



QuakeCoRE  
NZ Centre for Earthquake Resilience

RESILIENCE  
TO NATURE'S  
CHALLENGES

Kia manawaroa  
– Ngā Ākina o  
Te Ao Tūroa

National  
**Science**  
Challenges

# The human dimensions that influence earthquake resilient housing

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QuakeCoRE Meeting, 4-5 September 2019

JOINT  
CENTRE FOR  
DISASTER  
RESEARCH



# Earthquake resilient housing

What does it look like from a community member's perspective?





# The importance of land-use planning



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

International Journal of Disaster Risk Reduction

journal homepage: [www.elsevier.com/locate/ijdr](http://www.elsevier.com/locate/ijdr)



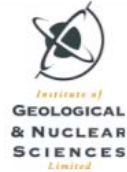
A discussion of resilience and sustainability: Land use planning recovery from the Canterbury earthquake sequence, New Zealand

W.S.A. Saunders\*, J.S. Becker

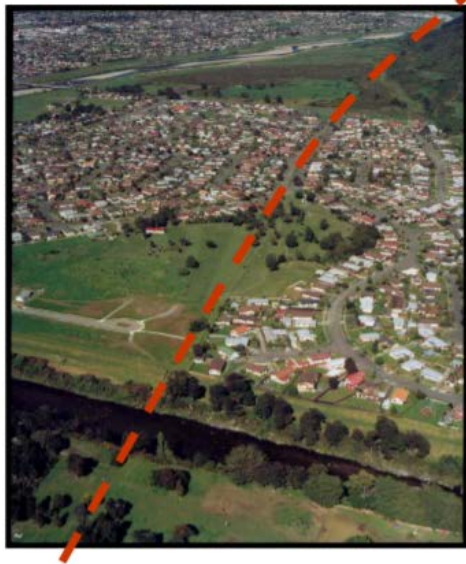
Joint Centre for Disaster Research, GNS Science, PO Box 30368, Lower Hutt, New Zealand



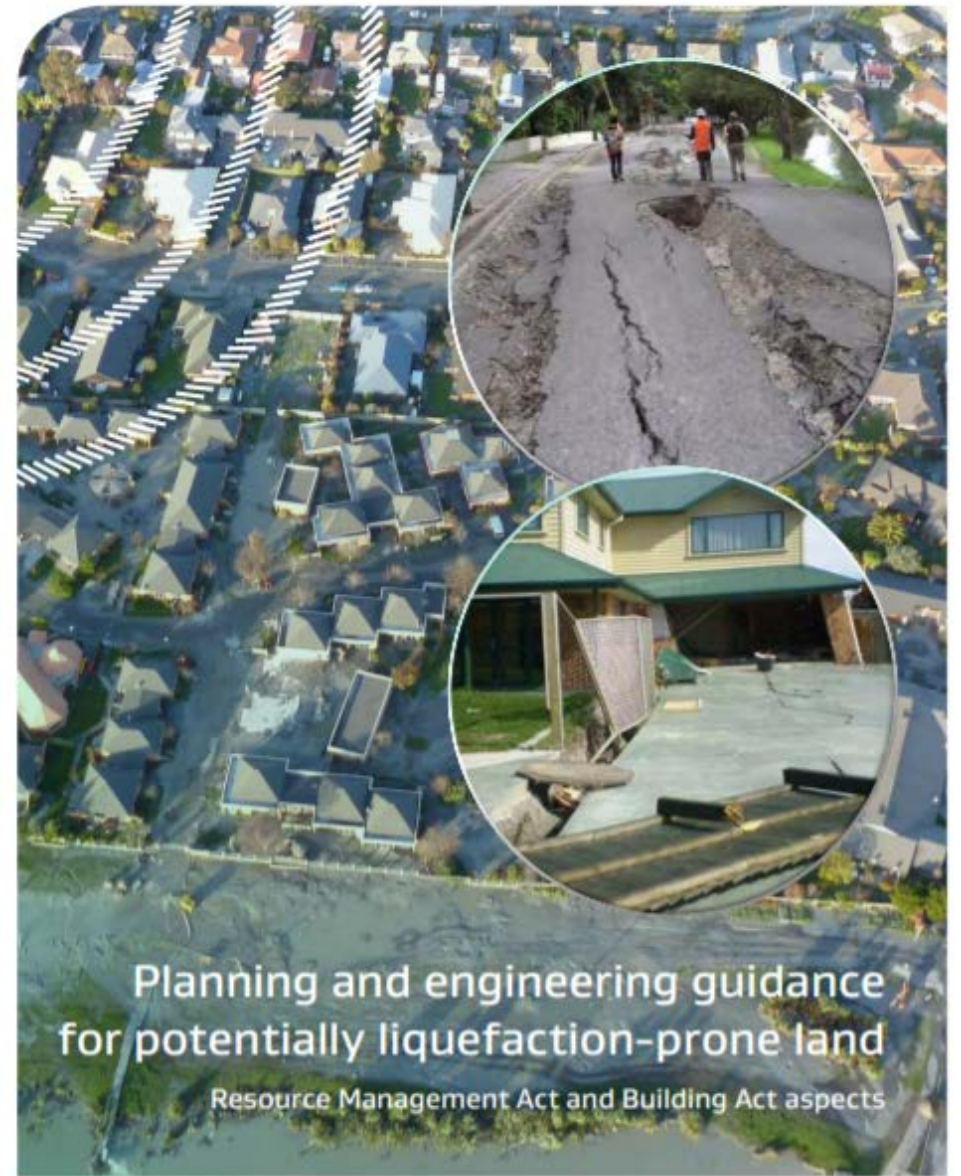
# Land-use planning guidance



## Planning for Development of Land on or Close to Active Faults



A guideline to assist resource management planners in New Zealand



MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT  
HĪKINA WHAKATUTUKI







# Totara Park, Upper Hutt



# Progress can be slow: Earthquake planning 2000-2016 (Sullivan-Taylor et al., in prep)

## **Key improvements :**

- An increase in the use of 'all hazards' objectives, policies, and rules;
- Greater recognition of earthquake hazard;
- A 19% increase in the use of earthquake specific rules;
- Reduced reliance on the Building Act to manage earthquake risk;
- A 42% increase in natural hazards on planning maps.

## **Negative aspects:**

- An increase thinking planning for earthquakes is not possible;
- A decrease in methods to incorporate new hazard information.

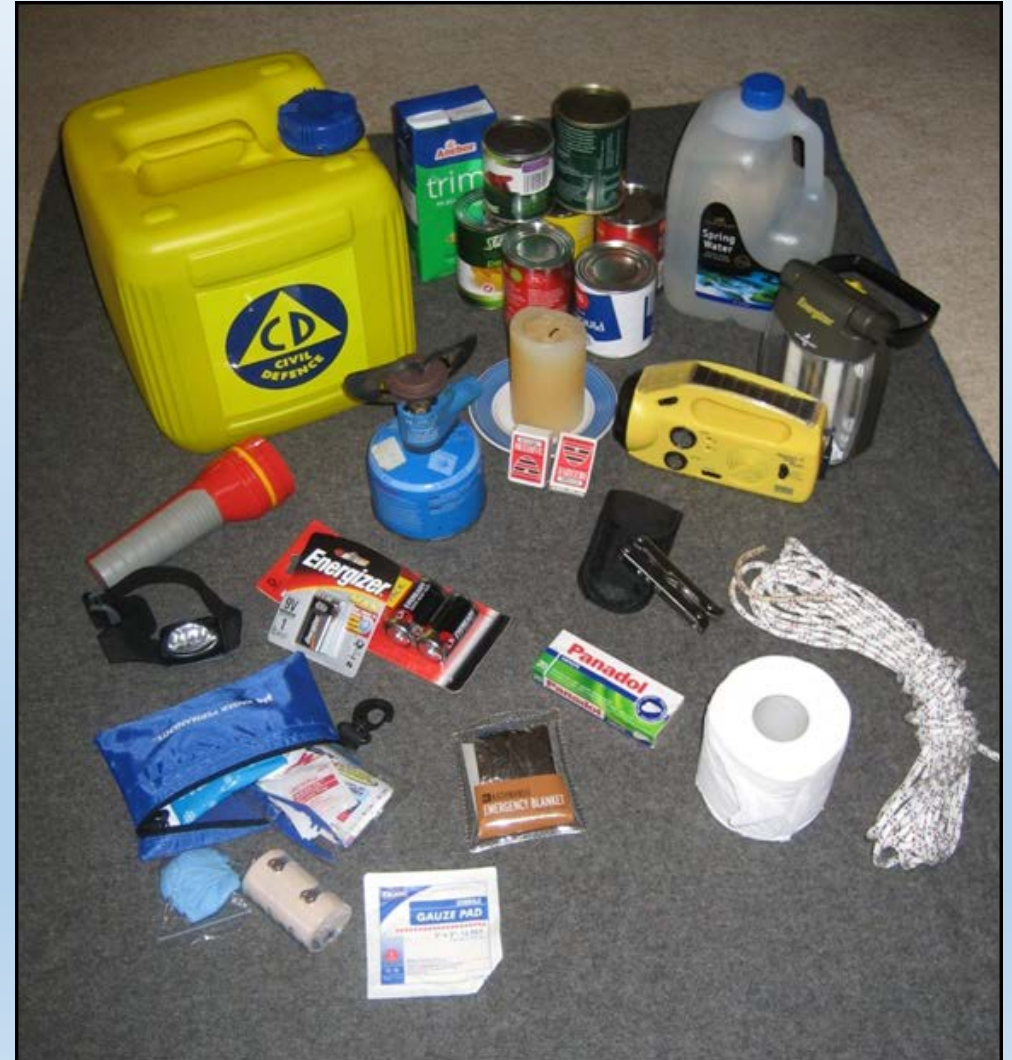


# When in a risky area already....



# Readiness: A continued challenge

- Preparing the community is difficult
  - 25-30 % of people “fully” prepared
  - Approximately 80% of people have some survival items
  - Perhaps only a third of people have ‘retrofitted’ in any way, but this is mostly to internal fittings
  - Challenges of home-owners versus renters





# Why don't people retrofit? (McClure et al. 2015)

- People don't think about it
- Perceive earthquakes to be low risk
- Lack of experience of earthquakes
- Don't think it will make a difference
- Lack of understanding of the benefits
- Lack of skills
- Not a priority
- Cost

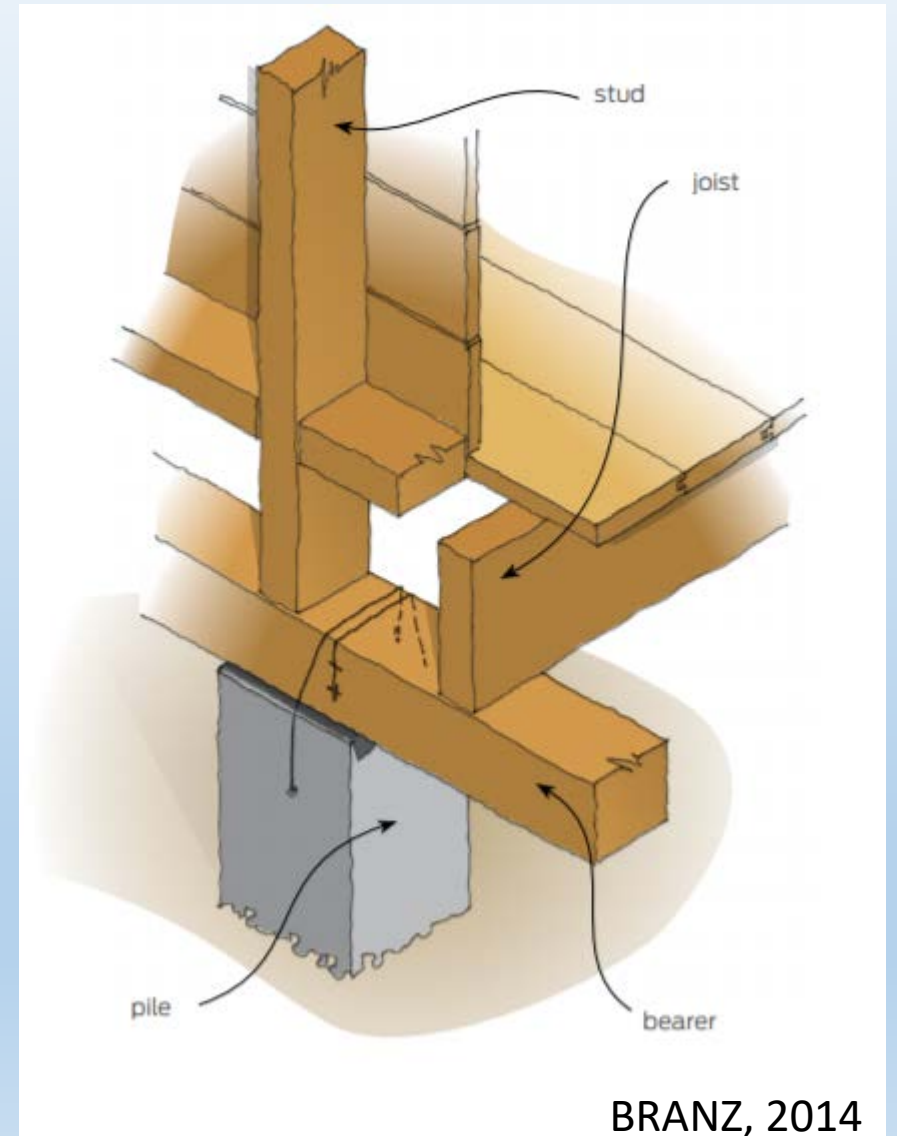


# How can we encourage retrofitting?



**FIX. FASTEN.  
DON'T FORGET.**

**EQC**  
EARTHQUAKE COMMISSION  
*Kōmihana Rūwhenua*



BRANZ, 2014



More than just physical mitigation...



# 2016 Kaikōura earthquake: Wellington apartment dwellers survey (Becker et al. 2018; Blake et al. in prep)





# People's concerns about safety were important

- 39% of people evacuated because of fear of being in their apartment
- 14% evacuated to be with other people
- Over half based their decisions about returning on feelings of safety
- We identified several key themes relating to safety and subsequent evacuation decisions including:
  - shaking severity
  - building damage
  - on-going aftershocks
  - official warnings
  - social facilitation.

# Kaikōura quotes

“Did not feel safe to stay in the building. There were cracks everywhere, and we weren't sure how severe the damage was.

“...the aftershocks were severely felt in the apartment with the movement of the building, and it was decided by the residents in our flat relocating to Kelburn would help us feel safer.”

“Felt unsafe alone”

“Too afraid to stay there alone”



"I thought it was going to collapse up there, for sure, it felt that violent ... I thought lots of people would have died and buildings and houses would have been completely levelled. So I was really surprised when I went outside – that everything was relatively fine."



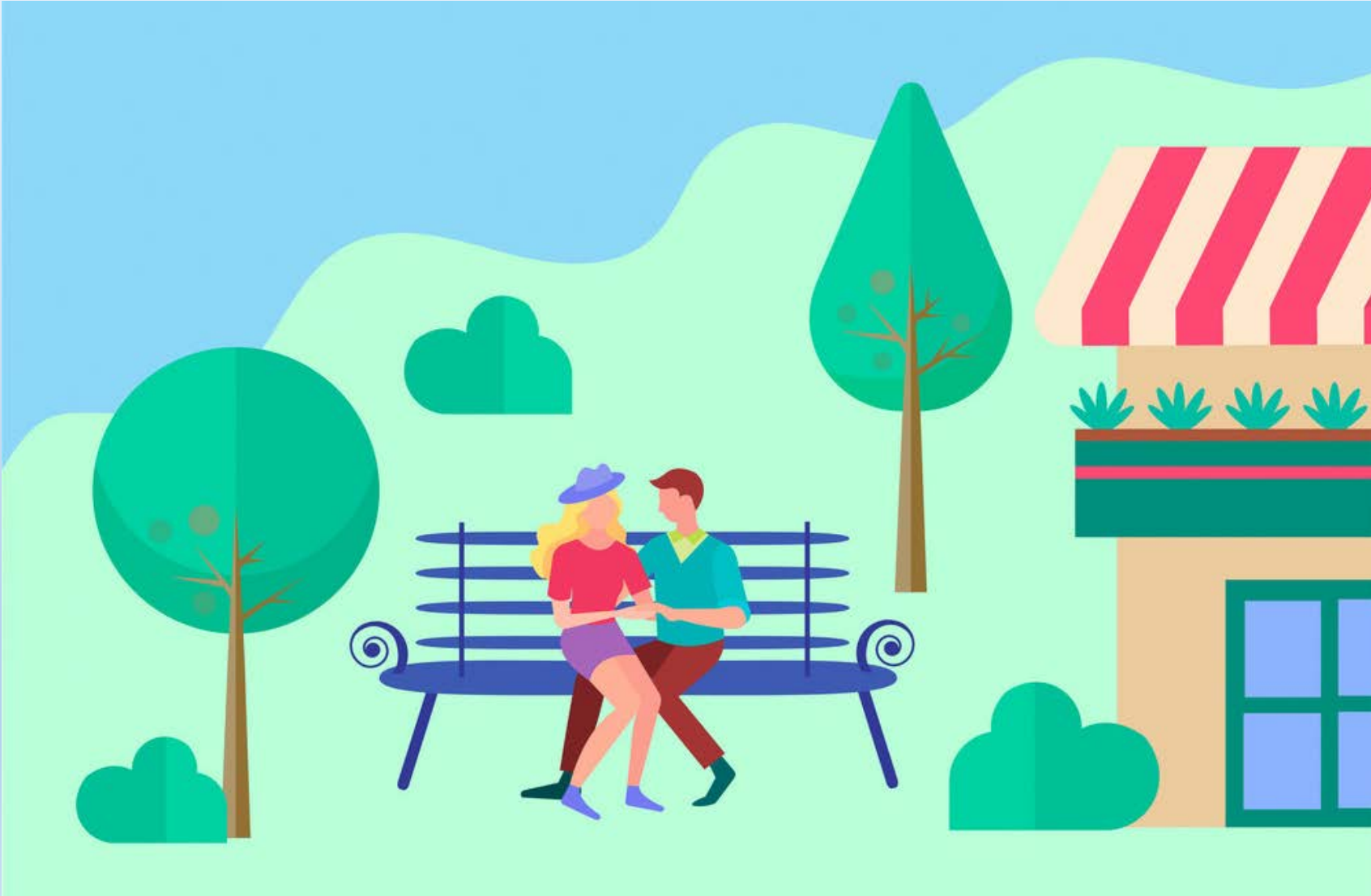
## Kaikōura quotes...

“We have moved apartments since the earthquake due to feeling unsafe”

“We ended up moving out of the apartment building we were in when the quake happened. Although structurally ok, the building shook more and made creaky noises in the wind that made me panic because it sounded like the earthquake. There were also a lot of cracks in the plaster that while only superficial, [it] was that constant reminder.”



# Creating a sense of safety



Many inputs are needed to create resilient housing

*A holistic approach should be taken*

