Hazard Management

Regional Council Future's Workshop

3 November 2010

HAWKE'S BAY
REGIONAL COUNCIL

Hazard Management

To avoid or mitigate the risks from hazards:

- Improve understanding of potential hazards and risks, including
  - Where? What is the current level of hazard recognition?
  - What impacts? What current techniques are available for measuring community vulnerability to different levels of different hazards and how have these been applied in New Zealand?
  - How often? What is the current state of probabilistic magnitude/ frequency methodologies?
- Determine acceptable levels of risks
- Implement integrated solutions (strategies, methods and tools) that lead to resilience
- Inform communities of hazards and consequences

Top 5 Research Needs

- LiDAR Coastal Survey Data
- Fault Trace Mapping
- Tsunami Inundation Mapping
- Risk Assessment and Risk Evaluation Criteria
- Flood Risk Maps

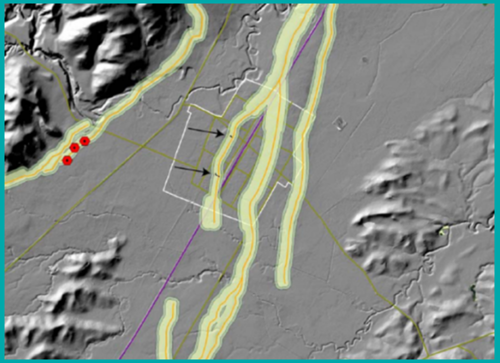
LiDAR Coastal Survey Data

(Light Detection and Ranging)

A cost effective alternative to conventional ground surveying for medium to large scale terrain modelling projects. NZ Geospatial Office looking to publish NZ description (metadata) & coverage extent of LiDAR (alot provided by RC's) but there are still large gaps.

Nation-wide coastal LiDAR enables identification of vulnerable low lying coastal areas and provides digital terrain elevation data that can be used quantitatively in modelling storm surge inundation and sea level rise. When conducted at low tide it can obtain high resolution coverage of the intertidal zone that is not easily surveyed by any other method. This area is an important part of modelling any processes in the foreshore, and as also proved an excellent tool for surface fault-line mapping.

Fault Trace Mapping

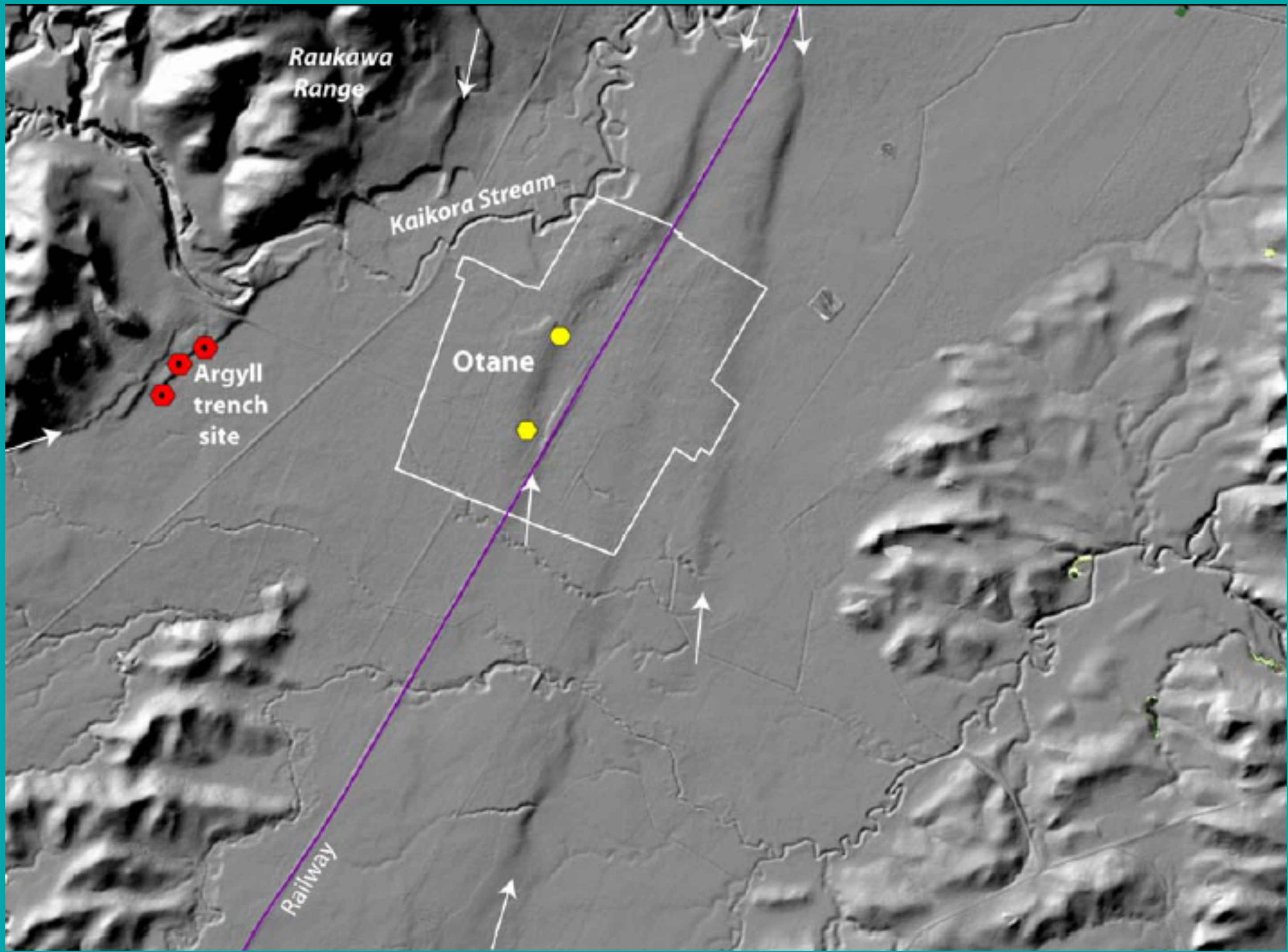


GNS Science maintains the New Zealand Active Faults Database. This database has been designed to hold all data collected from investigations of active faults. While it is a growing database, there remain many unmapped faults in NZ, and many regions find it difficult to fund.

Continued fault trace mapping throughout NZ according to the MfE Guidelines “Planning for development of land on or close to active faults” (Kerr et al 2003). Priority for all Class I faults and should determine where possible fault locations, types, return periods and establishment of Fault Avoidance Zones (FAZ).

The reverse fault scarp of the 1999 Chi-Chi earthquake, Taiwan. Here, the rupture is crossing a sealed road. The person is standing on the footwall side of the fault scarp. The hangingwall side of the fault has overthrust the footwall, towards the person, and is highly deformed in the scarp area and behind.

The reverse fault scarp that typifies the result of the 1999 Chi-Chi earthquake, Taiwan. The rupture zone of the fault occurs in the middle to lower part of the scarp. Note the tilting and destruction of buildings on the up thrown (Hanging wall) block of the scarp.



Raw LiDAR Shaded relief map of the Otane and Argyll Road area (scale 1:20,000). Otane. 3 trenches excavated at Argyll Road in the 1990’s. 2 trenches were excavated across the Otane trace (yellow dots). Scarps of the PFZ are arrowed and the Rail line is in purple. Note also the patterns of Holocene stream development.

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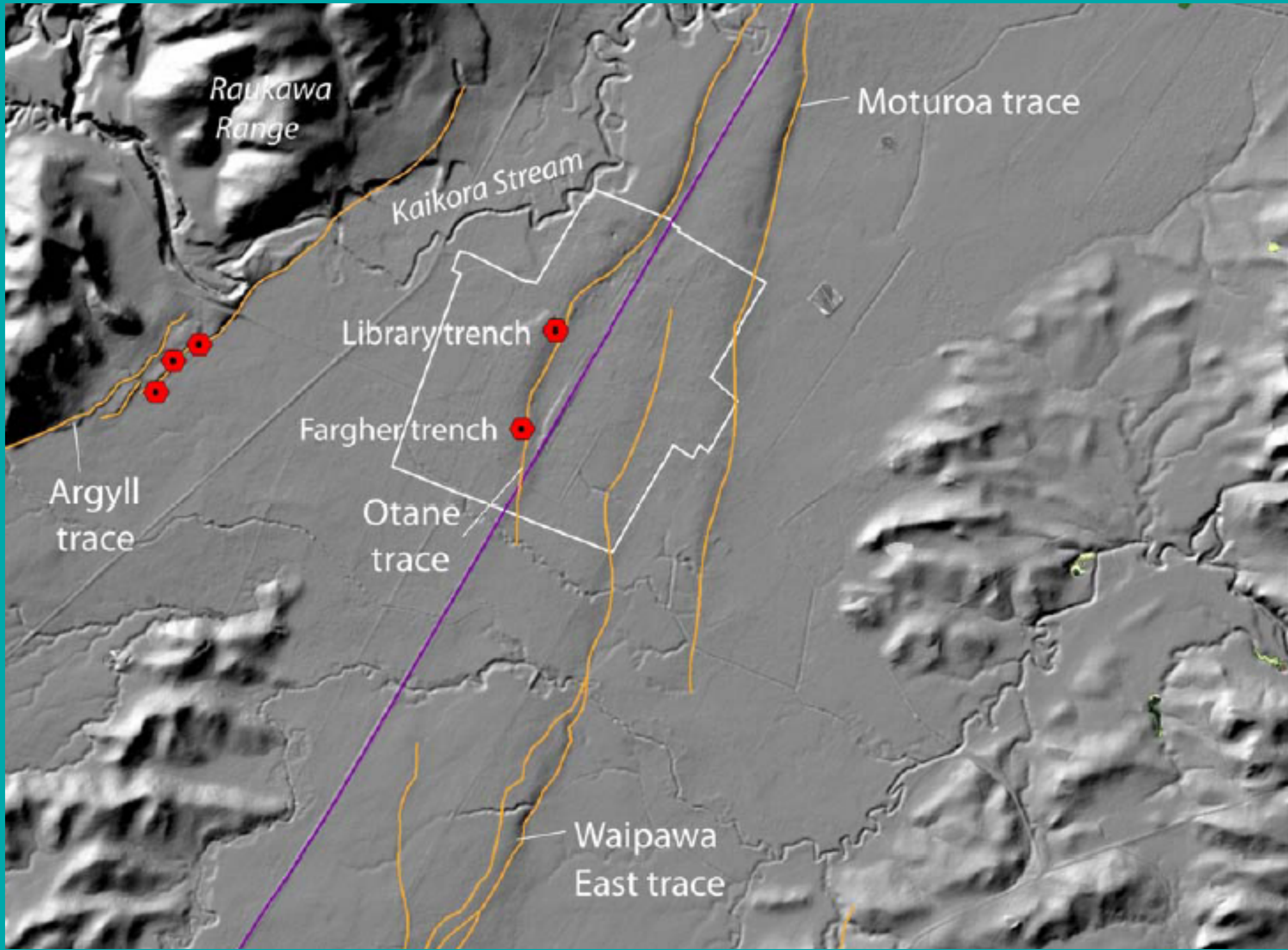
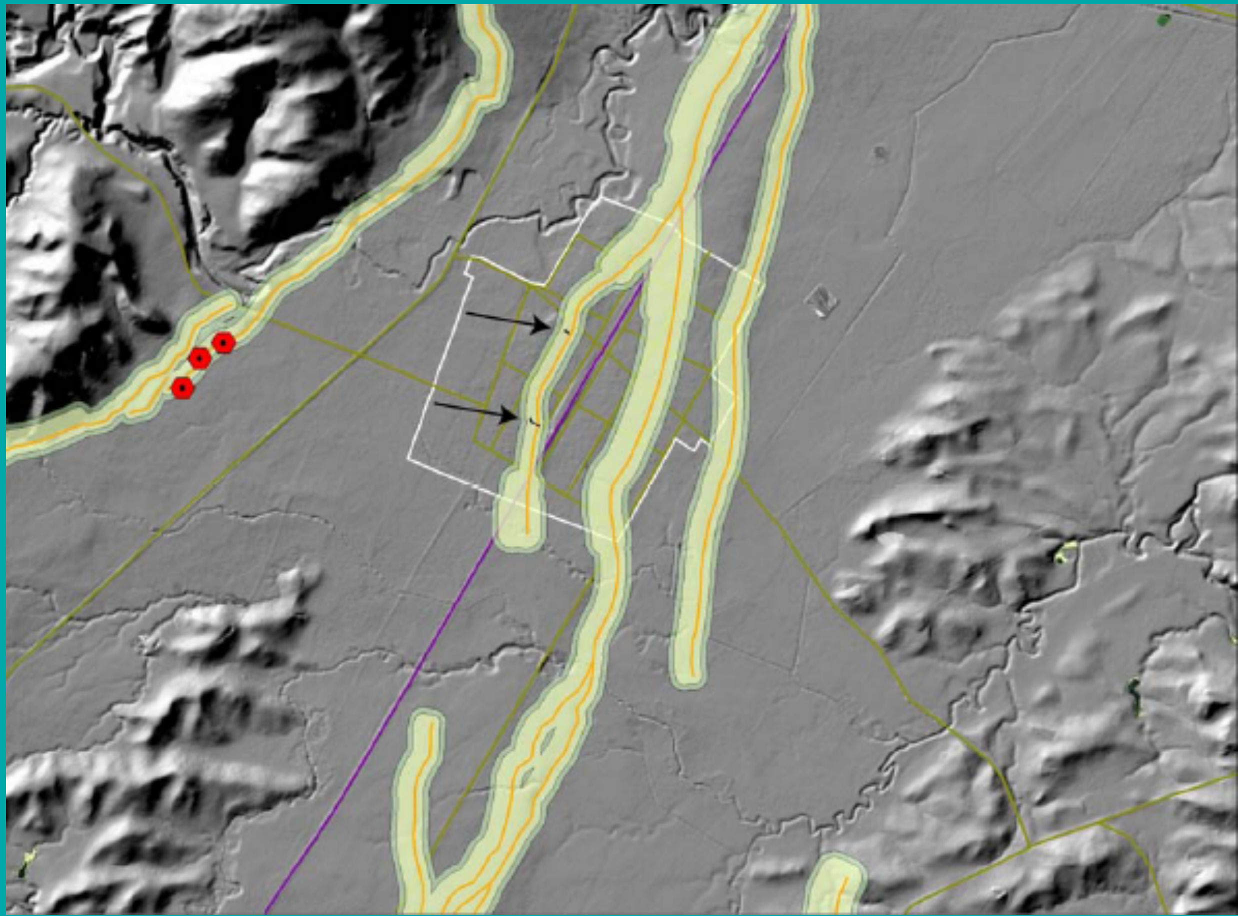


LiDAR Shaded relief map of the Otane and Argyll Road area (scale 1:20,000) with mapped interpretations of fault locations (orange lines). The Fargher & Library trenches were excavated in Otane in 2005/06 across the Otane trace of the PFZ to define the zone of surface deformation.



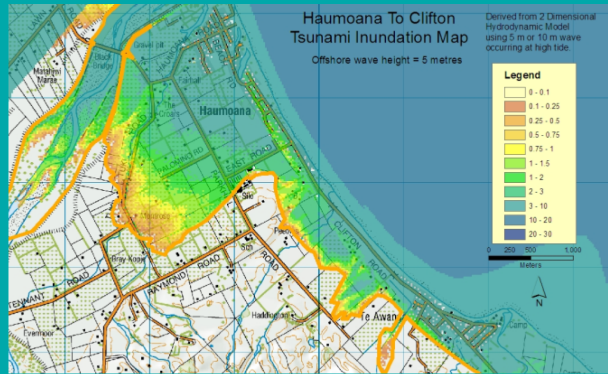
Active Fault Avoidance Zone map of the Otane area (scale 1:20,000). Orange line represents best estimate of fault rupture location; yellow zone is uncertainty on the location of the fault rupture location; the green zone is the Fault Avoidance setback of ±20 metres. Black arrows show the locations of trenches excavated in Otane.

MfE Active Fault Guidelines

Recurrence Interval Class	Average Fault Recurrence Interval of Surface Rupture	Building Importance Category (BIC) Limitations* (allowable buildings)	
		Previously subdivided or developed sites	"Greenfield" sites
I	≤2000 years	1 (temporary buildings only)	1
II	>2000 years to ≤3500 years	1& 2a (temp & resid timber framed & normal structures	
III	>3500 years to ≤5000 years	1, 2a, & 2b temp, resid timber framed and normal structures	1& 2a
IV	>5000 years to ≤10,000 years	1, 2a, 2b & 3 temp, resid timber-framed, normal and important structures	1, 2a, & 2b
V	>10,000 years to ≤20,000 years		1, 2a, 2b & 3
VI	>20,000 years to ≤125,000 years	1, 2a, 2b, 3 & 4 critical post disaster facilities cannot be build across an active fault with a recurrence interval <20,000 years	
Note: Faults with average recurrence intervals >125,000 years are not considered active			

Tsunami Inundation Mapping

GNS Tsunami Risk Report 2005 concluded NZ's ongoing risk from tsunamimi is significant. Central government (MCDEM) advocates for the development of tsunami evacuation zones throughout NZ, and tsunami inundation mapping is an essential first step.



Develop inundation hazards maps based on dynamic wave propagation models – focussed on areas of greatest risk. These inundation maps need to be adequate for evacuation planning using the methodology outlined in the MCDEM Directors Guidelines 'Tsunami Evacuation Zones' DGL 08/08, and ultimately land use planning.

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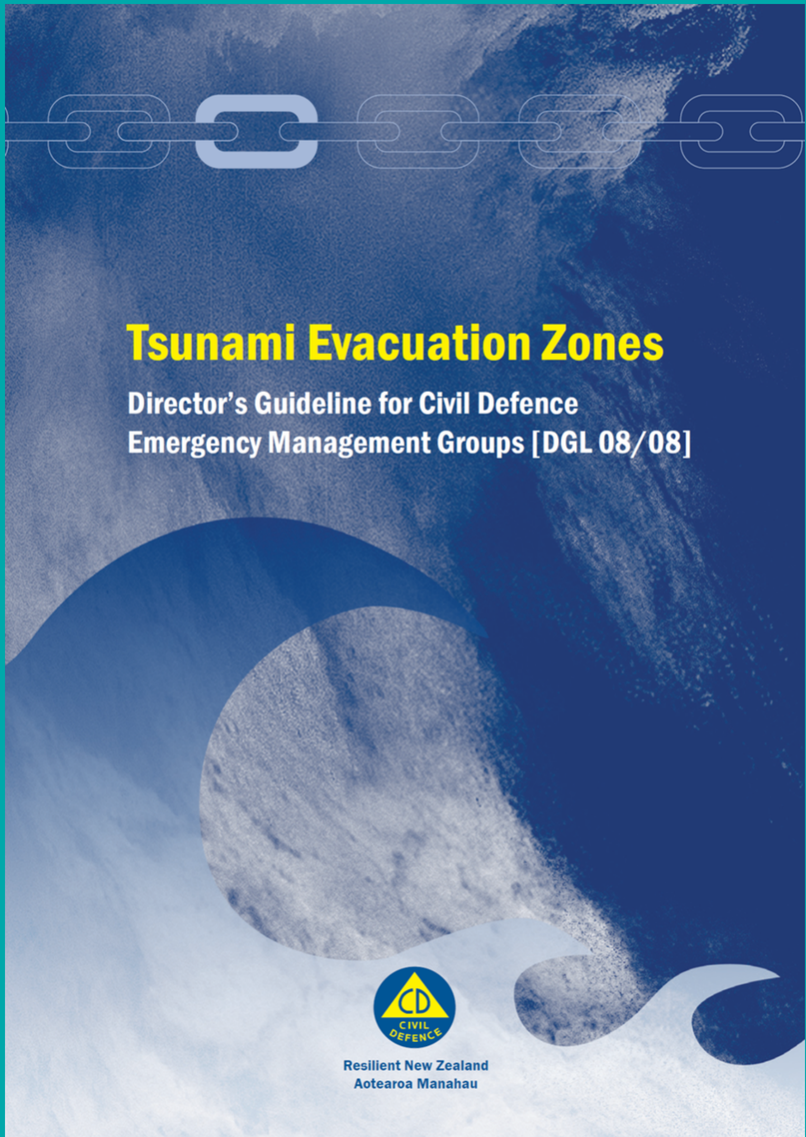
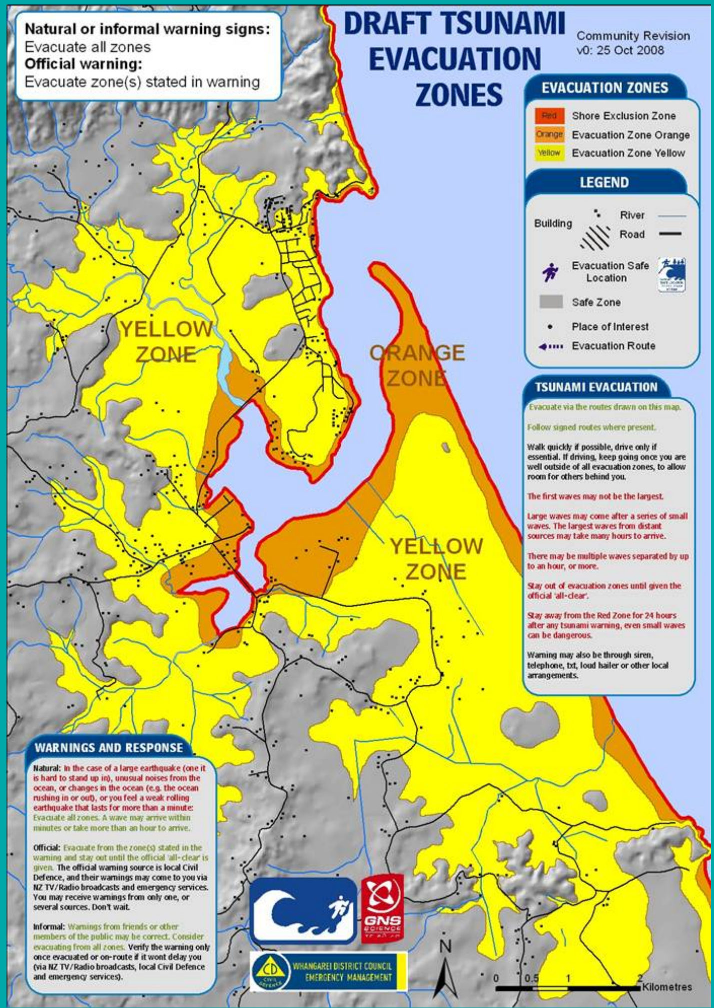
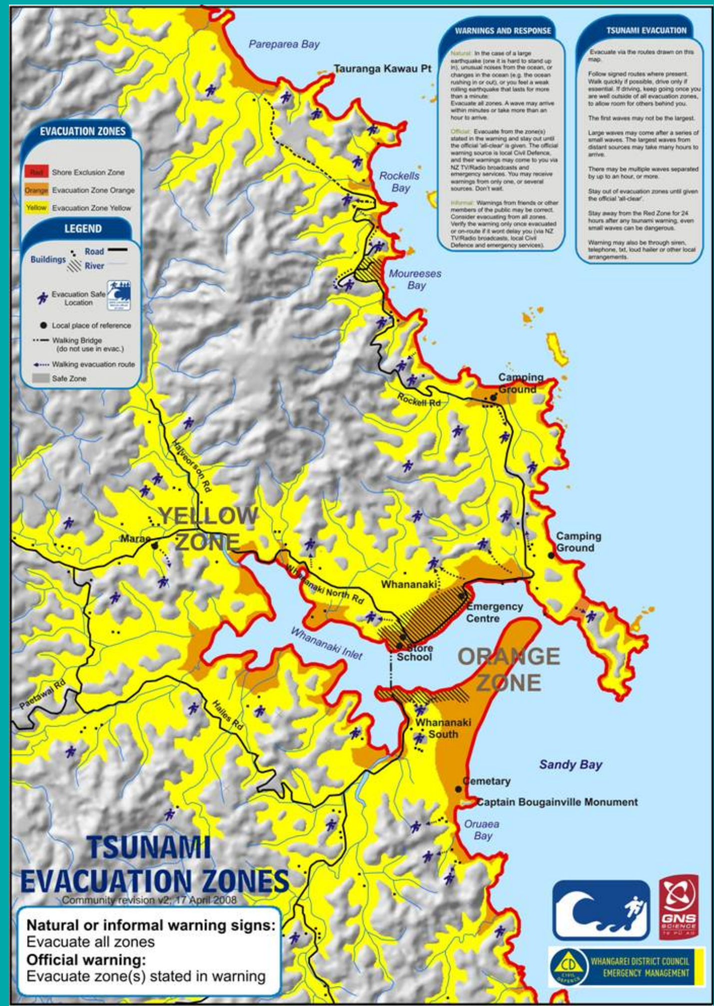

Tsunami Evacuation Zones
Director's Guideline for Civil Defence
Emergency Management Groups [DGL 08/08]
CD
CIVIL DEFENCE
Resilient New Zealand
Aotearoa Manahau


Technical Standard
National Tsunami Signage
CD
CIVIL DEFENCE





Mangawhai: A starting map ready for local details and evacuation routes

Whananaki: A complete map with local details, evacuation routes and signs planned

Risk Assessment and Risk Evaluation Criteria

Table 2: Land use importance categories. Adapted from Standards NZ (2002).

LUIC	Land use example
1	Land use for rural farm buildings, isolated structures
2a	Land use for residential dwellings
2b	Land use for subdivisions with more than *x* residential units, car park buildings, public assembly buildings, commercial (theatres, cinemas, office, retail), and industrial land use
3	Land use for medical facilities, educational facilities with capacity greater than 250, airport terminals, railway stations, public utilities (power generating facilities, water and waste water), any land use with hazardous materials
4	Land use for emergency medical or surgical facilities, buildings and facilities with special post-disaster functions, emergency services i.e. police, fire, ambulance, buildings containing hazardous materials with effects that could extend beyond property boundaries
5	Large dams, extreme hazardous facilities

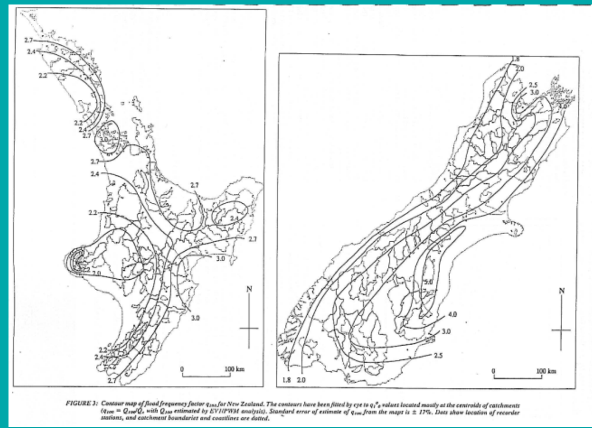
Further research is needed to provide guidance to Councils on how to include natural hazard risk into land use plans and how to determine what an acceptable level of risk is.

Develop social, economic, environmental, cultural, and health and safety criteria (LG, RM, CDEM Acts) for the levels at which natural hazard risk becomes acceptable (CDEM Act, s 3(b)), tolerable (AS/NZS ISO 31000:2009, clause 5.3.5, 6th bullet) and intolerable (SAA/SNZ HB 436:2004, ch 7).

Also provide guidance on how to include hazard risk into land use plans i.e. better tools to assist with the analysis of, and responses to, hazard risks.

National Flood Risk Maps

All Regional Councils reference for flood flow & frequency and at 21 years, the review is overdue. NIWA has been aiming for this revision with proposals to FRST & commenced work under other projects, such as Riskscape. But constrained and there is limited progress to date.



Support for the work done in 1989 to be revised and updated:

- McKerchar AI, Pearson CP. 1989. *Flood Frequency in New Zealand*. Publication No 20 of the Hydrology Centre. Christchurch: Department of Scientific and Industrial Research.

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