

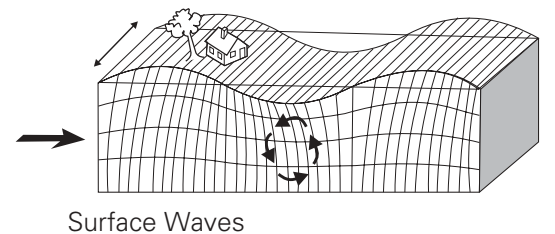
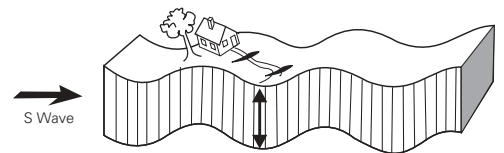
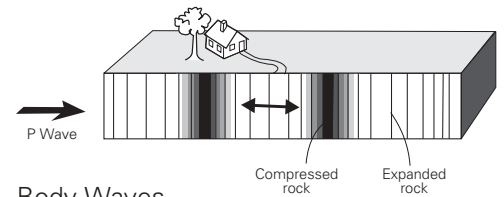
# Hazardfacts

## Auckland's earthquake hazards

This fact sheet describes the main effects and hazards likely from earthquakes in the Auckland region.

### Ground Shaking

This is the main hazard associated with earthquakes. The energy released in an earthquake travels through the ground in waves, like the ripples in a pond when a stone is tossed in. Two types of waves are generated: body waves and surface waves. Body waves travel through the earth whereas surface waves travel along or near the earth's surface. Body waves consist of Primary or P-waves and secondary or S-waves. P waves arrive first and cause the rock to vibrate back and forth in the direction of the wave. The slower S waves cause the rock to oscillate up and down as the wave moves forward. Surface waves move the land sideways (Love waves) and in a circular path (Rayleigh waves) like rolling ocean surf.



During an earthquake a combination of these waves toss people and buildings about like ships on a stormy sea. Beams and foundations, windows and internal walls may be damaged in houses and larger buildings like office towers. Pipes may burst and doors stick. People and furniture can be flung about as well.

The delay between the P waves and the others depends on the distance from the earthquake. There may be a few seconds of shaking, or up to several minutes, depending on the magnitude of the earthquake and ground conditions. Sometimes aftershocks can occur, causing more damage.

Buildings, roads and services on soft ground suffer more damage than those on firm rock. In areas such as Orewa, Helensville and near Takanini where sands, silts and estuarine muds make up the soil, ground shaking will be worse. Ground shaking will also be greater on reclaimed land such as parts of downtown Auckland.

Damage from ground shaking can be reduced by strengthening older buildings, designing new buildings to withstand certain size earthquakes and

by securing heavy furniture and appliances to prevent them moving.

## Fault Rupture

Faults are cracks in the large blocks that make up the earth's crust. In a large shallow earthquake the fault may rupture the ground surface causing it to move upwards, downwards or sideways. This surface rupturing can cause severe damage along the fault path. Auckland has no known active surface faults, although the Hunua Ranges in the southeast shows where the ground has been pushed upwards as the result of fault ruptures several tens of thousands to millions of years ago.

## Liquefaction

Liquefaction is the term used when soil is shaken violently, becomes like liquid, loses its strength and consequently loses its ability to support structures. Sand or silty soil are prone to liquefaction. Layers of sand or silt below rock can cause sand and water to spurt at the ground surface. Buildings can topple, tilt or partially collapse when liquefaction occurs beneath their foundations. Usually areas prone to liquefaction are also at risk from excessive ground shaking.

Built up areas at risk in Auckland include the waterfront, parts of downtown central Auckland and the international airport. For liquefaction to occur, the earthquake must be quite a large one. In Auckland, earthquake shaking capable of causing liquefaction damage has a return period of more than 500 years, or a 10% chance of occurring in the next 50 years.

## Other hazards

Other hazards from earthquakes are rockfalls and landslides. The extent and severity of these hazards will depend on how steep the slopes are and how wet the soil or rock is at the time of the earthquake.

Auckland is also at risk from tsunamis - ocean waves generated by earthquakes or landslides on the seafloor. See Hazardfacts H09 for more information on tsunamis.

## Auckland's main earthquake hazard is ground shaking.

### Further reading

Hazardfacts in the Earthquake series:

Measuring Earthquakes	Hazardfacts H06
Earthquakes in Auckland	Hazardfacts H07
Earthquake Hazards	Hazardfacts H08
Auckland's Tsunami Hazard	Hazardfacts H09

Hull et al, April 1995, Earthquake Hazards in the Auckland Region, Auckland Regional Council Technical Publication No. 57, Auckland Regional Council.

Eiby, G A, 1989, Earthquakes, Heinemann Reed, Auckland.

For information on what to do in an earthquake, contact a civil defence emergency management advisor at your local council.



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