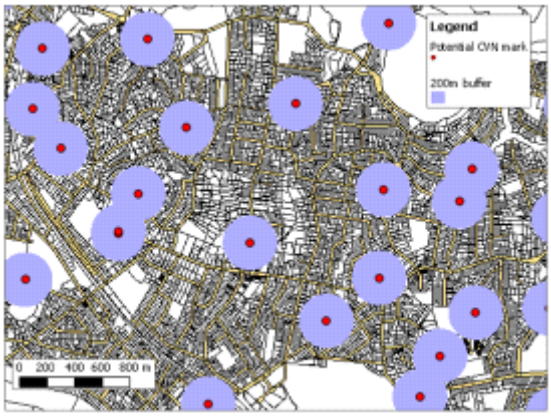


Cadastral Horizontal Control Network

- Provides 'street-level' control for cadastral surveys
- Primarily surveyed using rapid-static or RTK GNSS
- Existing marks preferred, with improved coordinates

Cadastral Vertical Control Network

- In many cases will be the same marks used for horizontal network
- Existing density generally not sufficient

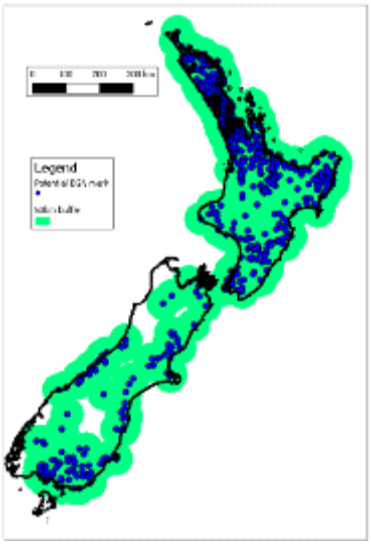


Basic Geospatial Network

- Ensures a minimal level of control where other networks are not required (eg Antarctica)
- Meets needs of topographic mapping, hydrographic surveying etc
- Must be visible in overhead imagery (4M beacons)

Basic Geospatial Network

- On mainland New Zealand, density requirements generally already met

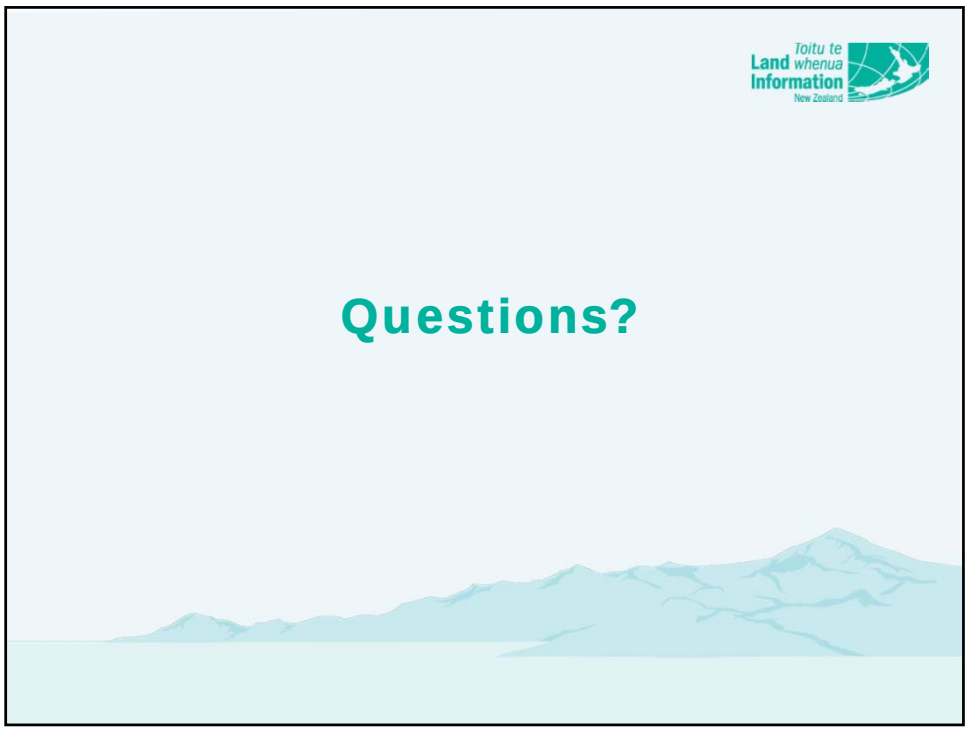


National Height Network

- LINZ no longer undertakes extensive precise levelling surveys
- Precise heighting infrastructure remains valuable and therefore needs protection
- Network will mainly consist of existing benchmarks

Summary

- New Zealand has a new survey control standard, which helps ensure the objectives of the geodetic system are met
- The standard outlines what is required but not how the requirements should be met
- Six control networks defined, which will initially be populated with existing control marks
- Work to achieve full compliance with the standard will occur over the next 5-10 years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