



Tsunami Advisory and Warning Plan

Supporting Plan [SP 01/09]

Revised October 2014



Resilient New Zealand
Aotearoa Manahau

New Zealand Government

Tsunami Advisory and Warning

Supporting Plan [SP 01/09]

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Preface

This plan describes the national arrangements to receive and assess tsunami information and to disseminate national tsunami advisories and/or warnings.

New Zealand is a member of the Pacific Tsunami Warning System (an international system under the auspices of the Intergovernmental Oceanographic Commission of UNESCO) designed to provide timely and effective information about tsunamis or potential tsunamis generated in the Pacific Basin. In New Zealand the system is complemented by GNS Science geological hazards and sea level monitoring. The Ministry of Civil Defence & Emergency Management (MCDEM) is the agency responsible for initiating national tsunami advisories and warnings to the communities of New Zealand.

This plan describes the procedures to receive, assess and disseminate tsunami notifications at the national level. However, national tsunami advisories or warnings may not reach all local communities at all times. Local authorities must therefore maintain public alert systems and procedures to communicate tsunami advisories or warnings received from the national level further down stream to local communities. The arrangements for local level public alerting should be contained in CDEM Group Plans.

For any tsunami warning to be effective, the population in general must be aware of the nature of tsunamis, the damage they can cause in their areas and ways to mitigate (prevent or avoid) the destructive aspects of tsunamis. The responsibility for public awareness rests at both national and local levels.

Additional information about tsunamis may be found in the National Hazardscape Report on the MCDEM website, www.civildefence.govt.nz, in the Publications section.

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Glossary

Key terms	The following terms and abbreviations are frequently used in relation to tsunami. Some of these terms are used in this plan and may occur in tsunami notifications and discussion.
Amplitude:	The absolute value of the difference between a particular crest or trough of a wave and the undisturbed sea level at the time. In the context of threat levels as discussed on pages 11-13, amplitude relates to the wave at the shoreline.
Arrival time:	The time of the arrival of the first tsunami wave. See 'Estimated time of arrival (ETA)' below.
Bathymetry:	The science of measuring the depths of oceans, seas, etc.; the topographic maps of the sea floor resulting from such measurements.
Crest:	The highest part of a wave.
Distant source tsunami:	A tsunami originating from a far away source, generally more than 1000 km or more than 3 hours travel time from a given coastal point. (For the purpose of this plan, more than 3 hours travel time to the nearest New Zealand coastline).
Estimated time of arrival (ETA):	The time of the first tsunami wave arrival at a fixed location, estimated through modelling the speed and refraction of the tsunami waves as they travel from the source. Accuracy depends on precision of source location, earthquake magnitude and bathymetry data.
Inundation:	The horizontal distance inland that a tsunami penetrates, generally measured perpendicular to the mean sea level line. The 'inundation line' is the inland limit of wetting i.e. the landward limit of tsunami run-up (see 'Run-up').
Leading wave:	The first arriving wave of a tsunami. In some cases, the leading wave produces an initial depression or drop in sea level, and in other cases, an elevation or rise in sea level. When a drop in sea level occurs, sea level recession is observed.
Local source tsunami:	A tsunami originating from a source within a few hundred km, or less than 1 hour travel time from a given coastal point. For the purpose of this plan, less than 1 hour travel time to the nearest New Zealand coastline, noting that travel times may be less than 30 minutes and as short as a few minutes.
Mean sea level:	The average height of the sea surface, based upon observation of tide height over a considerable period of time (years). Typically it can be seen as the halfway point between the mean high tide and the mean low tide. Mean sea level varies from location to location; thirteen primary mean sea level vertical datums are used in New Zealand.
Natural warning:	Natural warnings are personal observations of natural occurrences. They

can involve any of the following:

- Strong earthquakes (it's hard to stand up), weak earthquakes lasting for a minute or more;
- Strange sea behaviour, such as the sea level suddenly rising and falling; or
- Hearing the sea making loud and unusual noises or roaring like a jet engine.

Public education about tsunami awareness, tailored to the specific community realities is critical in this regard.

Official notification /warning:	Official notifications or warnings are issued by designated authorities. They are different to “natural” warnings (felt, heard, and observed experiences) and “informal” warning (informal means of communication e.g. person to person or media reports).
PTWC:	Pacific Tsunami Warning Centre (see page 26 of this plan).
PTWS:	Pacific Tsunami Warning System (see page 26 of this plan).
Regional source tsunami:	A tsunami originating from a source within 1000km or 1-3 hours travel time from a given coastal point. For the purpose of this plan, between 1-3 hours travel time to the nearest New Zealand coastline.
Run-up:	The vertical height (elevation) that the tsunami reaches on land above the normal sea level status at the time.
Sea level:	The height of the sea at a given time measured relative to some datum such as mean sea level.
Seiche:	A wave or waves oscillating in a partially or fully enclosed body of water.
Teletsunami:	Distant source tsunami.
Tidal wave:	The wave motion of the tides. Often incorrectly used to describe a tsunami, storm surge, or other unusually high and therefore destructive water levels along a shore that are unrelated to the tides.
Travel time:	The time required for the first tsunami wave to propagate from its source to a given point on a coastline.
Travel time map:	A map showing isochrones or lines of equal tsunami travel time calculated from the source outwards toward points on coastlines.
Trough:	The lowest part of a wave.
Tsunami:	Japanese term meaning wave (“nami”) in a harbour (“tsu”). A natural phenomenon consisting of a series of waves generated when a large volume of water in the sea or in a lake is rapidly displaced.
Tsunamigenic:	Capable of generating a tsunami. For instance, a tsunamigenic earthquake, tsunamigenic landslide.

- Tsunami period:** The amount of time that a tsunami wave takes to complete a cycle. Tsunami periods typically range from five minutes to two hours.
- Tsunami source:** The point or area of tsunami origin, usually the site of an earthquake, volcanic eruption or landslide that caused large-scale rapid displacement of water to initiate tsunami waves.
- Tsunami wave:** Tsunami waves differ from ordinary coastal waves in that the entire column of water from the ocean floor to the surface is affected. They have periods (see 'Tsunami period') that may range from a few minutes to an hour or more and wave lengths (see 'Wave length') that can span up to several hundred kilometres. Tsunami waves therefore contain significant more energy compared to ordinary coastal waves. In the deep and open ocean they can travel at speeds of 500 to 1000 km per hour, while they also create other phenomena not characteristic of ordinary waves such as strong currents.
- Water level (maximum):** The difference between the elevation of the highest local water mark and the elevation of the sea level at the time of the tsunami. This is different from maximum run-up because the water mark is often not observed at the inundation line, but may be halfway up the side of a building or a tree trunk.
- Wave length:** The horizontal distance between similar points on two successive waves measured perpendicular to the crest. For tsunamis generated by earthquakes the typical wave length ranges from 20 to 300km. For tsunamis generated by landslide the wave length is considerably shorter, ranging from hundreds of metres to tens of kilometres.
- Wave height:** The vertical trough-to-crest height of a wave. Tsunami wave height is not constant- it increases substantially as the wave approaches the shore, depending on the near shore topography. In the deep ocean the height of the waves is generally less than a metre even for the most destructive tsunamis, and the waves easily pass ships unnoticed.

Section 1 Introduction

This section provides an introduction to this plan and includes the purpose, scope and use of the plan.

1.1 About this plan

The **purpose** of this plan is to outline the national procedures to warn local authorities and national agencies of the approach of known or possible tsunamis that could affect coastal areas of New Zealand.

Structure

This plan has the following main sections:

- [Section 1 Introduction](#) – an introduction to this plan, including a scope of the plan, and its use.
- [Section 2 Tsunami Categories and Threat](#) – an overview of the types and sources of threat from tsunami to New Zealand.
- [Section 3 Responsibilities and action guides](#) – an overview of the responsibilities of agencies and organisations with regards to tsunami warning.
- [Section 4 Initial tsunami threat assessment](#) – explains MCDEM's process for assessing tsunami information and determining the appropriate response.
- [Section 5 Further assessment for national warnings](#) – an overview of additional information that can be provided around expected tsunami arrival times and threat levels.
- [Section 6 Types of notifications](#) – an overview of the types of tsunami notifications issued by the Ministry of Civil Defence & Emergency Management (MCDEM).
- [Appendix Tsunami notification examples](#) – examples of the various templates used for tsunami notifications.

1.2 Scope

This is a National Advisory and Warning Plan and deals with the arrangements to receive and assess tsunami information at the national level, and the dissemination of national official notifications via the National Warning System.

The plan does not address the detailed actions to be taken by local authorities and national agencies upon receipt of national official tsunami notifications. Matters such as local public alerting systems, possible areas of inundation and evacuation arrangements must be incorporated into local plans. This plan can assist in the preparation of local plans and educational material.

This plan also does not address the response arrangements after a tsunami has struck. Generic response arrangements are detailed in the National Civil Defence Emergency Management (CDEM) Plan and CDEM Group Plans for multi-hazard response.

1.3 Use of this plan

This plan is to be used by:

- Ministry of Civil Defence & Emergency Management (MCDEM).
- Science agencies associated with civil defence and emergency management
- Emergency services
- Other government agencies
- Civil Defence Emergency Management (CDEM) Groups
- Local government

These organisations must plan their actions for when they receive information through the National Warning System to enable them to respond appropriately.

1.4 Testing of this plan

Testing of this plan will be done in conjunction with the testing of the National Warning System as well as specific exercises that MCDEM initiates or is involved in.

1.5 Annexes to this plan

The annex attached to this plan provides examples of the templates used for National Warnings and Advisories.

1.6 Other documents relevant to this plan

Other documents that must be read in conjunction with this plan are:

- The Guide to the National CDEM Plan
- Review of Tsunami Hazard in New Zealand (2013 Update) [GNS Science Consultancy Report 2013/131, August 2013]
- Directors Guideline: Tsunami Evacuation Zones [DGL 08/08]
- Technical Standard: National Tsunami Signage [TS 01/08]
- Technical Standard: Tsunami Warning Sirens [TS 03/14]

These documents can be found on the Publications page of the Ministry's website, www.civildefence.govt.nz

Section 2 Tsunami categories and threat

This section describes the categories of tsunamis and summarises the threat to New Zealand.

2.1 Categories of tsunami

The three categories of tsunami

For the purposes of emergency management and the time needed to respond and act on warnings, tsunamis are divided into three categories:

- Distant source
- Regional source
- Local source.

The categories are based on the shortest time it would take the tsunami to travel from its source to an area of concern – in New Zealand’s case, the closest part of the New Zealand coastline. This categorisation by travel time is fairly consistent with the geographical location of the source. The travel times for the three categories are:

- Distant Source – more than 3 hours travel time from New Zealand
- Regional Source – 1 to 3 hours travel time from New Zealand
- Local Source – 0 to 60 minutes travel time to the nearest New Zealand coast; most local sources are less than 30 minutes travel time away.

Warning consideration for the three categories of tsunami

Most major distant tsunami sources are more than 10 hours travel time from New Zealand, giving in theory, adequate time for National Advisories or Warnings to be issued and subsequent response actions to be initiated. While the threat may be difficult to assess initially, more confident forecasts will become available over time but still early enough to support local level decision making and response.

Regional tsunami sources are one to three hours travel time to New Zealand and therefore provide much less time for assessment before National Advisories or Warnings are issued. Initial National Advisories or Warnings are likely to be issued on the basis of ‘rule of thumb’ thresholds based on the location, size and depth of the earthquake. These National Advisories and Warnings are unlikely to include confident forecasts of wave amplitudes and local decisions may have to be made without that information. The hazard assessment presented by regional sources contained in the GNS Science Report *Review of Tsunami Hazard in New Zealand (2013 Update)* [GNS Science Consultancy Report 2013/131, August 2013]¹ must be used to support decision making at local level.

¹ <http://www.civildefence.govt.nz/cdem-sector/cdem-research-/mcdem-research-projects-and-resources/review-of-tsunami-hazard-in-new-zealand/>

Local tsunami sources offer very little (if any) time for timely official warnings as most local source tsunamis are less than 30 minutes travel time to the nearest New Zealand coast. In this case public awareness to be able to recognise and individually respond to natural warnings is vital.

However, local source tsunamis will take longer to travel to other areas of the New Zealand coast and therefore do not exclude official warnings. National Advisories or Warnings are unlikely to include forecasts of wave amplitude and local decisions will have to be made without that information. The hazard assessment presented for local sources in the GNS Science Report *Review of Tsunami Hazard in New Zealand (2013 Update)* [GNS Science Consultancy Report 2013/131, August 2013]² must be used to support decision making at the local level.

2.2 The tsunami hazard for New Zealand

National hazard assessment

In 2005 GNS Science led an urgent assessment of the tsunami hazard and risk in New Zealand based on existing knowledge, and of New Zealand's preparedness for this hazard. That review was updated in 2013 to highlight the results of new research and changes in scientific understanding since 2005. The updated report³ quantifies tsunami hazard, i.e. the likely size and frequency of tsunami for given time periods along the entire New Zealand coastline. It does not provide estimates of risk, i.e. expected damage, costs and casualties.

The hazard information on the respective tsunami sources relevant to New Zealand in this Plan represents a summary of the 2013 GNS Science Report.

² <http://www.civildefence.govt.nz/cdem-sector/cdem-research-/mcdem-research-projects-and-resources/review-of-tsunami-hazard-in-new-zealand/>

³ *Review of Tsunami Hazard in New Zealand (2013 Update)* [GNS Science Consultancy Report 2013/131, August 2013]: <http://civildefence.govt.nz/cdem-sector/cdem-research-/mcdem-research-projects-and-resources/review-of-tsunami-hazard-in-new-zealand/>

2.3 Regions where tsunamis originate

List of regions

The following regions represent potential origins of tsunami that can affect New Zealand:

Region	Description
0	New Zealand (local source)
1	Solomon Islands, Papua New Guinea and the rest of the South-west Pacific (regional source)
2	South America, which is divided into three areas
3	Central America
4	Cascadia (NW USA and Vancouver Island, Canada)
5	Aleutians / Rat Island
6	Kurile Islands, Kamchatka
7	Japan

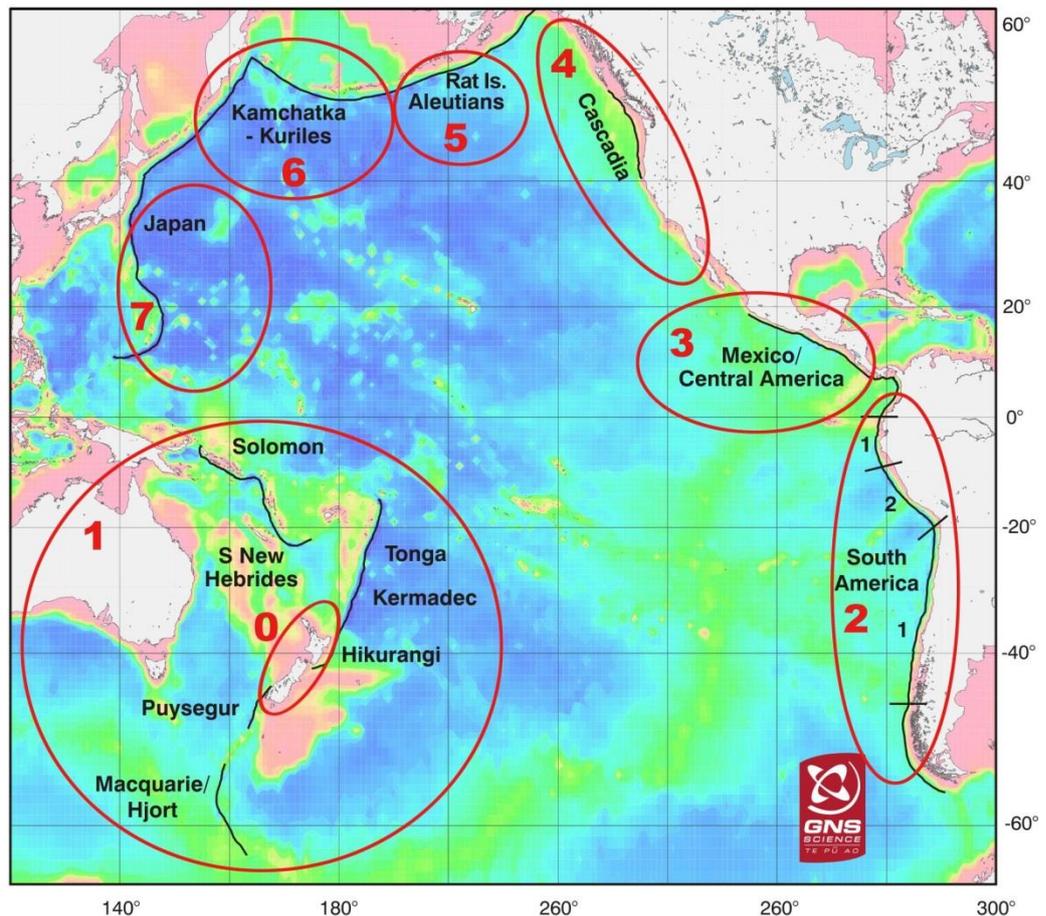


Figure 1: Subduction margins in the Pacific where tsunamis are generated. The South American margin is partitioned into three areas: area 2.2 propagates tsunami westward towards eastern New Zealand, especially the eastern South Island; areas marked 2.1 propagate tsunami further northward. These are more likely to affect the northern North Island and the North Pacific.

2.4 Local Sources, Region 0 – New Zealand (earthquake)

Summary

Local earthquakes have the potential to produce catastrophic tsunami, with seven to ten metres or more run-up, over a short length of coast (local impact, i.e. tens of kilometres of coast) or over a longer length of coast (regional impact, i.e. hundreds of kilometres of coast). The impact depends on the extent of fault rupture and seafloor deformation, which in turn depends on the magnitude of the earthquake. The tsunami resulting from a very large, 200-300 km long rupture of the Hikurangi Trough plate-interface on the east coast of the North Island could affect 200-300 km or more of the nearby coast with large run-ups. Such an event could cause significant to severely damaging waves along much of the east coast and in the Chatham Islands.

Some coasts are more at risk from tsunami than others because of their proximity to areas of high local seismic activity, but no part of New Zealand coastline can be considered completely free from local source tsunami hazards.

Kermadec Trench

The Kermadec Trench is both a regional and a local source for tsunami. Earthquakes that rupture only on the northern half of the Kermadec Trench produce tsunami that take more than an hour to reach New Zealand (excluding the Kermadec Islands), while those whose ruptures include the southern portions of the trench produce tsunami that reach parts of New Zealand in less than an hour. Because of the orientation of the trench, even for tsunami originating on the southern part of the trench, the most strongly affected coasts are usually more than one hour travel time away. The main description of the Kermadec Trench as a tsunami source is under the regional sources section.

Eastern North Island

A significant source of large vertical-slip faulting exists in conjunction with the Hikurangi subduction margin off the eastern North Island. Tsunami could be generated by large earthquakes (magnitude 7.5 - 9.0) on the plate interface itself from slip between the two opposing plates, or by rupture of steeper faults that break up through the Australian plate.

Many faults have been mapped in the offshore area from the inner shelf to the deep ocean of the Hikurangi subduction margin. Studies of these faults show a potential of large surface rupturing earthquakes every 615-2333 years (Barnes et al., 2002; Berryman, 1993).

Subduction thrust earthquakes in the Hikurangi margin are recognised as a potential large earthquake (and tsunami) hazard. However little data is available on the timing and size of large-to-great earthquakes from this source. The Hikurangi margin is apparently more efficient at making large subduction thrust earthquakes in the southern part adjacent to Wellington than further north off the Raukumara Peninsula.

**Eastern North
Island
(continued)**

However, the March 1947 Gisborne tsunami, caused by a magnitude 7.1 earthquake, caused much larger than expected run-ups of up to about ten metres. This earthquake showed characteristics of a 'tsunami earthquake' – located close to the trench where the interface is at very shallow depths, rupture velocities were slow and rupture durations long. Power et al. (2008) suggested that earthquakes might recur in the source area of the 1947 tsunami earthquake as frequently as about every 70-80 years.

Overall, it is expected that the southern Hikurangi margin experiences less frequent (i.e. at about 300-900 year intervals) but extremely large to great (magnitudes greater than 8.0) subduction earthquakes. The northern Hikurangi margin, on the other hand, probably experiences more frequent, moderately sized earthquakes that are allocated at very shallow levels along the Hikurangi trench that could also produce significant tsunami. Very infrequent subduction thrust events that rupture the entire Hikurangi margin in magnitude 9.0 plus earthquakes also cannot be ruled out. If such events occur, they would produce devastating tsunami similar to those observed in Japan in the magnitude 9.0 Tohoku event in March 2011.

Bay of Plenty

There are many active faults in the offshore area of the Ruapehu-White Island volcanic zone. These faults typically have smaller dimensions than the faults offshore of the eastern North Island, and the maximum earthquake that these faults can produce is about magnitude 7 with two to three metres of potential seabed displacement on a fault up to 30 km long. These relatively small sources are not capable of producing large tsunami, with fault sources more than 30 km from the coast not capable of producing tsunami wave heights of more than two metres. (No active fault sources are known in the Bay of Plenty that is within 30 km of Tauranga).

Auckland

The active Kerepehi Fault probably extends into the Hauraki Gulf about 40 km east of Auckland, and is the only offshore active fault known in the Auckland region. This fault could produce earthquakes up to about magnitude 7, similar to those in the Bay of Plenty. At 40 km distance, the fault is considered unlikely to pose a tsunami hazard to Auckland, or at least not of two metres or more.

**Cook Strait and
offshore
Marlborough**

Numerous active faults occur in the Cook Strait area and offshore Marlborough including the offshore southern part of the Wairarapa Fault that, in 1855, generated a tsunami with ten metres of local run-up (and up to five metres run-up in Wellington). The 1855 earthquake is estimated to have been magnitude 8.2.

Other Marlborough and Wellington region faults, including the Wellington, Ohariu, Awatere and Wairau faults are considered unlikely to produce damaging tsunami because of their primarily strike-slip character (Barnett et al., 1991). However, some local tsunami damage is possible if the fault motions include a vertical component, or if the fault shaking initiates landslides. Apart from the Wairarapa Fault, the largest earthquakes assigned to offshore faults in this region are magnitude 7.5-7.8.

Western Cook Strait and offshore Manawatu

An extensive marine survey of the region offshore from the Manawatu-Kapiti area has recently been completed (Lamarche et al., 2005), and has provided valuable new insight into the location and characteristics of offshore faults in the region. These structures have a modest potential to generate tsunami (maximum earthquake magnitudes of up to magnitude 7.7), but they may be important as they are located at short distances from urban areas on the Kapiti coast, Porirua and northern South Island.

South Island

In the offshore Fiordland region plate boundary structures including the Alpine Fault and the Puysegur subduction zone are capable of producing earthquakes greater than magnitude 8, similar to or larger than the magnitude 7.8 Dusky Sound earthquake in July 2009. Because the Alpine Fault is predominantly a strike-slip fault the structure is not considered likely to generate significant tsunami except at localised areas where the fault steps from one strand to another, and locally large vertical movements are possible. Thus, the tsunami source tends to be very localised, which could generate a large run-up locally, but is unlikely to travel as far as Invercargill.

The Puysegur subduction interface has the potential to generate major tsunami. The plate interface here is the mirror image of the Hikurangi subduction zone, in that the Australian plate is here subducted beneath the Pacific plate. The bathymetry (sea floor topography) off the southern South Island appears to offer some natural protection to southern shores. This is because the water shallows at a substantial distance from the coast and much of the energy is dissipated in the shallow coastal waters.

2.5 Local Sources, Region 0 – New Zealand (landslide)

Local Sources: All NZ areas

Being an island nation surrounded by a large deep sea, New Zealand has a tsunami hazard from coastal and submarine landslides. Several landslides that have been triggered by earthquakes have resulted in significant tsunami, at least locally.

There is no doubt that large submarine landslides feature prominently over much of the sea floor around New Zealand, and that future large submarine landslides will cause large tsunamis at some time. Mass failure of sediment is a ubiquitous geological process on New Zealand's continental margin (Lamarche et al., 2003). Mass failures are recognised essentially along the entire margin from north of Bay of Plenty to south of Fiordland.

Most historical landslide-generated tsunami have been associated with earthquakes, but earthquakes are not the only cause. Wave action in large storms can trigger coastal and submarine landslides, heavy rain or a wet season can trigger coastal landslides, and a few landslides occur without an obvious trigger. The size of known landslide sources varies from very small (several tens of metres across) to continental margin scale failures (several tens of kilometres across).

**Local Sources: All
NZ areas
(continued)**

The best studied landslide tsunami scenario in New Zealand is for the head of the Kaikoura Canyon. An unstable accumulation of 0.25km³ of sediment there has been inferred, based on local sedimentary processes (Lewis and Barnes, 1999). The shallowest area of the sediment is in only 35m water depth. Dated sedimentary events within Kaikoura Canyon and further down-slope suggest that sediment failure occurs every 200-300 years. Based on this scenario, Walters et al. (2006) carried out a tsunami simulation and found that for the average-case scenario, the inferred landslide is capable of generating waves of up to 13m above tide level in adjacent Goose Bay, and 2m at Kaikoura. The arrival time for these waves is very short, at 1 minute and 15 minutes respectively. Large local tsunami in this region are supported by historical records and paleo-tsunami data (Du Bois, 2012).

2.6 Local Sources, Region 0 – New Zealand (volcano)

**Local Sources: All
NZ areas**

Mayor and White Island volcanoes represent potential local tsunami sources.

Mayor Island has produced both explosive and lava flow eruptions, and includes three phases of caldera collapse. The last caldera collapse, associated with the largest eruption, occurred 6300 years ago (Houghton et al., 1992) and included the movement of rock and ash flows into the sea. This 6300 year ago event is probably the only recorded instance of rock and ash flow entering the sea within the New Zealand region.

Numerical modelling of a credible 1km³ (“Mt St Helens scale”) rock and ash flow from Mayor Island, that enters the sea, would produce a 0.5m high tsunami on the adjacent coast around Whakatane (de Lange and Healy, 1986; de Lange, 1997).

The possibility of a significant tsunami generated from White Island is considered to be low (de Lange and Healy 1986; de Lange and Prasetya, 1997), not least because the most likely sector collapse direction is towards the east and any tsunami generated would be directed offshore.

2.7 Regional Sources, Region 1 – South West Pacific (earthquake)

Summary

In New Zealand’s historical record, the largest earthquakes along the arc between New Hebrides (Vanuatu), Kermadec Islands and Tonga have been less than magnitude 8.5. Only one of these is known to have caused run-ups in New Zealand approaching one metre.

To the south of New Zealand, only a few large earthquakes have occurred since the 1960s, when the installation of a worldwide seismic network allowed large earthquakes to be identified and located. The only three large earthquakes in the last 40 years had magnitudes between 7.8 and 8.4, and all were in areas of the plate boundary where earthquakes with horizontal (strike-slip) movement occur predominantly. These earthquakes do not usually generate large tsunami and none had run-up of more than one metre in New Zealand (along the south and west coasts of the South Island).

Summary (continued)

Most of the tsunami energy generated from the southern part of this zone (Puysegur and Macquarie-Hjort Trench areas) will tend to be channelled away from New Zealand towards the west and south-west.

The 2011 Tohoku earthquake in Japan demonstrated that there may be very long intervals of time between the largest earthquakes on a subduction zone (the most recent earthquake of similar size in Tohoku was in 869AD). Consequently the ability to infer a maximum potential earthquake size from 100-200 years of historical data is very limited.

Southern New Hebrides

Large earthquakes of up to magnitude 8.5 causing tsunami with run-ups of twelve metres locally have occurred near Vanuatu in the central part of the New Hebrides region. The central part of the subduction zone is not well oriented to direct tsunami towards New Zealand except at its southern part, where the record of earthquakes is probably only complete since 1960.

The historical record of earthquakes in the Southern New Hebrides is short and complete for major earthquake (greater than magnitude 7.5) only over the past century. Power et al. (2012) show that earthquakes larger than a magnitude 8.0 on the southern section of the New Hebrides trench could present a significant hazard for Northland. An under-sea ridge (the Three Kings Ridge) extends north from Cape Reinga and acts as a waveguide, leading to potentially hazardous wave heights in the northern North Island. Numerical models show that earthquake scenarios ranging from magnitude 8.1 to magnitude 8.8 on the southern New Hebrides Trench could lead to maximum tsunami heights of 2 to 15m respectively at highly amplifying sites in the far north, such as the Aupouri Peninsula. Along the eastern and western coastlines of Northland, maximum expected tsunami heights range from less than 1 to about 5 metres as the magnitude ranges from 8.1 to 8.8.

Tonga Trench

Historically, earthquakes have not exceeded magnitude 8.5 in the Tonga Trench, and the tsunami produced have not affected New Zealand, principally because of the orientation of the subduction margin. It had been thought that the potential for regional scale tsunami was limited, as the plate interface appears to be uncoupled, so the plates slide past each other relatively freely (Bevis et al., 1995), but the September 2009 Samoa tsunami (also called the 'South Pacific tsunami') was found to be caused by two near simultaneous earthquakes – one on the subduction interface and the other on an outer rise normal fault (Beaven et al., 2010; Lay et al., 2010), so this assumption is open to question. If the magnitude of earthquakes on the Tonga Trench were to be limited only by subduction zone length, then earthquakes with magnitudes of up to 9.0 would be possible; yet this still appears to be unlikely based on the lack of coupling revealed by current geodetic measurements (though these measurements are not sufficient to fully reveal the extent of coupling, especially close to the trench).

Kermadec Trench

The Kermadec Trench is both a regional tsunami source and a local source. Earthquakes caused by rupture along only the northern half of the Kermadec Trench could produce tsunami that take more than an hour to reach New Zealand (excluding the Kermadec Islands), while rupture of the southern Kermadec Trench could produce tsunami that reach some parts of New Zealand in less than an hour. Because of the orientation of the Kermadec Trench, even for tsunami originating on the southern part of the trench, the most strongly affected coasts are usually more than one hour travel time away.

The approximately 1400 km long Kermadec Trench has a moderate level of historical seismicity (544 earthquakes of greater than magnitude 5 in 33 years from 1976 to 2009) originating on the shallow part (≤ 40 km depth) of the plate interface.

Only earthquakes of about magnitude 8.5 and above are assessed to have the potential to produce a damaging tsunami above two metre run-up in urban areas at least 500 km distant. The potential for this area to produce earthquakes larger than about magnitude 8.5 is not well known.

Comparisons with other subduction margins similar to the Kermadecs suggest that the plate interface is relatively weakly coupled, i.e., the plates are sliding past each other relatively freely and without building up elastic energy that is then released as earthquakes. However, analysis of GPS data from Raoul Island indicates that the plate interface is probably strongly coupled or locked, at least in that part of the Trench (Power et al., 2012).

Numerical modelling shows that tsunami generated for the southern and/or middle sections of the Kermadec subduction zone pose a greater hazard to the coast of New Zealand than tsunami generated along the northern Kermadec Trench. For tsunami generated in the northern Kermadec Trench, the majority of energy travels towards the open Pacific, as well as though the South Fiji Basin to the northwest toward Norfolk Island and New Caledonia. In contrast, if the southern and/or middle sections of Kermadec plate interface are ruptured, refraction effects due to the sloping continental shelf of the North Island will gradually bend tsunami waves onshore, and thus much more energy will be directed toward the coasts of the Northland and Auckland regions. For the scenario in which a 300km long section of the southern Kermadec Trench ruptures in a magnitude 8.5 event, water levels 3-5m above mean sea level would occur along north-eastern coasts of Northland and the Auckland region, as well as the coasts of Gisborne and the Bay of Plenty. Waves with amplitudes of over 10m would strike the north-eastern coasts of Great Barrier Island. Water level increases of 1-3m would occur along the south-western coast of Northland.

South of New Zealand (including Macquarie Ridge)

Most plate boundary zones in the Southern Ocean have horizontal (strike-slip) movement and large earthquakes in these zones are unlikely to produce large tsunamis. There are no highly active subduction zones in the Southern Ocean. The Hjort Trench and subduction zone is the only part of the margin where orientation of the zone would partially direct tsunami towards New Zealand. However, recent studies of the Hjort trench area (Meckel et al., 2003) suggest subduction in this region is immature with little significant down-dip movement, so large thrust earthquakes are unlikely to occur.

Historically, large earthquakes along the Macquarie Ridge (magnitude 8.1 earthquakes in 1989 and 2004), and further south near Balleny Islands (magnitude 8.1 in 1998) have been strike-slip events, producing small tsunamis (less than 50 cm) in southern New Zealand. The effects of a magnitude 8.3 earthquake on the Macquarie Ridge in 1924 have not yet been well researched.

2.8 Regional Sources, Region 1 – South West Pacific (landslide)

**Regional Sources:
All Regional
Areas**

No landslide sources, at regional distances, have been thus far identified that are sufficiently large or frequent enough to justify inclusion in this review.

2.9 Regional Sources, Region 1 – South West Pacific (volcano)

**Southern
Kermadec arc**

There are 26 volcanoes (>10 km in diameter) along the active Taupo – Kermadec arc that lie between 300 km and 1000 km from mainland New Zealand. For these volcanoes there are three “scenarios” for the generation of possible regional tsunamis:

- catastrophic submarine silicic eruption and caldera collapse
- large catastrophic sector collapse
- frequent small avalanches on edifice flanks.

However, no historical records exist of volcanic activity in the Kermadec chain producing tsunamis in New Zealand or elsewhere. In general, the volumes of eruptions, associated caldera collapses and the scale of sector collapse features so far identified are significantly (at least in order of magnitude) smaller than has been proposed in the literature for damaging tsunami effects at distances of 1000 km or so. Additionally, a numerical model of a 1 cubic kilometre rock and ash avalanche entering the sea from Mayor Island in the Bay of Plenty indicated only a 0.5 m tsunami on the coast about 30 km distant (de Lange and Prasetya, 1997) so it is expected that events with volumes typically ten times larger but at 10-30 times the distance will have effects no larger than indicated by the modelling of the Mayor Island event.

Volcanic unrest in the Kermadec volcanoes leading to a major eruption is expected to have a long lead time, so an extended period of preparation prior to any tsunami should be possible.

2.10 Distant Sources, Regions 1-7 (earthquake)

Summary

Large to great (greater than magnitude 8.0) earthquakes are the most frequently-occurring source of damaging tsunami worldwide and 80% of these earthquakes occur around the margins of the Pacific Ocean. At many of the plate boundaries in the Pacific, one tectonic plate is diving down beneath another tectonic plate in a process called subduction. Often, the subducting and overriding plates can become stuck together due to friction on the boundary between the plates. Eventually the stored energy due to this 'locking' process overcomes the strength of the plate boundary, and the two plates suddenly slip past each other in a large earthquake. The 2004 Indian Ocean tsunami was generated by this process in the Indian Ocean, where the Australian plate is subducted beneath the Eurasian plate along the Sumatran subduction zone. The Tohoku (Japan) 2011 tsunami was similarly generated on a plate boundary where the Pacific plate is subducted beneath northern Japan.

The potential of subduction zones to produce tsunami at the New Zealand coast has been assessed from the available data and the evaluation revealed that only sources in the circum-Pacific region (including New Zealand's subduction zones and some offshore faults) are likely to generate tsunami with heights of greater than 2m. Tsunami have been recorded along the New Zealand coast from other sources (for example the 2004 Indian Ocean tsunami from the Indian Ocean), but these are not expected to exceed 2m.

The 2011 Tohoku earthquake demonstrated that there may be very long intervals of time between the largest earthquakes on a subduction zone (the most recent earthquakes of similar size in Tohoku was in 869AD). Consequently, the ability to infer maximum potential earthquake size for historical data is very limited in the Pacific where, apart from Japan, records of historical events are typically only a few hundred years long. From a civil defence emergency management standpoint, it should be assumed that any subduction zone could produce a magnitude 9 earthquake, unless there are strongly convincing counter-arguments.

Region 1: Solomon Islands

Historically, the Solomon Islands and Papua New Guinea have produced few earthquakes over magnitude 8.5, although the possibility cannot be ruled out. In Papua New Guinea, the primary source that could affect New Zealand would be the New Britain Trench. However, the PNG mainland and numerous islands located between the New Britain Trench and New Zealand would scatter the waves. However, great earthquakes on the San Cristobal Trench just to the southwest of the Solomon Islands could pose a significant tsunami hazard to New Zealand. Modelling has shown that the Lord Howe Rise behaves as a waveguide, steering tsunami waves from the Coral Sea region towards New Zealand.

**Region 1:
Solomon Islands
(continued)**

Historically, few tsunami from this region have produced tsunami heights exceeding 1-2m at a large distance from the source. The magnitude 8.1 earthquake in the Solomon Islands on 2 April 2007 produced a tsunami with a maximum reported run-up of 12m in the Solomons and killed 52 people; the largest recorded waves in New Zealand from this event were just over half a metre in amplitude.

The northern part of the New Hebrides subduction zone is a distant source, while the central and southern parts are regional sources. The possibility exists that a very large earthquake could rupture multiple fault segments. Near Vanuatu, in the central part of the New Hebrides region, large earthquakes with magnitudes of 8.5 or less have created tsunami with run-ups of 12m locally. The northern part of the New Hebrides subduction zone is not well oriented to direct tsunami towards New Zealand, although modelling suggests that undersea ridges in the Tasman Sea will direct some of the tsunami energy towards New Zealand.

**Region 2: South
America**

The historical evidence suggests that South America is the most important distant tsunami source region. Earthquakes along this coastline produce tsunamis that are often well directed towards New Zealand.

This is due to:

- the orientation of the plate boundary on which the earthquakes occur
- the focusing of the tsunami by the sea-floor shape between South America and New Zealand
- there are few island chains to scatter the tsunami.

The location of the earthquake along the South American coast however has a direct influence on the expected impact on New Zealand. The following two tsunamis illustrate this:

Example 1: 1868 Peru earthquake: Region 2, area 2

The distant-source tsunami that caused the most damage to New Zealand in historical times was caused by a magnitude 9.1 earthquake on the southern coast of Peru in 1868 (see area 2.2 of Figure 1, page 11). This area of South America's coastline is orientated in such a way that the tsunami energy is more effectively directed towards New Zealand than it is for other sections of the South American coast where the majority of energy tends to be directed further north.

Should a larger earthquake than the 1868 event occur in this part of the coast, the effects of a tsunami in New Zealand could be considerably greater than they were in 1868 when a village was destroyed, one person was killed in the Chatham Islands, and damage was caused in Lyttelton Harbour and other bays around the Banks Peninsula.

**Region 2: South
America
(continued)**

Example 2: 1960 Chile earthquake: Region 2, area 1

In contrast, the 1960 tsunami, although caused by a much larger earthquake than the 1868 event (magnitude 9.4, possibly 9.5), occurred on a part of the South American plate boundary that is not as well oriented to New Zealand as the 1868 location (area 2.1 on Figure 1, page 11). It produced a smaller tsunami in New Zealand than would have occurred had the location been better oriented. Nevertheless, the 1960 tsunami caused run-ups of up to four metres in parts of the North and South Islands. The 2010 Chile tsunami, caused by an earthquake of magnitude 8.8 that occurred to the north of the location of the 1960 earthquake, had run-up heights of up to 1m in parts of the North and South Islands. The magnitude of the 1960 earthquake at 9.5 probably represents the upper limit for earthquakes for the whole South American coastline (and worldwide).

Computer models (Power et al., 2004), combined with historical observations, suggest that South American earthquakes with magnitudes less than 8.5 generate a minimal risk of a damaging tsunami in New Zealand. The historical records of Peru and Chile, which are hundreds of years longer than New Zealand's, indicate that large earthquakes and tsunami have occurred relatively frequently in the past 450 years. Nine earthquakes with estimated magnitudes >8.5 caused near- source run-up heights near to, or greater than, those produced locally by the 1868 event, and hence probably produced significant tsunami in New Zealand prior to European settlement.

The average return period based on seismological assessment (50 years) is about the same as has occurred in the last 160 years, and provides an indication of the frequency of potentially damaging South American-source tsunami in New Zealand. Paleo tsunami work suggests that tsunami comparable in size to the 1960 event occur in southern Chile with an average interval of slightly less than 300 years.

As tsunami from South America approach New Zealand from the east, the east coast will be more affected than the west coast. However, waves do propagate around New Zealand, as well as through Cook Strait, and the west coast will have significant waves in some cases.

**Region 3: Central
America and
Mexico**

The largest well-recorded historical earthquakes in the Mexico and Central America area have magnitudes of less than 8.5, too small generally to produce a damaging Pacific-wide tsunami. However, an earthquake in 1787 is estimated at magnitude 8.6 and the possibility of still larger earthquakes cannot be excluded.

The coastline of the region is well oriented for directing tsunami towards New Zealand and the possibility of earthquakes that produce tsunami large enough to be damaging in New Zealand cannot be ruled out.

**Region 4:
Cascadia**

The Cascadia margin refers to the boundary between the Juan De Fuca and North American tectonic plates between northern California and Vancouver Island.

Rupture of the plate interface is thought to occur either:

- as whole-region earthquakes of about magnitude 9 at intervals of approximately 800 years (Witter et al., 2003), or
- as earthquakes with magnitude <9, which may occur more frequently (Clague, 1997). These earthquakes would probably not bring about a significant tsunami risk to New Zealand.

The last great Cascadia earthquake occurred in 1700 AD. This date is earlier than written records in New Zealand, the US and Canada, and the only means of estimating its likely impact in New Zealand is by using numerical modelling. Japanese researchers have estimated the magnitude of the 1700 event at magnitude 9.0. An earthquake of this magnitude is expected to produce a tsunami with amplitudes up to about 1m in many parts of New Zealand, and possibly 1-3m in Banks Peninsula and the Chatham Islands. The dimensions of the Cascadia subduction zone appear to set an upper limit on the magnitude of possible earthquakes at about magnitude 9.2; at this magnitude many areas of New Zealand would be expected to experience waves with amplitudes between 1-3m.

**Region 5:
Aleutians/Rat
Island**

The plate boundary between Alaska and the Aleutians is a highly active source of great plate interface earthquakes and tsunami in the Pacific. Historically, three earthquakes have caused run-ups of up to two metres along the north and east coasts of New Zealand, but not at any of the main urban centres. These earthquakes were:

- 1964 magnitude 9.4 in Alaska
- 1957 magnitude 8.7-9.1 in Rat Island
- 1946 magnitude 7.9 in the Aleutians.

The historical record is too short to reflect the full range of tsunami that New Zealand might experience from the Alaskan and Aleutians region. However, most parts of this coastline produce tsunami that are not particularly well directed to New Zealand, with the exception of the area around the source zone of the 1957 Rat Island earthquake.

**Region 6: Kurile
Islands,
Kamchatka**

The largest earthquake to have occurred in this area in New Zealand's historical record is a magnitude 9 earthquake south of Kamchatka Peninsula in 1952. This produced a maximum run-up of nearly 19m locally, and a maximum in New Zealand of over one metre in Gisborne. A larger tsunami, with a maximum run-up of 63m locally and 15m at a distance of over 1000km, was recorded in 1737 from a magnitude 8.3 earthquake. Its effects in the larger Pacific area are unknown. The capacity of the area to produce earthquakes with magnitudes greater than magnitude 9 in the historical record is unknown.

Region 7: Japan

The subduction zones off Japan are some of the most active in the Pacific. The region also has one of the longest historical records of large earthquakes and tsunami, spanning over a thousand years. Until recently, no earthquakes offshore of Japan were thought to have reached magnitude 9, although there are many historical events over magnitude 8. In New Zealand's historical record prior to 2011, only very small waves with amplitudes of less than a metre were recorded from Japanese earthquakes.

The largest historical subduction thrust earthquake in Japan was of magnitude 9.0 rupturing much of the northern Japan Trench in March 2011. This event produced tsunami with run-up heights of as much as 35m at locations along the northeast Japan coastline, with inundation of areas up to about 5km inland from the coast on the Sendai plain, and significantly further along the banks of rivers. In New Zealand, wave amplitudes of up to about 1m were recorded at various tide gauges. A marine threat warning was issued throughout New Zealand for this event, and anomalous waves and currents related to the tsunami were observed for several days after the earthquake. There was some flooding of residential houses at the head of the bay at Port Charles in the Coromandel.

It is expected that earthquakes on Japan's subduction boundaries much larger than the March 2011 event are rare (i.e. with recurrence intervals of several thousands of years, if they occur at all), although events up to magnitude 9.5 cannot be entirely ruled out. The worst-case magnitude 9.5 scenario would lead to wave heights in New Zealand approximately 2-3 times the ones observed from the March 2011 event. Fortunately, the propagation path from Japan to New Zealand is studded with islands that are thought to protect New Zealand from wave amplitudes of more than 2-3m, even in this worst case.

2.11 Distant Sources, Regions 2-7 (landslide)

Distant Sources: All Regions

Submarine landslides have been argued to have added substantially to the trans-Pacific tsunami resulting from the 1946 earthquake from the Aleutians (Fryer et al., 2004). It is argued that the narrow "beam" of devastating tsunami that swept Hawaii and the Marquesas Islands, and had run-up of four metres in Antarctica was the result of a 200 cubic kilometre landslide triggered by the magnitude 7.9 subduction earthquake. Others (e.g. Tanioka & Seno, 2001) have suggested the earthquake had very large slip for its apparent magnitude, such that it would fall into the "tsunami earthquake" category.

Huge sector collapses (1000-5000 cubic kilometres) of the flanks of the Hawaiian volcano chain have been modelled to produce Pacific-wide tsunami as well as very large local tsunami of hundreds of metres (McMurtry et al., 2004). While it is likely that flank collapses of this scale would produce large tsunami in New Zealand, their return periods from any one source are well in excess of 2500 years.

No landslides at global distances are currently considered viable tsunami sources for New Zealand within a 2500 year return period.

2.12 Distant Sources, Regions 2-7 (volcano)

Distant Sources: All Regions

Other than the potential for flank collapse on the slopes of volcanoes, no volcanoes in the historical record are known to have directly produced significant tsunami at great distances.

The great 1883 eruption of Krakatau, Indonesia, produced huge local tsunami with some run-up heights exceeding 40m, but tsunami-like water level oscillations observed at great distances from the volcano have been attributed to a coupling of an atmospheric pressure wave with the ocean. These waves are given the name *rissaga*, or atmospheric tsunami. Not enough is known about their mechanisms to include them as a tsunami source. Nevertheless, oscillations in New Zealand following the Krakatau eruption included 1.8m (measured peak to trough) waves at Whitianga and in the anchorage area at Auckland (although only 0.9-1.2m at the Auckland docks) (de Lange and Healy, 1986).

2.13 Distant Sources, Regions 2-7 (meteorite)

Distant Sources: All Regions

As an island nation surrounded by a large deep sea, New Zealand has a tsunami hazard from impacts of asteroids and comets. This hazard is real, finite and determinable, but the probability of a damaging tsunami from these sources is low.

Asteroids and comets are collectively known as Near Earth Objects (NEOs) when they approach close to Earth, especially if their closest approach is less than the distance to the moon. If they enter the Earth's atmosphere, they are collectively called bolides. The visible track of a bolide across the sky is a meteor or shooting star. The solid objects that sometimes are recovered later are meteorites. A meteorite survives its passage through the atmosphere and hits Earth about once every two hours.

Current technology allows for detection and tracking of the larger (larger than a few metres in diameter) NEOs and the calculation of their probability of hitting Earth days, weeks, and sometimes months in advance of their closest approach. The larger the body, the further out it can be identified and tracked. If a NEO large enough to be of concern were likely to hit Earth, substantial advance warning would be given. All significant objects on a collision course can be tracked, and their likely impact site on Earth predicted, with known uncertainty, some substantial time in advance of impact. Large bolides, however, have never been so common that they have featured prominently in human history.

Numerical estimates of the frequency of impact of a meteorite of sufficient size within a distance range of New Zealand that could cause a damaging tsunami appear to have a recurrence interval many times longer than 2500 years. While most bolide impacts occur as distant sources of tsunami to New Zealand they may also occur at regional or local distances.

Section 3 Responsibilities and action guides

This section provides an overview of the responsibilities of agencies and organisations with regards to tsunami warning.

Responsibilities are indicated as one or combinations of the following:

- Detection;
- Assessment;
- Decision;
- Distribution; or
- Support.

Detailed action guides for some agencies are also provided in this section.

3.1 Pacific Tsunami Warning Centre (PTWC): Detection

The Pacific Tsunami Warning Centre (PTWC) is located in Hawaii and serves as the operational headquarters for the Pacific Tsunami Warning System (PTWS). The PTWS is a tsunami warning system governed by Pacific member countries of the Intergovernmental Oceanographic Commission (IOC) which is a body under the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The PTWC monitors an expansive seismic and sea level network in the Pacific and issues tsunami messages under the following categories:

- Tsunami Information Statement, and
- Tsunami Threat Message.

The threat assessment contained in PTWC messages does not represent the official assessment in New Zealand. MCDEM uses the PTWC threat assessment as one of several considerations to initiate official advisories or warnings in New Zealand. PTWC tsunami messages are disseminated directly to MCDEM and GNS Science. MCDEM, with the support of GNS Science assess all messages received from the PTWC to determine the threat for New Zealand.

PTWC tsunami messages are also sent to Airways Corporation New Zealand in Christchurch via the Aeronautical Fixed Telecommunication Network (AFTN) and to the MetService in Wellington via the Global Telecommunication System (GTS) as redundancy measures for MCDEM.

3.2 GNS Science: Detection, assessment

Responsibilities

GNS Science maintains a national geological hazards monitoring and data collection system through its GeoNet project. GeoNet incorporates dual data centres with duty officers on 20 minute 24/7 response time. Through this system GeoNet is able to detect earthquakes in the seas around New Zealand. GeoNet earthquake reports are disseminated to MCDEM.

GeoNet also monitors and maintains New Zealand's sea level monitoring network around New Zealand coasts and off-shore islands. GNS Science is also expanding its GeoNet data management centre capability to include sea level information. GeoNet receives tsunami messages directly from PTWC.

GNS Science serves as MCDEM's primary advisor for tsunami threat analysis. It can activate a tsunami experts panel usually consisting of representatives from GNS Science, National Institute of Water and Atmospheric Research (NIWA) and academic institutions for this purpose when required.

Notification GNS Science may receive one or more of the following initial notifications:

- GNS Science seismic and sea level data
- PTWC Tsunami Information Statement
- PTWC Threat Message.

Action guide The actions that will be carried out by GNS Science are detailed in the tables below.

Estimated time to complete steps 1-3: 15 to 30 minutes		
On receipt of notifications that indicate a potential threat to New Zealand		
Step	Event and action	Responsibility
1	Monitor and assess information to provide advice to the MCDEM Duty Officer.	GNS Science Duty Officer
2	Provide advice to MCDEM Duty Officer if required.	GNS Science Duty Officer
3	Activate the Tsunami Experts Panel (TEP) if required.	GNS Science Duty Officer
Estimated time to complete steps 4-6: 30 minutes ongoing until a cancellation message is issued		
Step	Event and action	Responsibility
4	Provide continual assessments of information to the Duty Officer/NCMC including the following specific data if known: <ul style="list-style-type: none"> • travel-time estimates for the tsunami • wave amplitude estimates for coastal zones 	GNS Science Duty Officer/ TEP
5	Send a Liaison Officer to the NCMC when requested.	GNS Science/ TEP
6	Provide ongoing advice to the Duty Officer/National Controller/Planning and Intelligence function.	GNS Science/ TEP liaison

3.3 MCDEM: Assessment, decision, distribution

Responsibilities The overall responsibility for the initiation and issue of national official tsunami notifications in New Zealand rests with the Ministry of Civil Defence & Emergency Management (MCDEM). MCDEM receives tsunami messages directly from PTWC and earthquake reports from GeoNet.

MCDEM uses the National Warning System (NWS) to disseminate official tsunami notifications in the form of national advisories and warnings on a 24/7 basis. Section 19 of The Guide to the National CDEM Plan describes the NWS.

MCDEM represents New Zealand in the Pacific Tsunami Warning System. MCDEM maintains a Memoranda of Understanding with GNS Science for the provision of earthquake and tsunami information and advice to MCDEM and with radio and television broadcasters for the broadcast of an emergency announcement.

Notification MCDEM may receive one or more the following initial notifications for a tsunami event:

- GNS Science earthquake reports,
- PTWC Tsunami Information Statement,
- PTWC Tsunami Threat Message.

Action guide The actions that will be carried out by MCDEM are detailed in the tables below.

Estimated time to complete steps 1-3: 15 to 30 minutes		
On receipt of any of the above notifications:		
Step	Event and action	Responsibility
1	Assess the threat to New Zealand	Duty Officer
2	Consult GNS Science	Duty Officer/ GNS Science and TEP
3	<p>If deemed appropriate, or advised by GNS Science, or if initial information meets the thresholds detailed in <i>Table 1: Response Indicators</i> on page 34 of this plan, MCDEM will issue appropriate notifications to agencies via the National Warning System:</p> <ul style="list-style-type: none"> • “National Advisory–Tsunami No Threat to NZ” • “National Advisory–Tsunami Potential Threat to NZ” • “National Warning–Tsunami Threat to NZ” 	Duty Officer

Estimated time to complete steps 4-8: 30 minutes ongoing until a cancellation message is issued

Step	Event and action	Responsibility
4	When a <i>National Advisory – Tsunami: Potential Threat to NZ</i> or a <i>National Warning – Tsunami: Threat to NZ</i> is issued, request the broadcast of an emergency announcement and activate the National Crisis Management Centre (NCMC).	Duty Team
5	Establish ongoing communications with GNS Science for updated assessments.	Duty Officer
6	Provide updates at least hourly via the NWS and the media. Upgrade advisory to warning if necessary.	Duty Manager
7	Host regular teleconferences with CDEM Groups to share information.	National Controller
8	Issue a cancellation message when there is no longer a threat or potential threat to New Zealand.	Duty Manager

3.4 Airways New Zealand and MetService: Support

Responsibilities Upon receipt of PTWC messages, Airways New Zealand makes contact with MCDEM to confirm receipt of the message.

MetService also contact the MCDEM Duty Officer to confirm MCDEM has received the message.

3.5 CDEM Groups: Assessment, decision, distribution

Responsibilities CDEM Groups and CDEM Group members are responsible for the planning for, development and maintenance of appropriate public alerting and tsunami response systems for their areas.

All the CDEM Groups and CDEM Group members receive official national tsunami advisories and warnings via the NWS. CDEM Groups and CDEM Group members are responsible for further local threat assessment and deciding on appropriate local public alerting.

Notification CDEM Groups and CDEM Group members will receive one or more of the following initial notifications:

- “*National Advisory - Tsunami No Threat to NZ*”
- “*National Advisory - Tsunami Potential Threat to NZ*”
- “*National Warning – Tsunami Threat to NZ*”.

Action guide The actions that will be carried out by CDEM Groups are detailed in the table below.

Estimated time to complete steps 1-2: 15 to 30 minutes

On receipt of one or more of the notifications listed above.

Step	Event and action	Responsibility
1	Follow Group emergency response procedures. Assess local threat and if appropriate, issue local warnings and/or decide on evacuations.	Group Controller
2	In the event of a <i>National Advisory Tsunami Potential Threat</i> or <i>National Warning - Tsunami: Threat to NZ</i> being issued, inform the appointed MCDEM Regional Emergency Management Advisor about the response taken. Similarly when responding in reaction to any other notification, inform the appointed MCDEM Regional Emergency Management Advisor.	Group Controller
3	Upon activation of the CDEM Group Emergency Coordination Centre, establish contact with the NCMC.	Group Controller
4	Attend teleconferences hosted by the National Controller.	Group Controller
5	Update the NCMC and neighbouring CDEM Groups on response actions taken.	Group Controller

3.6 Media: Distribution

Responsibilities

MCDEM distributes all National Advisories and Warnings to the media who broadcast or publish the information at will.

When MCDEM issues a *National Advisory – Tsunami Potential Threat to NZ* or a *National Warning – Tsunami Threat to NZ* certain public radio and television stations are requested to interrupt programmes to broadcast the official information at indicated intervals.

CDEM Groups may also include local broadcasters in their local public alerting systems.

Notification

Radio and television stations will receive one or more of the following initial notifications:

- “*National Advisory – Tsunami No Threat to NZ*”
- “*National Advisory – Tsunami Potential Threat to NZ*”
- “*National Warning – Tsunami Threat to NZ*”
- “*Request for the broadcast of an emergency announcement*”.

3.7 Maritime New Zealand: Distribution

Responsibilities Maritime New Zealand, using the Maritime Operations Centre, is responsible for safety of life at sea communications, including maritime safety information in Navigation Area XIV. This area covers the Pacific stretching from the equator to the South Pole and the Mid Tasman to 120 degrees west. This includes the dissemination of maritime safety information in the area it is responsible for.

Notification Maritime New Zealand will receive one or more of the following initial notifications:

- “National Advisory – Tsunami No Threat to NZ”
- “National Advisory – Tsunami Potential Threat to NZ”
- “National Warning – Tsunami Threat to NZ”.

Action guide The actions that will be carried out by Maritime New Zealand using the Maritime Operations Centre are detailed in the table below.

Estimated time to complete steps 1-2: 15 to 30 minutes		
On receipt of one or more of the notifications listed above.		
Step	Event and action	Responsibility
1	Broadcast the <i>National Advisory – Tsunami: Potential Threat to NZ</i> or <i>National Warning – Tsunami: Threat to NZ</i> to mariners.	Duty Officer
2	Carry out own agency response actions.	Duty Officer

3.8 Other agencies: Distribution

Responsibilities A number of other New Zealand agencies, including the emergency services, receive official national tsunami advisories and warnings from MCDEM. These agencies respond to the information in accordance with their own arrangements and/or procedures and where applicable, in support of CDEM Groups.

Notification National agencies will receive one or more of the following initial notifications:

- “National Advisory - Tsunami No Threat to NZ”
- “National Advisory - Tsunami Potential Threat to NZ”
- “National Warning – Tsunami Threat to NZ”.

Action guide

The actions that will be carried out by these agencies are detailed in the tables below.

Estimated time to complete step 1: 15 to 30 minutes

On receipt of one or more of the notifications listed above.

Step	Event and action	Responsibility
1	Follow agency emergency response procedures.	Agency Duty Officer

Estimated time: 1 hour from receipt of *National Advisory - Tsunami: Potential Threat to NZ* or *National Warning - Tsunami: Threat to NZ*

Step	Event and action	Responsibility
2	Inform the NCMC about decisions made and activities undertaken.	Agency Duty Officer
3	Provide Liaison Officer(s) to the NCMC if requested.	Agency Controller

Section 4 Initial tsunami threat assessment

This section explains MCDEM's process for assessing tsunami information and determining the appropriate response.

4.1 Initial assessment

The MCDEM Duty Officer determines if the information received from PTWC/GNS Science meets the indicators identified in *Table 1: Response Indicators*.

Where necessary the MCDEM Duty Officer will engage with the GNS Science Duty Officer who will assist the initial assessment.

SPECIAL CONSIDERATION – LOCAL SOURCE TSUNAMIS

A tsunami generated in conjunction with a nearby large earthquake or undersea landslide may not provide sufficient time to implement official warning procedures.

Persons in coastal areas who:

- **experience strong earthquakes (hard to stand up);**
- **experience weak earthquakes lasting for a minute or more;**
- **observe strange sea behaviour such as the sea level suddenly rising and falling, or hear the sea making loud and unusual noises or roaring like a jet engine;**

should not wait for an official warning. Instead, let the natural signs be the warning. They must take immediate action to evacuate predetermined evacuation zones, or in the absence of predetermined evacuation zones, go to high ground or go inland.

4.2 “Response indicators” for MCDEM

The following table explains the “*Response indicators*” used by MCDEM to initiate national tsunami advisories or warnings. The table details the thresholds for the respective originating locations and templates to use if the thresholds are met.

Region	Location	Thresholds	Template to use
0	NZ Local (within ±500km from any NZ shore)	Mw≥7.5 and depth <100km	National Warning – Tsunami: Threat to NZ
1	South West Pacific	Mw≥8 and depth <100km	National Warning – Tsunami: Threat to NZ
		Mw>7.5-≤7.9 and depth <100km	National Advisory – Tsunami: Potential threat to NZ
2	South America	Mw≥8.0 and depth <100km	National Advisory – Tsunami: Potential threat to NZ
3	Central America		
4	Cascadia		
5	Aleutians Rat Island		
6	Kurile Islands Kamchatka		
7	Japan		
8	Other (any location not inside a circle on map)		

Table 1: Response Indicators

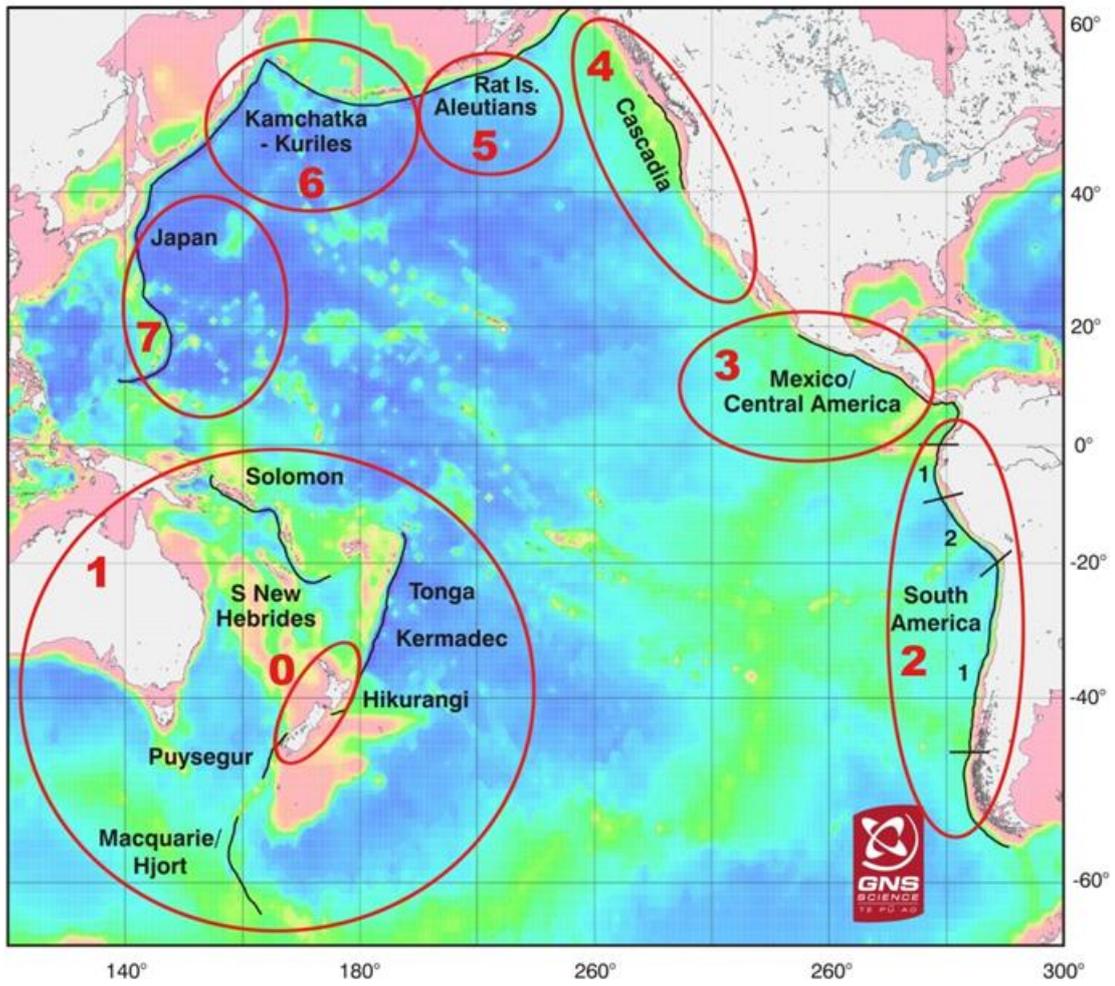


Figure 2: Origin Locations (Regions 0-7)

Section 5 Further assessment for national warnings

5.1 Introduction

When a National Advisory-Tsunami: Potential Threat to New Zealand is upgraded to a National Warning-Tsunami: Threat to New Zealand by MCDEM, information about expected arrival times and threat will be provided. Where a National Warning-Tsunami: Threat to New Zealand is issued as the initial (first) notification, the additional information will be provided from the next (subsequent) notification. This section explains this additional information.

5.2 Estimated times of arrival

Information about expected arrival times is derived from modelling conducted by the PTWC and moderated by GNS Science. The information is expressed as the estimated time of arrival (ETA) of the first (lead) wave at a given coastal point. The modelling applied is not precise and the ETA given is the earliest possible time of arrival.

The coastal points that ETAs may be provided for are:

Chatham Islands-Kaingaroa	Wellington
Chatham Islands-Waitangi	Nelson
North Cape	Marlborough Sounds
Whangarei	Westport
Auckland	Greymouth
Mt Maunganui	Lyttelton
East Cape	Timaru
Gisborne	Milford Sound
New Plymouth	Dunedin
Napier	Bluff
Wanganui	Stewart Island

Estimated times of arrival are displayed in map and/or table format in MCDEM national warning messages as they become available.

NOTE:

- 1 The first wave is not always the largest or highest and waves are likely to continue for many hours.**
- 2 ETAs are only provided up to the time when all the estimated first arrival times have passed. It is likely that warnings will remain in force after that.**
- 3 ETAs are given in terms of date and NZ Standard Time (NZST) or NZ Daylight Saving Time (NZDT) – whichever applies.**
- 4 Not all the coastal points given in the list above may be covered at all times. For coastal areas that are not covered the nearest point covered must apply.**

5.3 Threat estimation

GNS Science will apply source modelling to provide information about the maximum expected water elevation (wave amplitude, see glossary, page 4) at shore for specific New Zealand coastal zones. GNS Science may activate the Tsunami Experts Panel (TEP) for support.

5.4 Coastal zones

The 43 coastal zones for which estimates will be made are as follows:

Figure 2: New Zealand coastal zones for tsunami threat forecasts



5.5 Threat levels

The amplitudes at shore and threat definitions that can be assigned for the coastal zones are as follows:

Maximum expected amplitude at shore		Threat definition
	<0.2m	No threat
	0.2-1m	Marine and Beach Threat (incl. harbours, estuaries and small boats)
	1-3m	Marine and Land Threat
	3-5m	
	5-8m	
	>8m	

Threat levels are displayed in map and/or table format in MCDEM national warning messages as they become available.

CDEM Groups and CDEM Group members must apply these threat indicators including consideration of wave run-up to decide appropriate evacuation zones (see Note below).

NOTE:

- 1 **The stated levels may apply to any one of the series of waves generated by the event and not necessarily to the first wave. The first wave is not always the largest or highest and waves are likely to continue for many hours.**
- 2 **The threat levels suggest the largest wave at any coastal point inside the zone. Wave amplitudes will vary within a zone.**
- 3 **The amplitudes do not include the tidal state (sea level) at the time the wave reaches the shore.**
- 4 **The estimate is for the maximum expected wave amplitude at shore. Run-up can be twice as high on steep slopes onshore near the coast, i.e. a wave measuring 5m at shore can run up as high as 10m on-land near the shore.**
- 5 **The expected wave amplitudes (crest or trough to sea level) at the shore are likely to be different to measurements given in PTWC messages. PTWC measurements are taken at sea level gauges in the open ocean or at coastal points off-shore from New Zealand. MCDEM information represents the official threat estimates.**

Section 6 Types of notifications from MCDEM

6.1 Notifications from MCDEM

Depending on the assessment of the information received for an earthquake, MCDEM may issue one or more of the following notifications:

National Advisory - Tsunami: No threat to NZ
National Advisory - Tsunami: Potential threat to NZ
National Warning - Tsunami Threat to NZ
National Warning - Tsunami Marine and Beach Threat
National Warning - Tsunami Marine and Land Threat
National Advisory - Tsunami Cancellation
National Warning - Tsunami Cancellation
Request for the broadcast of an emergency announcement
Request for the termination of an emergency announcement

Note:

Section 3 of this plan details the actions to be taken by CDEM agencies and associated organisations when receiving national tsunami notifications.

Annex A to this plan shows examples of the templates used to format the message for each type of notification issued.

6.2 National Advisory – Tsunami: No threat to NZ

Description	<p>A <i>National Advisory – Tsunami: No Threat to NZ</i> is a message that tsunami information has been received and the tsunami does not pose a threat to New Zealand coastlines but the event is deemed to be within the interests of the CDEM sector.</p> <p>An example of the <i>National Advisory – Tsunami: No Threat to NZ</i> template is located in Annex A to this plan.</p>
Issuing process	<p>A <i>National Advisory – Tsunami: No Threat to NZ</i> is issued through the National Warning System to all those that are registered on the NWS database, including the media.</p> <p>A <i>National Advisory – Tsunami: No Threat to NZ</i> is the final message for the event and it is not followed up by subsequent information or notifications and a cancellation message will not be issued.</p>

6.3 National Advisory – Tsunami: Potential threat to NZ

Description

A *National Advisory – Tsunami: Potential Threat to NZ* is a message that tsunami information has been received and:

- the current threat is unknown, and the information is being assessed to determine the potential tsunami threat for New Zealand, or
- the characteristics of the earthquake are such that there is a possibility a tsunami has been generated.

An example of the template *National Advisory – Tsunami: Potential Threat to NZ* is located in Annex A to this plan.

Issuing process

A *National Advisory – Tsunami: Potential Threat to NZ* is issued through the National Warning System to all those that are registered on the NWS database, including the media.

MCDEM will follow up a *National Advisory – Tsunami Potential Threat to NZ* by issuing a *National Advisory - Tsunami Cancellation* or escalate the advisory to a warning by issuing a *National Warning – Tsunami Threat to NZ*, a *National Warning – Tsunami Marine and Beach Threat*, or a *National Warning – Tsunami Marine and Land Threat*.

A *National Advisory – Tsunami: Potential Threat to NZ* will be followed up by hourly (or more frequent) messages until a Cancellation is issued.

A *Request for Broadcast of an Emergency Announcement* will be made to radio and television under the arrangements in The Guide to the National CDEM Plan.

6.4 National Warning – Tsunami: Threat to NZ

Description

A *National Warning – Tsunami Threat to NZ* is a message that a tsunami threat to the New Zealand coastline is imminent or likely. In a developing situation some information may not be available or may reflect a degree of uncertainty. Where known it will contain the following information:

- Estimated first tsunami arrival times at specific New Zealand coastal points,
- estimated threat levels for specific coastal zones,
- advice for the general public.

An example of the template *National Warning – Tsunami Threat to NZ* is located in Annex A to this plan.

Issuing process

A *National Warning – Tsunami Threat to NZ* is issued through the National Warning System to all those that are registered on the NWS database, including the media.

MCDEM will follow up a *National Warning – Tsunami Threat to NZ* with hourly updates or will formally cancel the warning by issuing a *National Warning – Tsunami Cancellation*.

A *Request for Broadcast of an Emergency Announcement* will be made to radio and television under the arrangements in The Guide to the National CDEM Plan.

6.5 National Warning – Tsunami: Marine and Beach Threat

Description

A *National Warning – Tsunami Marine and Beach Threat* is a message that a tsunami threat to the New Zealand coastline is imminent or likely. Unusually strong currents and unpredictable water flows near the shore can be expected. This means a threat to beach, harbour, estuary and small boat activities. Coastal inundation (flooding of land areas near the shore) is not expected but this assessment may change.

Where known, the message information will contain the following information:

- estimated first tsunami arrival times at specific New Zealand coastal points,
- estimated threat levels for specific coastal zones.

An example of the template *National Warning – Tsunami Marine and Beach Threat* is located in Annex A to this plan.

Issuing process

A *National Warning – Tsunami Marine and Beach Threat* is issued through the National Warning System to all those that are registered on the NWS database, including the media.

MCDEM will follow up a *National Warning – Tsunami Marine and Beach Threat* with hourly updates or will formally cancel the warning by issuing a *National Warning – Tsunami Cancellation*.

A *Request for Broadcast of an Emergency Announcement* will be made to radio and television under the arrangements in The Guide to the National CDEM Plan.

6.6 National Warning – Tsunami: Marine and Land Threat

Description

A *National Warning – Tsunami Marine and Land Threat* is a message that a tsunami threat to New Zealand coastal areas is imminent or likely. In addition to the threat described under *National Warning – Tsunami Marine and Beach Threat*, a threat of coastal inundation to land areas near the shore exists.

Where known, the message information will contain the following information:

- estimated first tsunami arrival times at specific New Zealand coastal points,
- estimated threat levels for specific coastal zones.

An example of the template *National Warning – Tsunami Marine and Land Threat* is located in Annex A to this plan.

Issuing process

A *National Warning – Tsunami Marine and Land Threat* is issued through the National Warning System to all those that are registered on the NWS database, including the media.

MCDEM will follow up a *National Warning – Tsunami Marine and Land Threat* with hourly updates or will formally cancel the warning by issuing a *National Warning – Tsunami Cancellation*.

A *Request for Broadcast of an Emergency Announcement* will be made to radio and television under the arrangements in The Guide to the National CDEM Plan.

6.7 National Advisory or Warning -Tsunami Cancellation

Description

A *National Advisory or Warning – Tsunami Cancellation* is a notification to inform all agencies that there is no longer a tsunami threat to New Zealand. MCDEM will issue this notification once it has received confirmation from its scientific advisors that a threat no longer exists or has reduced to below warning level. If there is a degree of uncertainty the Advisory or Warning will remain in place.

An example of the template *National Advisory or Warning – Tsunami Cancellation* is located in Annex A to this plan.

Issuing process

A *National Advisory or Warning – Tsunami Cancellation* is issued through the National Warning System to all those that are registered on the NWS database, including the media.

All agencies will follow stand-down procedures as detailed in their own agency or group plans.

A request will be made to terminate the Broadcast of an Emergency Announcement made under the arrangements in The Guide to the National CDEM Plan.

6.8 Request for the broadcast of an emergency announcement

Description

A *Request for the broadcast of an emergency announcement* is made by MCDEM when a *National Advisory – Tsunami Potential Threat to NZ*, a *National Warning - Tsunami Threat to NZ*, a *National Warning – Tsunami Marine and Beach Threat*, or a *National Warning – Tsunami Marine and Land Threat* is issued.

The radio and television stations requested to broadcast the announcement under the terms of the MOU agreement with MCDEM are:

- Radio New Zealand
- Radio New Zealand International
- Classic Hits
- NewstalkZB
- More FM
- Radio Live
- TVNZ
- TV3

Depending on the priority (urgency), a *Request for the broadcast of an emergency announcement* can state that the information must be broadcasted at least every 15 minutes until a request is made to terminate the broadcast.

Examples of the templates *Request for the broadcast of an emergency announcement* and *Request to terminate the broadcast of an emergency announcement* are located in Annex A to this plan.

Issuing process

MCDEM maintains formal arrangements with radio and television for the broadcast of emergency announcements. These arrangements are described in The Guide to the National CDEM Plan.

Any request for the broadcast of an emergency announcement must be closed by an official *Request to terminate the broadcast of an emergency announcement* forwarded in the same manner as the initiating request for broadcast.

Appendix A Tsunami notification examples

Introduction

This section contains examples of the various templates used for tsunami notifications. Templates are subject to change in order to accommodate operational improvements and changes in contact details.

Note about the examples provided

Yellow highlight fields within the templates show information that needs to be inserted or edited.

In their completed state, all colour coding will be removed.

Some telephone numbers have been removed from the examples.

1. Example: National Advisory – Tsunami No Threat to NZ

National Advisory: Tsunami – No Threat to New Zealand

No: 01

Issued at [insert time __: __] hours on [insert date __/__/__].

Issued by the Ministry of Civil Defence & Emergency Management (MCDEM)

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

Summary:

The Pacific Tsunami Warning Centre (PTWC) has issued a Tsunami Information Statement in response to the above earthquake.

Only messages issued by MCDEM represent the official warning status for New Zealand.

MCDEM has assessed the information with the assistance of scientific advisors. Based on current information, the initial assessment is that the earthquake is unlikely to have caused a tsunami that will pose a threat to New Zealand.

This advisory has been issued to all local civil defence authorities, emergency services, other agencies and media.

This will be the final message via the national warning system for this event unless the event parameters change significantly.

NCMC status:

The National Crisis Management Centre (NCMC) is not activated.

Normal Ministry of Civil Defence & Emergency Management contact details apply.

General enquiries to 04 XXX XXXX

Media enquiries to 04 XXX XXXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

2. Example: National Advisory – Tsunami Potential Threat to NZ

National Advisory: Tsunami: Potential Threat

No: 01

Issued at [insert time __:__] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a Tsunami Potential Threat advisory for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')]

The Potential Threat advisory will remain in effect until:

- It is upgraded to a Tsunami Warning by MCDEM, or
- A cancellation message is issued by MCDEM.

MCDEM and scientific advisors are in the process of assessing the situation to determine the severity of the threat to New Zealand. Updates will be issued at least hourly.

Meanwhile, people in coastal areas should:

- Note that a tsunami is possible
- Listen to the radio/TV for further assessment and updates
- Follow instructions of their local Civil Defence authorities.

Only messages issued by MCDEM represent the official warning status for New Zealand. We note the Pacific Tsunami Warning Centre (PTWC) has issued a Tsunami [Information Statement/Threat Message – [delete as appropriate]] for this event. PTWC messages do not represent the official warning status for New Zealand.

This advisory has been issued to all local civil defence authorities, emergency services, other agencies and media.

Information for emergency managers:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Advisory: Tsunami: Potential Threat - continued

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM to act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM has activated the Memorandum of Understanding (MoU) with public broadcasters to broadcast this advisory.

NCMC status:

The National Crisis Management Centre (NCMC) is being activated.

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Media enquiries to 04 XXX XXXX.

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

3. Example: National Advisory – Tsunami potential threat to NZ, still awaiting confirmation

National Advisory: Tsunami Potential Threat to New Zealand Update: Still awaiting threat confirmation

No: [insert e.g. 02]

Issued at [insert time __:__] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a Tsunami Potential Threat advisory for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')]

The Potential Threat advisory will remain in effect until:

- It is upgraded to a Tsunami Warning by MCDEM, or
- A cancellation message is issued by MCDEM.

MCDEM and scientific advisors are still in the process of assessing the situation to determine the severity of the threat to New Zealand. An update will be issued shortly.

Meanwhile, people in coastal areas should:

- Note that a tsunami is possible
- Listen to the radio/TV for further assessment and updates
- Follow instructions of their local Civil Defence authorities.

Only messages issued by MCDEM represent the official warning status for New Zealand. We note the Pacific Tsunami Warning Centre (PTWC) has issued a Tsunami [Information Statement/Threat Message – [delete as appropriate]] for this event. PTWC messages do not represent the official warning status for New Zealand.

This advisory has been issued to all local civil defence authorities, emergency services, other agencies and media.

Information for emergency managers:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Advisory: Tsunami Potential Threat to New Zealand Update: Still awaiting threat confirmation - continued

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM to act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM has activated the Memorandum of Understanding (MoU) with public broadcasters to broadcast this advisory.

NCMC status:

The National Crisis Management Centre (NCMC) is activated.

General enquiries	(04) XXX XXXX
Media enquiries	(04) XXX XXXX
Email	XXX@XX.govt.nz
Satellite phone	00881 XXX XXX XXXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

4. Example: National Warning – Tsunami threat to NZ

National Warning: Tsunami Threat to New Zealand

No: 01

Issued at [insert time __:__] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a tsunami warning for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')]

A tsunami is possible. If a tsunami has been generated, the first wave may arrive in New Zealand in the areas around [insert place] at earliest [insert time NZDT/NZST] on [insert date]. The first waves may not be the largest and wave activity will continue for several hours.

This warning will remain in effect until a cancellation message is issued by MCDEM.

A more detailed threat assessment or a cancellation will be issued by MCDEM within the next hour. Meanwhile, people in coastal areas should:

- Stay out of the water (sea, rivers and estuaries, including boating activities)
- Stay off beaches and shore areas.
- Do not go sightseeing.
- Share this information with family, neighbours and friends.
- Listen to the radio/TV for updates
- Follow instructions of their local Civil Defence authorities.

Only messages issued by MCDEM represent the official warning status for New Zealand, not those issued by the Pacific Tsunami Warning Centre (PTWC).

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media.

More detail:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Warning: Tsunami Threat to New Zealand - continued

Information for emergency managers:

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM to act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM has activated the Memorandum of Understanding (MoU) with public broadcasters to broadcast this warning.

NCMC status:

The National Crisis Management Centre (NCMC) is being activated.

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Media enquiries to 04 XXX XXXX.

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

5. Example: National Warning – Tsunami threat to NZ, still awaiting confirmation

National Warning: Tsunami Threat to New Zealand Update: Still awaiting threat confirmation

No: [insert e.g. 02]

Issued at [insert time __: __] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a tsunami warning for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')]

MCDEM is still assessing the threat and will provide a detailed threat assessment or a cancellation within the next hour.

A tsunami is still possible. If a tsunami has been generated, the first wave may arrive in New Zealand in the areas around [insert place] at earliest [insert time NZDT/NZST] on [insert date]. The first waves may not be the largest and wave activity will continue for several hours.

This warning will remain in effect until a cancellation message is issued by MCDEM.

Meanwhile, people in coastal areas should:

- Stay out of the water (sea, rivers and estuaries, including boating activities)
- Stay off beaches and shore areas.
- Do not go sightseeing.
- Share this information with family, neighbours and friends.
- Listen to the radio/TV for updates
- Follow instructions of their local Civil Defence authorities.

Only messages issued by MCDEM represent the official warning status for New Zealand, not those issued by the Pacific Tsunami Warning Centre (PTWC).

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media.

More detail:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Warning: Tsunami Threat to New Zealand Update: Still awaiting threat confirmation - continued

Information for emergency managers:

Estimates of expected first wave arrival times are as follows: **[delete this section if wave arrival times are not available.]**

Note: These times are provisional and based on the best information available. Arrival times may be as much as one hour later and may be adjusted in subsequent messages.

Chatham Islands - Kaingaroa	[insert NZST or NZDT time and date, or No Information] delete one
Chatham Islands – Waitangi	[insert NZST or NZDT time and date, or No Information] delete one
North Cape	[insert NZST or NZDT time and date, or No Information] delete one
Whangarei	[insert NZST or NZDT time and date, or No Information] delete one
Auckland	[insert NZST or NZDT time and date, or No Information] delete one
Mt Maunganui	[insert NZST or NZDT time and date, or No Information] delete one
East Cape	[insert NZST or NZDT time and date, or No Information] delete one
Gisborne	[insert NZST or NZDT time and date, or No Information] delete one
New Plymouth	[insert NZST or NZDT time and date, or No Information] delete one
Napier	[insert NZST or NZDT time and date, or No Information] delete one
Wanganui	[insert NZST or NZDT time and date, or No Information] delete one
Wellington	[insert NZST or NZDT time and date, or No Information] delete one
Nelson	[insert NZST or NZDT time and date, or No Information] delete one
Marlborough Sounds	[insert NZST or NZDT time and date, or No Information] delete one
Westport	[insert NZST or NZDT time and date, or No Information] delete one
Greymouth	[insert NZST or NZDT time and date, or No Information] delete one
Lyttelton	[insert NZST or NZDT time and date, or No Information] delete one
Timaru	[insert NZST or NZDT time and date, or No Information] delete one
Milford Sound	[insert NZST or NZDT time and date, or No Information] delete one
Dunedin	[insert NZST or NZDT time and date, or No Information] delete one
Bluff	[insert NZST or NZDT time and date, or No Information] delete one
Stewart Island	[insert NZST or NZDT time and date, or No Information] delete one

National Warning: Tsunami Threat to New Zealand Update: Still awaiting threat confirmation - continued

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM must act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM is continuing the activation of the Memorandum of Understanding (MoU) with public broadcasters to broadcast this warning.

NCMC status:

The National Crisis Management Centre (NCMC) is activated.

General enquiries	(04) XXX XXXX
Media enquiries	(04) XXX XXXX
Email	XXX@XX.govt.nz
Satellite phone	00881 XXX XXX XXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

6. Example: National Warning – Tsunami Threat to New Zealand, Tsunami confirmed

National Warning: Tsunami Threat to New Zealand Update: Tsunami confirmed

No: [insert e.g. 02]

Issued at [insert time __: __] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a tsunami warning for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')]

This warning will remain in effect until a cancellation message is issued by MCDEM.

Confirmation has been received that a tsunami was generated. A wave height measuring [insert metres] was measured at [insert place/gauge] at [insert time NZDT/NZST]. Refer to the attached threat level estimates for New Zealand [delete if not available].

The first wave to arrive in New Zealand will be in the areas around [insert place] at approximately [insert time NZDT/NZST] on [insert date]. The first wave may arrive later and may not be the largest. Waves will continue for several hours.

People in coastal areas should:

- Stay out of the water (sea, rivers and estuaries, including boating activities)
- Stay off beaches and shore areas.
- Do not go sightseeing.
- Share this information with family, neighbours and friends.
- Listen to the radio/TV for updates
- Follow instructions of their local Civil Defence authorities.

Only messages issued by MCDEM represent the official warning status for New Zealand, not those issued by the Pacific Tsunami Warning Centre (PTWC).

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media.

More detail:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Warning: Tsunami Threat to New Zealand Update: Tsunami confirmed - continued

Information for emergency managers:

Estimates of expected first wave arrival times are as follows:

Note: These times are provisional and based on the best information available. Arrival times may be as much as one hour later and may be adjusted in subsequent messages.

Chatham Islands - Kaingaroa	[insert NZST or NZDT time and date, or No Information] delete one
Chatham Islands – Waitangi	[insert NZST or NZDT time and date, or No Information] delete one
North Cape	[insert NZST or NZDT time and date, or No Information] delete one
Whangarei	[insert NZST or NZDT time and date, or No Information] delete one
Auckland	[insert NZST or NZDT time and date, or No Information] delete one
Mt Maunganui	[insert NZST or NZDT time and date, or No Information] delete one
East Cape	[insert NZST or NZDT time and date, or No Information] delete one
Gisborne	[insert NZST or NZDT time and date, or No Information] delete one
New Plymouth	[insert NZST or NZDT time and date, or No Information] delete one
Napier	[insert NZST or NZDT time and date, or No Information] delete one
Wanganui	[insert NZST or NZDT time and date, or No Information] delete one
Wellington	[insert NZST or NZDT time and date, or No Information] delete one
Nelson	[insert NZST or NZDT time and date, or No Information] delete one
Marlborough Sounds	[insert NZST or NZDT time and date, or No Information] delete one
Westport	[insert NZST or NZDT time and date, or No Information] delete one
Greymouth	[insert NZST or NZDT time and date, or No Information] delete one
Lyttelton	[insert NZST or NZDT time and date, or No Information] delete one
Timaru	[insert NZST or NZDT time and date, or No Information] delete one
Milford Sound	[insert NZST or NZDT time and date, or No Information] delete one
Dunedin	[insert NZST or NZDT time and date, or No Information] delete one
Bluff	[insert NZST or NZDT time and date, or No Information] delete one
Stewart Island	[insert NZST or NZDT time and date, or No Information] delete one

National Warning: Tsunami Threat to New Zealand Update: Tsunami confirmed - continued

Estimates of expected threat levels are as per the map attached: **[delete this section if wave height/threat level map is not available.]**

Note: The threat levels given in the attachment suggest the largest wave at any coastal point inside the zone. Waves will vary within the zone, and the first wave may not be the highest. The estimate is for the maximum expected wave amplitude at shore; run-up can be up to twice as high on steep slopes onshore near the coast, i.e. a 5m wave at shore can run-up as high as 10m on land near the shore. The amplitude given does not include the sea state or tidal state at the time of wave arrival. **[delete this section if threat levels are not available.]**

[Remember to attach GNS threat level map as a separate attachment and do not include in the body of the email/fax]

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM must act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM is continuing the activation of the Memorandum of Understanding (MoU) with public broadcasters to broadcast this warning.

NCMC status:

The National Crisis Management Centre (NCMC) is activated.

General enquiries	(04) XXX XXXX
Media enquiries	(04) XXX XXXX
Email	XXX@XX.govt.nz
Satellite phone	00881 XXX XXX XXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

7. Example: National Warning – Tsunami Marine and Beach Threat

National Warning: Tsunami Marine and Beach Threat

No: [01]

Issued at [insert time __: __] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a tsunami warning (marine and beach threat) for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')] See the attached map for affected areas [delete this sentence if no map is available].

People in the above/all coastal areas should:

- Stay out of the water (sea, rivers and estuaries, including boating activities)
- Stay off beaches and shore areas.
- Do not go sightseeing.
- Share this information with family, neighbours and friends.
- Listen to the radio/TV for updates
- Follow instructions of their local Civil Defence authorities.

This tsunami warning will remain in effect until a cancellation message is issued by MCDEM. Updates will be issued hourly.

Only messages issued by MCDEM represent the official warning status for New Zealand, not those issued by the Pacific Tsunami Warning Centre (PTWC).

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media. Local civil defence authorities will interpret this information for their areas and advise public action via local radio stations.

More detail:

Areas under 'Marine and Beach Threat': Expect unusually strong currents and unpredictable water flows near the shore. This means a threat to beach, harbour, estuary and small boat activities. The severity of currents and changing water flows will vary within a particular coastal area and over the period this warning is in effect. Current assessments indicate that coastal inundation (flooding of land areas near the shore) is not expected but this assessment may change.

Note:

- The wave amplitudes given indicate the largest expected wave activity at any coastal point in the particular coastal zone and at any time during the entire period this warning is in effect (tsunami activity will vary in a zone and with time; the first wave activity may also not be the largest).
- The given amplitudes do not include the local tidal or sea state at the time of tsunami activity.
- Local authorities will determine the implication of the expected wave heights for their areas and will decide on appropriate response actions (e.g. evacuations). Listen or check for this information from your local authority.

National Warning: Tsunami Marine and Beach Threat - continued

The first tsunami activity may reach New Zealand in the areas around [insert place] at approximately [insert time NZDT/NZST] on [insert date]. This may be later and the first activity may not be the most significant. Tsunami activity will continue for several hours and the threat must be regarded as real until this warning is cancelled.

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media. MDEM and scientific advisors are closely monitoring the situation to update this assessment. Information will be updated or repeated hourly until this warning is cancelled. Also see www.civildefence.govt.nz.

Information for emergency managers:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

Estimates of expected first wave arrival times are as follows:

Note: These times are provisional and based on the best information available. Arrival times may be as much as one hour later and may be adjusted in subsequent messages.

Chatham Islands - Kaingaroa	[insert NZST or NZDT time and date, or No Information] delete one
Chatham Islands – Waitangi	[insert NZST or NZDT time and date, or No Information] delete one
North Cape	[insert NZST or NZDT time and date, or No Information] delete one
Whangarei	[insert NZST or NZDT time and date, or No Information] delete one
Auckland	[insert NZST or NZDT time and date, or No Information] delete one
Mt Maunganui	[insert NZST or NZDT time and date, or No Information] delete one
East Cape	[insert NZST or NZDT time and date, or No Information] delete one
Gisborne	[insert NZST or NZDT time and date, or No Information] delete one
New Plymouth	[insert NZST or NZDT time and date, or No Information] delete one
Napier	[insert NZST or NZDT time and date, or No Information] delete one
Wanganui	[insert NZST or NZDT time and date, or No Information] delete one
Wellington	[insert NZST or NZDT time and date, or No Information] delete one

National Warning: Tsunami Marine and Beach Threat - continued

Nelson	[insert NZST or NZDT time and date, or No Information] delete one
Marlborough Sounds	[insert NZST or NZDT time and date, or No Information] delete one
Westport	[insert NZST or NZDT time and date, or No Information] delete one
Greymouth	[insert NZST or NZDT time and date, or No Information] delete one
Lyttelton	[insert NZST or NZDT time and date, or No Information] delete one
Timaru	[insert NZST or NZDT time and date, or No Information] delete one
Milford Sound	[insert NZST or NZDT time and date, or No Information] delete one
Dunedin	[insert NZST or NZDT time and date, or No Information] delete one
Bluff	[insert NZST or NZDT time and date, or No Information] delete one
Stewart Island	[insert NZST or NZDT time and date, or No Information] delete one

[delete this para if threat level map is not available:] Estimates of expected threat levels are as per the attached map.

Remember to attach GNS threat level map as a separate attachment and do not include in the body of the email/fax]

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM must act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM is continuing the activation of the Memorandum of Understanding (MoU) with public broadcasters to broadcast this warning.

NCMC status:

The National Crisis Management Centre (NCMC) is activated.

General enquiries	(04) XXX XXXX
Media enquiries	(04) XXX XXXX
Email	XXX@XX.govt.nz
Satellite phone	00881 XXX XXX XXX

National Warning: Tsunami Marine and Beach Threat - continued

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

8. Example: National Warning – Tsunami Marine and Land Threat

National Warning: Tsunami Marine and Land Threat

No: [01]

Issued at [insert time __:__] hours on [insert date __/__/__].

The Ministry of Civil Defence & Emergency Management (MCDEM) has issued a tsunami warning (marine and land threat) for [insert regions or all of New Zealand coastal areas including the Chatham Islands. (if regions haven't been identified, use 'all of New Zealand')] See the attached map for affected areas [delete this sentence if no map is available].

People in the above/all coastal areas should:

- Stay out of the water (sea, rivers and estuaries, including boating activities)
- Stay off beaches and shore areas.
- Do not go sightseeing.
- Share this information with family, neighbours and friends.
- Listen to the radio/TV for updates
- Follow instructions of their local Civil Defence authorities.

This tsunami warning will remain in effect until a cancellation message is issued by MCDEM. Updates will be issued hourly.

Only messages issued by MCDEM represent the official warning status for New Zealand, not those issued by the Pacific Tsunami Warning Centre (PTWC).

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media. Local civil defence authorities will interpret this information for their areas and advise public action via local radio stations.

More detail:

Areas under 'Marine and Beach Threat': Expect unusually strong currents and unpredictable water flows near the shore. This means a threat to beach, harbour, estuary and small boat activities. The severity of currents and changing water flows will vary within a particular coastal area and over the period this warning is in effect.

Areas under 'Marine and Land Threat': In addition to the threat described above, expect a threat of coastal inundation to land areas near the shore. Current assessments indicate that wave amplitudes of up to [insert metres] can be expected in some areas [see attached map].

Note:

- The wave amplitudes given indicate the largest expected wave activity at any coastal point in the particular coastal zone and at any time during the entire period this warning is in effect (tsunami activity will vary in a zone and with time; the first wave activity may also not be the largest).
- The given amplitudes do not include the local tidal or sea state at the time of tsunami activity.

National Warning: Tsunami Marine and Land Threat - continued

- The amplitudes given are at shore. Tsunami run-up on steep slopes onshore can be up to twice as high i.e. a 5m wave at shore can run-up as high as 10m on land near the shore.
- Local authorities will determine the implication of the expected wave heights for their areas and will decide on appropriate response actions (e.g. evacuations). Listen or check for this information from your local authority.

The first tsunami activity may reach New Zealand in the areas around [insert place] at approximately [insert time NZDT/NZST] on [insert date]. This may be later and the first activity may not be the most significant. Tsunami activity will continue for several hours and the threat must be regarded as real until this warning is cancelled.

This warning has been issued to all local civil defence authorities, emergency services, other agencies and media. MDEM and scientific advisors are closely monitoring the situation to update this assessment. Information will be updated or repeated hourly until this warning is cancelled. Also see www.civildefence.govt.nz.

Information for emergency managers:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

Estimates of expected first wave arrival times are as follows:

Note: These times are provisional and based on the best information available. Arrival times may be as much as one hour later and may be adjusted in subsequent messages.

Chatham Islands - Kaingaroa	[insert NZST or NZDT time and date, or No Information] delete one
Chatham Islands – Waitangi	[insert NZST or NZDT time and date, or No Information] delete one
North Cape	[insert NZST or NZDT time and date, or No Information] delete one
Whangarei	[insert NZST or NZDT time and date, or No Information] delete one
Auckland	[insert NZST or NZDT time and date, or No Information] delete one
Mt Maunganui	[insert NZST or NZDT time and date, or No Information] delete one
East Cape	[insert NZST or NZDT time and date, or No Information] delete one
Gisborne	[insert NZST or NZDT time and date, or No Information] delete one

National Warning: Tsunami Marine and Land Threat - continued

New Plymouth	[insert NZST or NZDT time and date, or No Information] delete one
Napier	[insert NZST or NZDT time and date, or No Information] delete one
Wanganui	[insert NZST or NZDT time and date, or No Information] delete one
Wellington	[insert NZST or NZDT time and date, or No Information] delete one
Nelson	[insert NZST or NZDT time and date, or No Information] delete one
Marlborough Sounds	[insert NZST or NZDT time and date, or No Information] delete one
Westport	[insert NZST or NZDT time and date, or No Information] delete one
Greymouth	[insert NZST or NZDT time and date, or No Information] delete one
Lyttelton	[insert NZST or NZDT time and date, or No Information] delete one
Timaru	[insert NZST or NZDT time and date, or No Information] delete one
Milford Sound	[insert NZST or NZDT time and date, or No Information] delete one
Dunedin	[insert NZST or NZDT time and date, or No Information] delete one
Bluff	[insert NZST or NZDT time and date, or No Information] delete one
Stewart Island	[insert NZST or NZDT time and date, or No Information] delete one

[delete this para if threat level map is not available:] Estimates of expected threat levels are as per the attached map.

Remember to attach GNS threat level map as a separate attachment and do not include in the body of the email/fax]

Local and regional/Group Civil Defence Emergency Management must:

1. Activate appropriate response coordination arrangements and communication processes.
2. Alert potentially at-risk communities as appropriate.
3. Establish contact with the National Crisis Management Centre (NCMC) once they have activated (CDEM Groups only).
4. Stand by for further information.

Local CDEM must act in coordination with regional/Group CDEM.

Local emergency services must establish and maintain active response coordination with respective local and regional/Group Civil Defence Emergency Management.

MCDEM is continuing the activation of the Memorandum of Understanding (MoU) with public broadcasters to broadcast this warning.

National Warning: Tsunami Marine and Land Threat - continued

NCMC status:

The National Crisis Management Centre (NCMC) is activated.

General enquiries	(04) XXX XXXX
Media enquiries	(04) XXX XXXX
Email	XXX@XX.govt.nz
Satellite phone	00881 XXX XXX XXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Further information:

A further update will follow within the next hour. Until a cancellation is issued, updates will continue at least hourly. All further updates will be communicated by MCDEM via the national warning system.

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

9. Example: National Advisory – Tsunami potential threat to NZ cancellation

National Advisory: Tsunami – Potential threat to New Zealand cancellation

No: [insert e.g. 03]

Issued at [insert time __: __] hours on [insert date __/__/__].

Issued by the Ministry of Civil Defence & Emergency Management (MCDEM).

Tsunami advisory cancelled.

[Insert appropriate free text relevant to the situation and have wording checked by the National Controller].

Earthquake parameters:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

Summary:

This is the last message via the national warning system for this event.

This cancellation message has been issued to all local civil defence authorities, emergency services, other agencies and media.

This cancellation message will be broadcast under the Memorandum of Understanding (MoU) with public broadcasters.

NCMC status:

The National Crisis Management Centre (NCMC) is standing down from [insert time and date].

After this time, normal Ministry of Civil Defence & Emergency Management contact details will apply:

General enquiries (04) XXX XXXX

Media enquiries (04) XXX XXXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

10. Example: National Warning – Tsunami threat cancellation message

National Warning: Tsunami – Threat to New Zealand Cancellation

No: [insert e.g. 03]

Issued at [insert time __: __] hours on [insert date __/__/__].

Issued by the Ministry of Civil Defence & Emergency Management (MCDEM) has cancelled the tsunami warning in place for [insert regions or: all of New Zealand coastal areas including the Chatham Islands (if regions haven't been identified, use 'all of New Zealand')].

[If cancelled after the arrival of destructive tsunami waves]

Based on all available data, the destructive tsunami waves from this earthquake have now passed and there is no further threat. However, some coasts may still experience small sea level fluctuations lasting for several more hours.

[or, if cancelled before wave arrival]

Based on the analysis of additional data, it has now been determined that there is no tsunami threat to New Zealand and a warning is no longer required. However, some coasts may still experience small sea level changes beginning around [insert earliest expected wave arrival time] and continuing for several hours.

[or, if cancelled because waves arrived and were too small]

Based on measurements of the tsunami waves now impacting the coast of New Zealand, a tsunami warning is no longer required. However, some coasts may continue to experience small sea level changes for several more hours.

[Insert appropriate free text relevant to the situation and have wording checked by the National Controller].

This cancellation message has been issued to all local civil defence authorities, emergency services, other agencies and media.

This cancellation message will be broadcast under the Memorandum of Understanding (MoU) with public broadcasters.

Earthquake parameters:

An earthquake has occurred with these parameters:

Origin time:	[insert UTC or GMT time and date]
NZ time:	[insert NZST or NZDT time and date]
Co-ordinates:	[insert]
Depth:	[insert]
Location:	[insert]
Magnitude:	[insert]

The above magnitude is provisional and may be increased or decreased as more seismic data becomes available.

National Warning: Tsunami – Threat to New Zealand Cancellation - continued

Summary:

This is the last message via the national warning system for this event.

NCMC status:

The National Crisis Management Centre (NCMC) is standing down from [insert time and date].

After this time, normal Ministry of Civil Defence & Emergency Management contact details will apply:

General enquiries (04) XXX XXXX

Media enquiries (04) XXX XXXX

Useful websites:

www.civildefence.govt.nz

www.getthru.govt.nz

Issued by:

Message authorised by the National Controller, Civil Defence Emergency Management.

End of Message

11. Example: MOU request for broadcast of emergency announcement

Request for the Broadcast of an Emergency Announcement

This is an official request for the broadcast of an Emergency Announcement in accordance with the Memorandum of Understanding between the Ministry of Civil Defence & Emergency Management and radio and television broadcasters.

[Time/Date]

Broadcast Target Areas: National/Regional:

[list regions]

Please broadcast at least every 15 minutes.

This request for an Emergency Announcement is made by the Civil Defence Emergency Management National Controller.

Verification

Before broadcast, this message must be verified by the Ministry of Civil Defence & Emergency Management duty Public Information Manager on 04 XXX XXXX.

Emergency announcement

This is a tsunami [advisory / warning] message.

The Ministry of Civil Defence & Emergency Management is [warning/advising] New Zealand coastal communities that a tsunami is possible following a magnitude [insert number] earthquake [at/near] [insert place] at [insert time] New Zealand time [today/yesterday].

If a tsunami has been generated [for advisory messages only - for warning messages remove this part of the sentence], the first wave may arrive in New Zealand in the areas around [insert place] at approximately [insert time NZDT/NZST on insert date]. The first wave may arrive later and may not be the largest. Waves may continue for several hours.

People in coastal areas should:

1. Stay off beaches
2. Stay out of the water (sea, rivers and estuaries, including boating activities)
3. Do not go sightseeing
4. Share this information with family, neighbours and friends
5. Listen to the radio and/or TV for updates
6. Follow instructions of your local Civil Defence authorities.

Stay tuned to this station for more information.

12. Example: MOU request to terminate emergency announcement

Request to Terminate the Broadcast of an Emergency Announcement

This is an official request to terminate the broadcast of the Emergency Announcement issued in accordance with the Memorandum of Understanding between the Ministry of Civil Defence & Emergency Management and radio and television broadcasters.

[Time / date]

Please terminate the Emergency Announcement about the [insert name of emergency e.g. tsunami warning following the Chile earthquake].

[Insert brief reason e.g. The Ministry of Civil Defence & Emergency Management has lifted the tsunami warning for New Zealand].

This request for Termination of an Emergency Announcement is authorised by [insert name of Civil Defence Emergency Management Manager].

Verification

Before broadcast, this message must be verified by the Ministry of Civil Defence & Emergency Management duty Public Information Manager on (04) XXX XXXX.