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.

It is normal to feel anxious or overwhelmed when thinking about future earthquakes and looking at shaking maps. All of the information on the website must be considered together – no one map on its own can illustrate the hazard.

**Waikato regional information**

The NSHM calculates multiple levels of potential shaking forecast to occur across the region. In Waikato, earthquake shaking is forecast to be more severe in the South East and between Taupō and Rotorua.

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.

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

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

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

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

**Significant past earthquakes which have affected Waikato**

Magnitude 6.2 - 1891
Magnitude 6.2 - 1921
Magnitude 6.3 - 2012

Source: Rollins et al (2022)

**Need to know**

The Waikato region lies upon several active faults, including the Kerepehi, the Rangipo, and the Wairoa North faults.

The shaking forecast is greater in the south east of the region, and between Taupō and Rotorua.

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

**Be prepared**

For more information visit Waikato Civil Defence Emergency Management’s website: waikatoregioncdem.govt.nz
National Emergency Management Agency: civildefence.govt.nz
Toka Tū Ake EQC: eqc.govt.nz

Don’t just think about your local or known faults. Damaging shaking can occur from earthquakes outside of the region.
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.

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.

**National Seismic Hazard Model**

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.

**Science → Decision making → Policy and practice**

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.

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.

**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.

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.

**Earthquakes Ngā Rū Whenua**

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.

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.

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.

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

- Fast ground shaking (higher frequency) might mostly affect shorter buildings.
- Slow ground shaking (lower frequency) might mostly affect tall buildings.

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.

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.

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.