

GIS Data and Mapping Tools for Disaster Management

A Suppliers Perspective

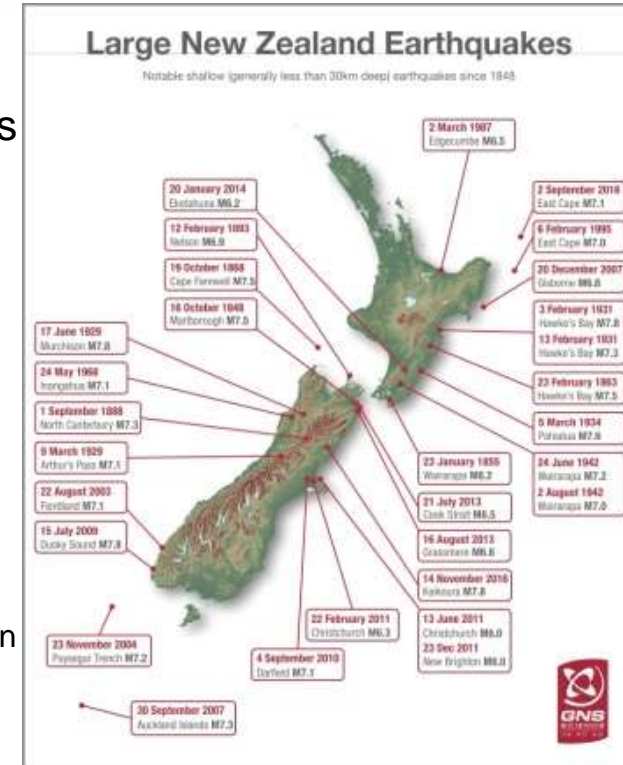
Aerial Surveys Limited

- A leading airborne surveying and mapping company in New Zealand
- Primary sensors for data collection include – Digital imagery/LiDAR/Hyperspectral
- Different tools for different solutions required | different costs
- Significant mapping capacity in association with Cyient
- The New Zealand environment
 - Small narrow country with a large coastline and highly variable topography
 - Earth Quake Prone with Alpine Fault line – split between Australian and Pacific plates
 - Series of volcanoes through the North Island
 - Geothermal activity (Energy generation)
 - High rainfall areas and flood prone areas
 - High winds with prevailing SW winds (Energy generation)
 - Highly variable weather patterns



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- New Zealand government initiatives
- GIS tools being used more and more in disaster readiness than ever before. (Better tools, more user enabled)
- Disasters
 - Earthquakes
 - Storms
 - Volcanic activity
 - Fires
 - Tsunamis
 - Biosecurity breaches
- Impact
 - Infrastructure and transport networks
 - Services (power, water, sewerage, communications)
 - Housing
 - Cadastral data
 - Hydrology networks
 - Ecological impact
 - Marine environment/navigation
 - Economic disruption
- Kaikoura Quake 2016
- Christchurch Quake 2010 / 11



Kaikoura Quake 2016

- Landslides, all major infrastructure damaged, road subsidence, new dams created
- Kaikoura water supply cut and sewerage system damaged | Seabed rise of +1m | Kaikoura land vertical shift +0.5m and horizontal +1m
- Wellington – numerous buildings damaged including newer quake proof buildings, parts of the city closed for safety assessments



Kaikoura Quake 2016



Kaikoura Quake 2016



Kaikoura Quake 2016



GIS Data/Tools Deployed

- The right tools for the right job
 - LiDAR capture for immediate response mapping for coast infrastructure reinstatement – main highway north, no real alternatives
 - Digital Photography and photogrammetric mapping of +10,000km² of region for mapping changes in terrain
 - Scale v Cost v end product required
 - Imagery captured at 30cm GSD
 - Use of latest dense matching software by Intergraph to create 1m DEM from imagery (capture at standard 60:30 overlap sufficient – only SW capable at this overlap)
 - Use dense matching software for creation of 1m DEM from 2015 regional imagery preQuake
 - Compare 1m DEM's and identify/manage major issues (hydrological, ecological, cadastral, environmental)
 - Additional uses gained from GIS data collected (LiDAR and Imagery)



Christchurch Quake 2010/2011



1st Quake - 4 September 2010

- Significant liquefaction affected the eastern suburbs, producing around 400,000 tonnes of silt

2nd Quake - 22 February 2011

- Death toll 185 with building collapses being biggest cause
- Rebuild estimated to exceed \$40 billion

GIS Data/Tools Deployed

- Immediate capture of imagery and LiDAR
- Difficulty with ongoing aftershocks and moving benchmarks
- Wide variety of mapping using imagery and LiDAR post immediate response
 - Change assessment
 - Key services management and recovery
 - Determination of red zones for housing (houses on land no longer suitable to living)
 - Insurance claims evidence (chimney pot collapses!)
 - Rebuild planning, Rezoning of rebuild areas + building code changes
 - Liquefaction mapping
- Importance of sharing GIS and geological data openly on a single platform for multiple users



Christchurch Quake 2010/2011



GIS in Disaster Management

Thank you