

Auckland's Tsunami hazard

Tsunami is the name for waves formed by movement of the sea floor. This fact sheet describes what they are and the risk to Auckland.

What is a tsunami?

Tsunami is a Japanese word meaning 'harbour wave', and is commonly used to describe the series of waves formed when the sea floor is disturbed usually due to an earthquake. Sudden uplift of the sea floor or large underwater landslides cause waves to move away from the source like ripples in a pond when a stone is tossed in. Tsunami can also be caused by volcanic eruptions and meteorite impacts. Tsunami can travel as fast as 700 km/hr across the deeper parts of the ocean and can travel for thousands of kilometres. They are barely noticed by sailors at sea as the waves are far apart. As the tsunami enters shallower water, the waves slow down and pile up into larger waves. They can be up to tens of metres high in shallow water, however most are much smaller than this.

Have we had any tsunami in Auckland?

Of the 32 recorded tsunami to hit New Zealand between 1840 and 1995, 12 have been detected within Auckland waters. Although information about many of these is sketchy, all were small (less than 2 metres) and if any damage occurred it was very minor - in fact most would not even have been noticed. However 150 years is not a very long time and more extreme events may have happened in the past.

How likely is it that a damaging tsunami will hit Auckland?

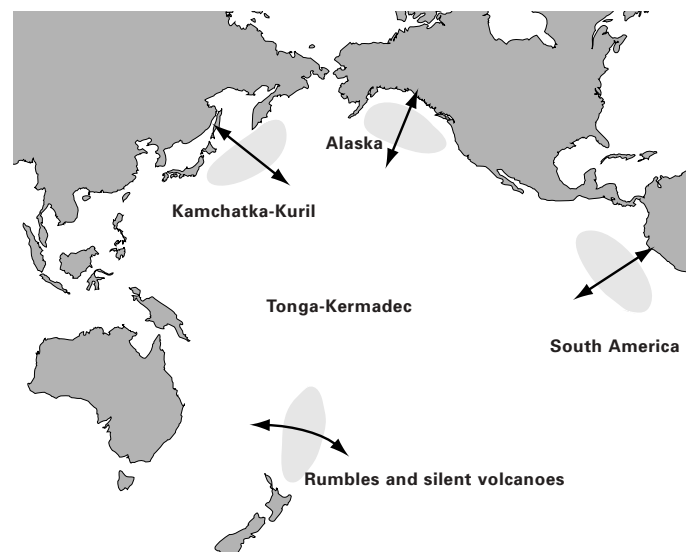
There is about a 50% chance within the next 50 years that Auckland will be hit by a tsunami originating from a large earthquake off the west coast of South America (see diagram). Wave heights of up to 4 metres could occur in the outer Hauraki Gulf. This represents the most likely damaging tsunami for Auckland.

Other distant tsunami sources are earthquakes in other parts of the Pacific ocean shown in the diagram, and although more frequent, the waves are likely to be much smaller.

Earthquakes closer to home could also cause tsunami. An earthquake in the outer Hauraki Gulf or Firth of Thames could generate a tsunami but the probability of this occurring in the next 50 years is less than 1%.

The Pacific Tsunami Warning Centre in Honolulu issues warnings to countries in the Pacific when a tsunami is on the way.

The map (top) shows how long in hours a tsunami from elsewhere takes to reach New Zealand shores.



Volcanic eruptions from the Auckland Volcanic Field could also produce tsunami though wave heights are unlikely to be much larger than 1m.

Earthquakes on land can also cause tsunami in protected harbours, lakes or reservoirs. Called seiches, these waves move backwards and forwards, sloshing water from side to side and can cause flooding along the shore for many hours after the earthquake.

What might happen?

The effects of tsunami can vary along the same coastline depending on the shape of the coast and the water depth, making it difficult to determine what might happen. Flooding of low lying areas is likely to occur. Within estuaries and the lower reaches of rivers and streams, currents can cause the waves to steepen and produce a lot of turbulence. Floating debris caught up in the waves can cause damage and injury. Tsunami may also spread liquid contaminants such as fuel and oil from damaged boats and fuel storage areas. The strong currents are likely to cause erosion of the seabed, damaging structures such as marinas and moorings.

Will we get any warning?

If the tsunami originates from an earthquake in the Pacific, we could get up to 12 hours warning depending on its location (see diagram above).

What to do if a tsunami is on the way

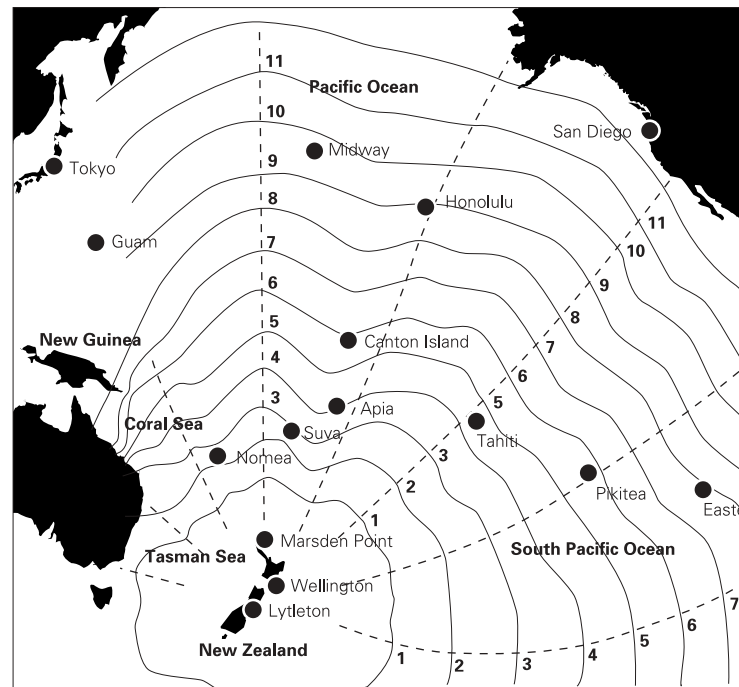
Do not go down to the shore to watch the wave arrive! Head for safe ground - as far inland as you can get or go to high ground - and listen to a radio for Civil Defence Emergency Management advice. If you are on the beach and feel a large earthquake, leave the area immediately and head for safe ground.

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

de Lange, WP & Hull AG, November 1994, Tsunami Hazard for the Auckland Region, Auckland Regional Council Technical Publication No. 50, Auckland Regional Council.

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



The Pacific Tsunami Warning Centre in Honolulu issues warnings to countries in the Pacific when a tsunami is on the way. This map shows how long in hours a tsunami from elsewhere takes to reach New Zealand shores.



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