

Questions and answers

What did the research do?

The research modelled 12 tsunami scenarios from different sources, and assessed the level of risk of each one for Pāpāmoa, Wairakei, and Te Tumu.

The purpose was to provide the most up-to-date science on tsunami risk on areas that may be developed in future.

What do the risk categories mean?

The risk categories in the SmartGrowth report are a technical assessment of risk. They provide information for local authorities and communities to use when deciding on what level of risk they are prepared to accept, and what mitigation measures are needed.

The technical risk categories were calculated according to likelihood of **and** projected number of resulting deaths from a tsunami. They were based on the likelihood of a single tsunami in one year, and assume no forewarning and no evacuation.

Acceptable risk means the tsunami would result in no more than one death per million people. No action is needed to reduce risk.

Tolerable risk means the tsunami would result in more than death per million people, but less than one death per 10,000 people. Tolerable risk should be reduced where practical.

Intolerable risk means the tsunami would result in one or more deaths per ten thousand people. Intolerable risk must be avoided in areas of new development.

So where is the risk?

Of the 12 scenarios modelled:

- In Pāpāmoa, seven scenarios are acceptable risk, one is tolerable risk, and four are intolerable risk.
- In Wairakei, nine scenarios are acceptable risk, and three are intolerable risk.
- In Te Tumu, five scenarios are acceptable risk, three are tolerable risk, and four are intolerable risk.

The 'intolerable risk' category results from four Kermadec Trench tsunami sources. The Kermadec Trench runs from off the tip of East Cape up to near Samoa - a distance of approximately 1000km. While the other tsunami sources (including from local volcanoes like White Island) may have an impact on our beaches and harbours, they are not considered a land threat.

A tsunami from the Kermadec Trench would take less than one hour travel time to the nearest coastline.

Tsunami source	Pāpāmoa	Wairakei	Te Tumu
Distant source (near South America)	Acceptable	Acceptable	Acceptable
Central Kermadec	Acceptable	Acceptable	Acceptable

Astrolabe Fault	Acceptable	Acceptable	Acceptable
Volkner Fault	Acceptable	Acceptable	Acceptable
White Island Composite Fault	Acceptable	Acceptable	Acceptable
Northern Kermadec	Acceptable	Acceptable	Tolerable
Southern Kermadec	Acceptable	Acceptable	Tolerable
Variation Central Kermadec	Tolerable	Acceptable	Tolerable
Variation Southern Kermadec	Intolerable	Intolerable	Intolerable
Whole Kermadec	Intolerable	Acceptable	Intolerable
Variation whole Kermadec	Intolerable	Intolerable	Intolerable
Kermadec-Hikurangi	Intolerable	Intolerable	Intolerable

What does ‘intolerable risk’ mean for people living in Pāpāmoa?

This is a technical term that adds to our knowledge of tsunami risk in the Bay. Landowners, the development community and Councils can include this information in their discussions on what measures, if any, should apply to properties along the coastline to reduce risk.

What about ‘tolerable risk’?

Again, this is technical information for local authorities and communities to take into account. Tolerable risk should be reduced to whatever point is practicable – this is a conversation for councils and communities to have together.

Is it true that Councils want to include tsunami risk information on future PIMs and LIMs?

One of the report’s recommendations was that technical work be done on the possibility of this. The recommendations haven’t yet been considered; no decisions have been made and we will keep communities informed.

What does ‘intolerable risk’ mean for the future development of Wairakei and Te Tumu and for property owners and property developers?

SmartGrowth needs to do more work on assessing where development will be appropriate, and what mitigation measures will be needed to reach acceptable risk.

The answers will become clearer over time. Some recommendations for mitigation are included in the report, and suggest possible outcomes such as: safe zones, which could be locations or structures; building design changes; and new development guidelines.

Why is Pāpāmoa included in the study area if the research is focused on undeveloped areas of future growth – Wairakei and Te Tumu?

Wairakei lies directly behind eastern Pāpāmoa, so Pāpāmoa is in the geographical study area for a tsunami.

What is a “significant” tsunami?

A tsunami big enough to cross our foredunes and flood some of the land behind the foredunes. This is also called a land threat tsunami.

How far inland will a significant tsunami flood?

The distance varies according to how high the tsunami surge is, how fast it is travelling, and the lie of the land that it floods. The SmartGrowth report focuses on the effect of a worst-case scenario, using previous modelling to develop inundation maps showing how a tsunami may flood over the land. These can be seen at: <http://www.bopcivildefence.govt.nz/document-library/maps/>

What causes a significant (land threat) tsunami?

The most common cause of land threat tsunami are very big earthquakes. In the Bay of Plenty, a land threat tsunami could result from an earthquake greater than 8.5 on the Richter scale. So this is a very large earthquake indeed.

How often is a land threat tsunami likely to happen?

Research in this area is ongoing. In general, the bigger a tsunami the less likely it is to occur. The current best information indicates that a significant tsunami can be expected to take place every 300 to 1000 years.

The best thing that everyone can do is consider that a tsunami may occur at any time and prepare for the eventuality. A resource to help you prepare can be viewed at: http://econtent.tauranga.govt.nz/data/a-z/files/tsunami_survive_summary.pdf

How long will a land threat tsunami take to arrive?

A land threat tsunami originating in the lower Kermadec Trench could arrive at our coastline as soon as 50 minutes after a very large earthquake occurs.

How would we know if a tsunami has been generated?

For any 'local source' tsunami (including from the Kermadec Trench), natural warning signs will be your most important indicators.

These include:

- Strong earthquake shaking (i.e. it is hard to stand up)
- Weak, rolling earthquake shaking of unusually long duration (i.e. a minute or more)
- Out of the ordinary sea behaviour, such as unusual and sudden sea level fall or rise
- The sea making loud and unusual noises, especially roaring like a jet engine

If you experience any of the above, go immediately to high ground or, in a flat area, go inland as far as possible. Once away from the water, listen to a radio station for information from local civil defence about further action you should take.

What is a vertical evacuation facility?

An accessible point that's high enough for people to gather for safety in a tsunami. A vertical evacuation facility could be a tower block; it could also be a raised and planted mound. A vertical evacuation facility doesn't have to look out of place or overbearing.

This research does not include the tsunami risk to the other coastal areas of the Western Bay of Plenty. Why?

The areas of Wairakei and Te Tumu are specific areas marked by SmartGrowth for future urban settlement and are as yet largely undeveloped. It is likely that other SmartGrowth areas will be evaluated as part of future research. The report recommends that similar assessment should be undertaken for other coastal areas.

What does the information mean for me if I live, work or visit coastal areas outside the Pāpāmoa study area?

The research reinforces what we already know – that a tsunami may occur at any time. The best thing that everyone can do is prepare for the eventuality. A resource to help you prepare can be viewed at:

http://econtent.tauranga.govt.nz/data/a-z/files/tsunami_survive_summary.pdf

Why has the work been done now?

SmartGrowth is currently updating its Settlement Strategy, and Wairakei and Te Tumu have been tagged as growth areas for future urban settlement. SmartGrowth required the latest research on tsunami hazard and possible mitigation measures to feed into this update.

The research is important from a land use planning perspective as well as a from response perspective. The legislative environment has changed dramatically since SmartGrowth was first initiated in 2004 as has the community awareness of the implications of major natural disasters on land-use planning (tsunami in Sumatra 2004 and Japan 2011 and Christchurch earthquakes), so it is part of SmartGrowth's duty of care to ensure that future decisions on land use and urban settlement are made within this new legislative landscape.

How does this research differ to that already done on the tsunami hazard to the Bay of Plenty coastline?

This research is separate from the work Tauranga City Council (TCC) recently undertook as part of the preparation of a tsunami evacuation plan called Tsunami Survive. Tauranga City Council is also obtaining better information to provide the community with more accurate information on safe places to go in the event of a tsunami.

The SmartGrowth discussion paper focuses on the risks of tsunami to the intended land use indicated in the SmartGrowth Settlement Pattern, namely undeveloped urban growth areas and developed urban growth areas where intensification would increase the risk posed by a tsunami.

What knowledge has been gained from this research?

There has always been the threat of tsunami to the Bay of Plenty coastline, so in that respect this research says nothing new. However it does lift the level of understanding in relation to future planning for areas as yet uninhabited along our coastline and it improves public awareness that we are living in a changing environment in terms of planning for natural hazards and how to respond to them.

Who carried out the study and why did they do it?

As part of the SmartGrowth Strategy Update, the Bay of Plenty Regional Council commissioned the Institute of Geological and Nuclear Sciences (GNS) to examine the tsunami risk to these three coastal growth areas. SmartGrowth's Implementation Committee required better information on which to base planning decisions for future urban development in the largely undeveloped growth areas of Wairakei and Te Tumu. GNS completed two reports; the first was an assessment of the size and scale of the tsunami hazard to the study area and the second – specific to Te Tumu – considered how the risk could be mitigated to an acceptable level.

Resources:

Inundation maps

<http://www.bopcivildefence.govt.nz/document-library/maps/>

Tsunami Survive

http://econtent.tauranga.govt.nz/data/a-z/files/tsunami_survive_summary.pdf

Evacuation information for Tauranga and the Western Bay of Plenty

<http://www.bopcivildefence.govt.nz/document-library/tauranga-city-tsunami-evacuation-information/>

<http://www.bopcivildefence.govt.nz/document-library/western-bay-evacuation-route-maps/>