Te Tauira Matapae Pūmate Rū i Aotearoa
NSHM The New Zealand National Seismic Hazard Model
A GNS Science Led Research Programme

2022 National Seismic Hazard Model: West Coast region

The National Seismic Hazard Model (NSHM) combines the best available scientific knowledge to estimate future earthquake shaking in Aotearoa New Zealand.

The NSHM considers possible earthquakes that could affect a location and then estimates the severity of the related shaking that might occur.

Knowing the likely impact of future earthquakes on New Zealand's land, structures, and people is essential to help us be as safe and prepared as we can be.

On average, around 250 earthquakes are felt in Aotearoa New Zealand each year and thousands more are measured

Knowing how strong future earthquake shaking might be can help us to understand the potential risks.

Various tools including computer modeling, the latest knowledge of how earthquakes occur, and understanding our turbulent past can help us prepare, make good decisions, and increase our resilience to earthquakes.

Need to know

The West Coast lies upon the Alpine fault, which runs along the length of the region. There are also known active faults towards the north, such as the Lyell, Hohonu or Maimai faults.

The shaking is forecast to be greater close to the Southern Alps, due to the Alpine fault, and highest near Milford Sound.

Anywhere in New Zealand can experience earthquakes and regions can be affected by earthquakes from far away.

West Coast regional information

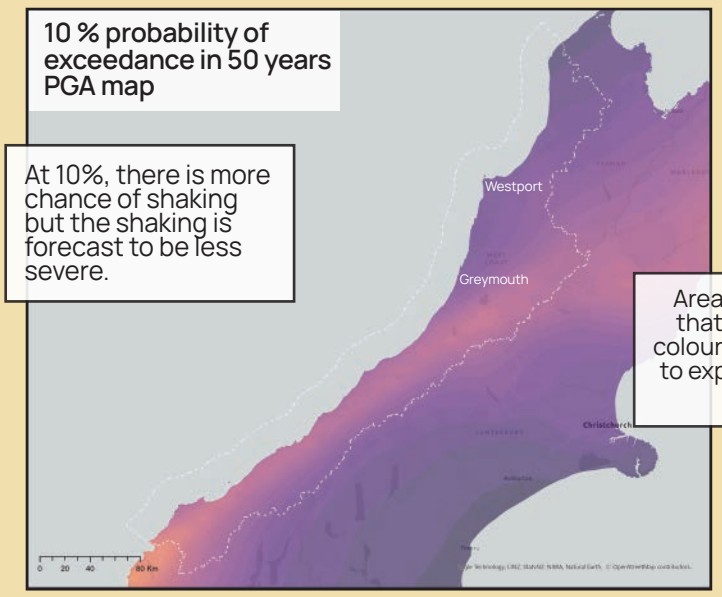
The NSHM calculates multiple levels of potential shaking forecast to occur across the region.

In the West Coast, earthquake shaking is forecast to be more severe closest to the Southern Alps, due to the Alpine fault, and highest near Milford Sound.

These two example maps display the level of ground shaking (PGA) that has either a **10% chance** or a **2% chance** of being exceeded within the next 50 years.

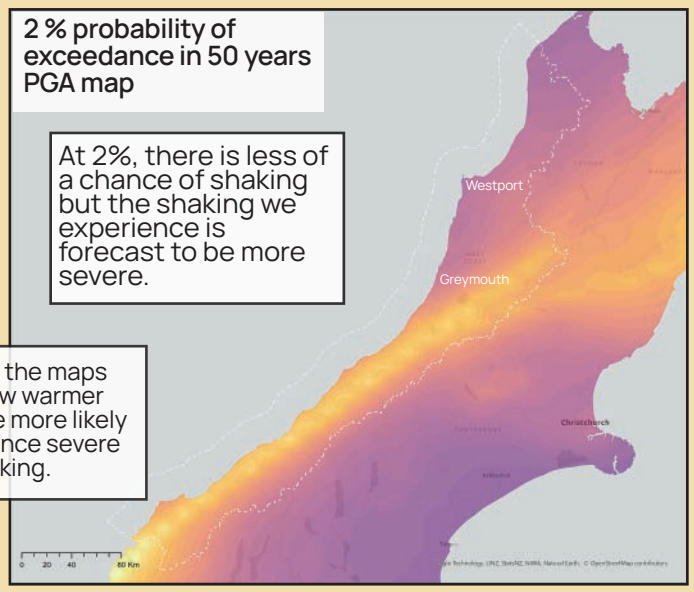
10 % probability of exceedance in 50 years PGA map

At 10%, there is more chance of shaking but the shaking is forecast to be less severe.



2 % probability of exceedance in 50 years PGA map

At 2%, there is less of a chance of shaking but the shaking we experience is forecast to be more severe.



Areas on the maps that show warmer colours are more likely to experience severe shaking.

Peak Ground Acceleration (PGA)

0 | 0.5 [g] | 1.0 [g] | 1.5 [g] | 2 [g] | 2.3 [g]

Short jolt — Falling objects — Hard to stand — Land features change — Ground cracking, people thrown

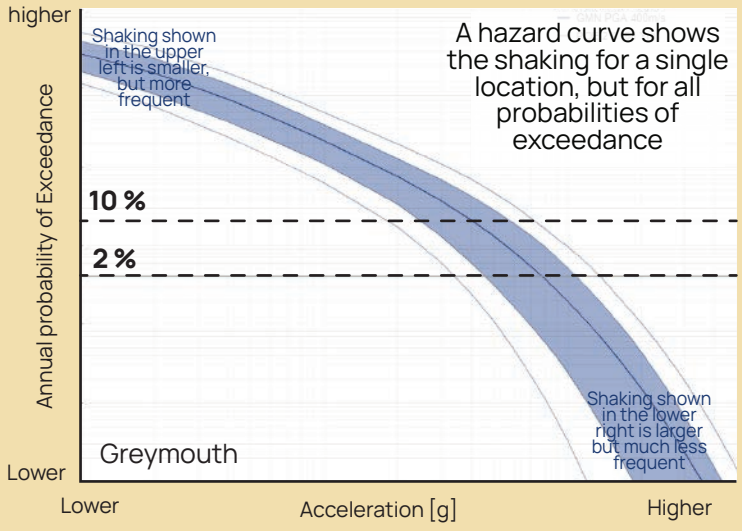
All of the information on the website must be considered together – no one map on its own can illustrate the hazard.

The approximate range of increased change in hazard compared to past estimates falls within these ranges:

Westport ‹1-2+

Greymouth ‹1-2+

Hazard curves are one way of showing the results for one location. Below is an example for Greymouth.



For detailed results: **www.gns.cri.nz/nshm**

West Coast: Notable earthquakes

Magnitude 7.5 - 1929
Magnitude 7.1 - 1968
Magnitude 6.5 - 1846

Source: Rollins et al (2022)

Don't just think about your local or known faults.

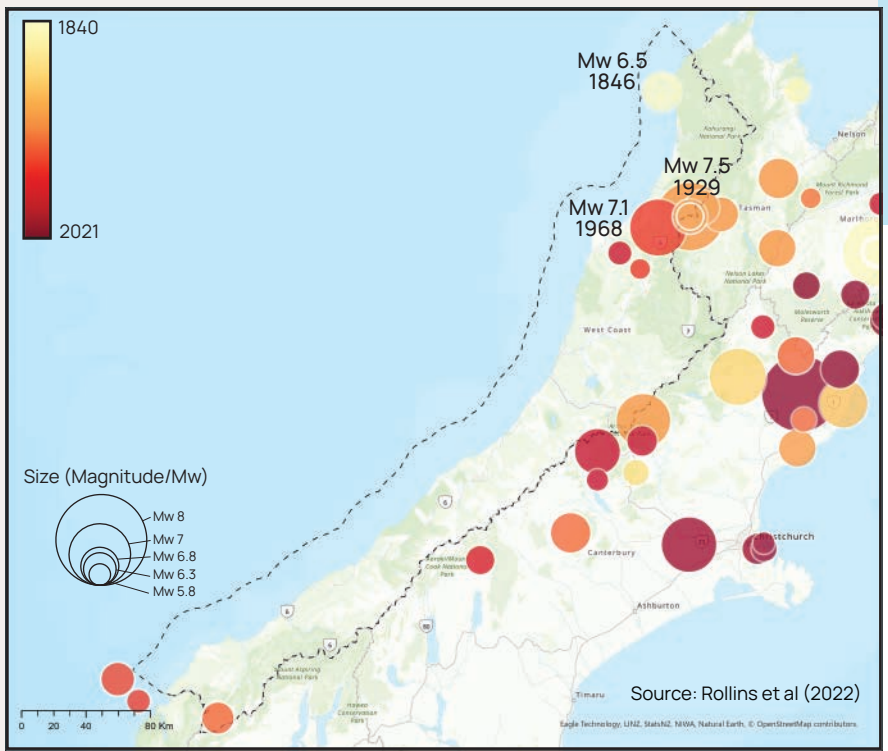
Damaging shaking can occur from earthquakes outside of the region.

For detailed results for your region, go to:

www.gns.cri.nz/nshm

Significant past earthquakes which have affected the West Coast region

Earthquakes shown: Mw > = 5.8 and since 1840 in upper 250 km



It is normal to feel anxious or overwhelmed when thinking about future earthquakes and looking at shaking maps.

Our scientific knowledge is constantly improving as we gain more understanding of earthquakes and their impacts.

Developing and sharing this knowledge is part of our safety tool-kit, as it helps New Zealanders to be prepared.

Be prepared

For more information visit West Coast CDEM group's website: westcoastemergency.govt.nz

National Emergency Management Agency: civildefence.govt.nz

Toka Tū Ake EQC: eqc.govt.nz

GNS SCIENCE TE PŪ AO
Toka Tū Ake EQC
National Emergency Management Agency Te Rākau Whakamarumaru
MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT HĪKINA WHAKATUTUKI

National Seismic Hazard Model

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The NSHM provides a scientific estimate of the likelihood and strength of potential earthquake shaking which might occur in different parts of the country.

It is detailed science, produced over several years, and the end product is a model that helps decision makers manage risks to safety and the economy from earthquakes.

What happens next?
NSHM science informs future policy and practice.

www.gns.cri.nz/nshm

On the NSHM website you can see multiple maps, hazard curves and reports. All of this information must be considered together to understand hazard and its likely impacts.

There is not one map which tells us what the hazard from earthquakes is.

Earthquakes Ngā Rū Whenua

There are **around 1000 faults** that we know of in Aotearoa New Zealand, and these are found both on and offshore.

Earthquakes mostly occur on faults. A fault is a rupture in the Earth's crust that enables the land to move independently on either side. When pressure builds up in a fault, it can cause an earthquake and ground shaking.

Faults can be as short as a few metres or up to 1000 kms long and they can cause a variety of different land movements. Many faults can rupture together affecting multiple regions.

That's 1000 faults we know about – there will be others that we haven't discovered yet. The potential for unknown faults is accounted for in the model.

Earthquakes generate waves in the earth which cause the ground beneath our feet to shake. These waves can be short and fast (like shaking a rattle) or long and slow (like fly fishing), depending on many factors.

Peak ground acceleration (PGA) is a measure of earthquake shaking. It measures the maximum acceleration of the ground that occurred during shaking at a particular location.

Acceleration describes how the ground moves from slower to faster shaking speeds, much like accelerating in your car.

How can earthquakes affect structures?

If an earthquake causes strong ground shaking our built infrastructure (like buildings and dams) and lifelines (like our power and water networks) can be affected.

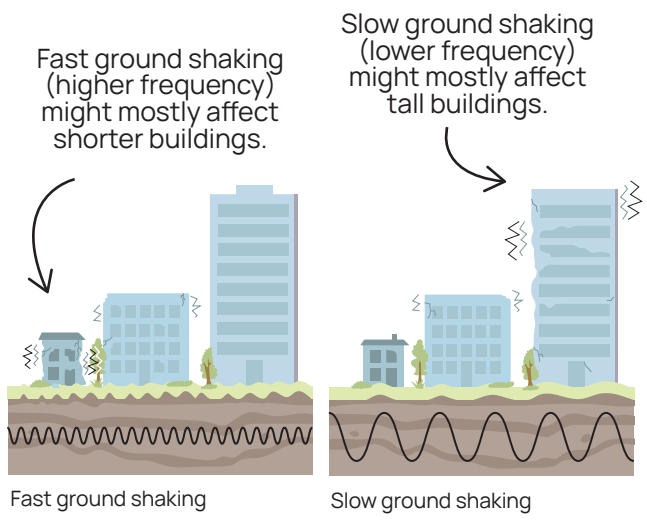
Ground shaking will vary due to:

- the ground conditions
- the land deep beneath our feet
- earthquake location and magnitude
- the direction the earthquake fault ruptures

These all affect the way the seismic waves travel through the ground and how the ground will shake. So, for the same earthquake affecting one region, an area of reclaimed land will shake very differently to an area of more solid rock.

It is common to see a range of hazard results, even within one region.

Earthquake waves can be: short and fast OR long and slow



This is why we have seen some buildings affected more than others in previous earthquakes. Buildings move as a result of the unique combination of earthquake source, ground shaking, soil type, and building design.

Be prepared

1

Keep your whānau safe:

Practice Drop, Cover and Hold at least twice a year.

2

There's a lot we can do to make our homes safer for earthquakes.

The Toka Tū Ake EQC website has key steps that will help you prepare your home and protect your whānau.

3

Long or Strong? Get Gone.

If you live near the coast, as soon as earthquake shaking stops, move immediately to high ground or as far inland as possible, in case of tsunami.

If you would like more support or advice, have feelings of heightened or prolonged anxiety, stress, fear, hopelessness, or anger, or if you just need to talk with someone: please text or free phone 1737 to speak to a trained counsellor in the National Telehealth Service.

More information

gns.cri.nz/nshm
civildefence.govt.nz
gns.cri.nz
eqc.govt.nz
mbie.govt.nz