Attachment 1

Wellington Region CDEM Group

Distant Source Tsunami Evacuation Plan

Contents

1. Preliminaries

1.1 Authority for Plan

Section 48 of the Civil Defence Emergency Management (CDEM) Act (2002) requires that CDEM Groups (CDEMGs) prepare a CDEM Group Plan to enable the effective and efficient management of regionally significant hazards and risk that may affect the region. In addition the National Tsunami Plan details the following responsibilities for CDEMGs:

- Plan for and maintain public alert systems
- Receive National Advisories and Warnings from MCDEM
- Conduct further local threat assessment
- Decide appropriate public alerting

The Wellington Region CDEM Group Plan Section 17.2 identifies tsunami as a hazard.

This plan forms part of a range of plans supporting the CDEM Group Plan

1.2 Approval of Plan

The Wellington Regional Civil Defence Emergency Management Group (WRCDEMG) approved this version of the Plan on *(insert date)*

1.3 Review

This Plan is effective from ***date to be inserted*** following approval from the Wellington Region CDEM Group and Co-ordinating Executive Group (CEG).

This Plan will be subject to a written audit three years from the above date. However, amendments may take place at anytime during the aforementioned period.

1.4 Abbreviations

The abbreviations below are those which are in common use in this Plan:

WRCDEMG	Wellington Regional Civil Defence Emergency Management Group
CDEM	Civil Defence Emergency Management

GEOC	Group Emergency Operations Centre
EOC	Emergency Operations Centre
MCDEM	Ministry of Civil Defence Emergency Management
GNS	GNS Science
RWAG	Regional Welfare Advisory Group
PTWC	Pacific Tsunami Warning Centre
NCMC	National Crisis Management Centre
TA	Territorial Authority
MOU	Memorandum of Understanding

1.5 Related Plans, SOPs and Guidelines

This plan should be read in conjunction with:

- National Tsunami Plan
- Director's Guideline: Mass Evacuation Planning
- The Guide to the National CDEM Plan
- The Wellington Region CDEM Group Plan
- Wellington Region CDEM Group - Standard Operating Procedure (SOP1) - Warning Receipt and Dissemination

2. Purpose of the Plan

This plan provides principles, regional protocols and considerations that are applicable to an evacuation of people in affected areas in the event of a distant source tsunami threat to the Wellington Region.

3. Scope

Tsunami can be generated by various events either close to or distant from New Zealand. Tsunami can be categorised as follows:

- Distant source – travel time > 3 hours
- Regional source – travel time 1-3 hours
- Local source – travel time less than 1 hour

This plan provides the guidance to emergency management staff and evacuation partners (see Section 5) within the Wellington Region to assist their local planning for an evacuation due to a distant source tsunami threat. There may be varying timeframes to the arrival of a tsunami from a distant source and the activities able to be conducted will vary dependent upon the official warning period.

To complete a controlled evacuation of the risk areas identified within this plan (see Section 8 and Appendix 1) a minimum period of 8 hours is required from the receipt of the initial warning (informal or formal).

Standard Operating Procedures (SOPs) are not included within this plan.

3.1 Exclusions

This plan does not include:

1. Evacuation for local or regional source tsunami – to be covered in public education strategy
2. Detailed evacuation routes as these are included in local plans

This plan does not include any response or recovery activities required to be conducted following the actual impact of a tsunami. It is presumed these are covered in existing response and recovery plans at local and regional levels.

4. Evacuation Principles

To ensure consistent planning across the region, the following principles have been agreed within the CDEMG and with various evacuation partners:

A Group Declaration will be made when a formal warning is received which would require evacuation of the identified zones

- Roads & rail – remain open until tsunami (expected arrival time of first wave) minus 2 hours
- Zones – as per inundation maps. This plan covers red and orange zones.
- Media – local EOCs are responsible for media messages within their district. Consolidation of messages through GEOC
- Safe locations – to be nominated by local CDEM
- Education – aligned to other CDEM programmes
- Local EOCs have own Evacuation Plans (suitable for distant source tsunami) which include expectations and actions for local evacuation partners
- Evacuation partners have own plans, processes and appropriate MOUs
- Wellington International Airport will remain open until tsunami minus 4 hours
- Centreport will close and vessels moved offshore
- Any evacuees / commuters to be relocated outside evacuation zone after tsunami minus 3 hours
- Roads to be closed at edge of orange zone at tsunami minus 2 hours to traffic / public entering.

5. Evacuation Partners Roles and Responsibilities

The following table details the roles and responsibilities of agencies identified as evacuation partners.

5.1 Evacuation partners

- Territorial Authorities

- NZ Police
- NZ Fire Service
- New Zealand Transport Agency
- Kiwi Rail
- NZ Bus
- Wellington Free Ambulance
- Ontrack
- Interislander Ferries
- NZ Red Cross
- District Health Boards

5.1 Roles and responsibilities

The roles and responsibilities of the evacuation partners are set out in Table 1 below.

TABLE 1

Function	Functional lead agency	Role	Support Agencies	Role	Supporting Documents
Evacuation	TAs	• Evacuate areas necessary for the preservation of human life. • Provide for the safety and welfare of evacuated people.	NZ Police NZ Fire Service	• Assist with personnel and resources for evacuation	
Registration of Evacuees	TAs	• Register people displaced by an emergency	Welfare centre staff NZ Red Cross	• Provide resources for registration and collect data for input.	
Welfare co-ordination	TAs	• Initiate and co-ordinate welfare services • Co-ordinate identification of at risk people / groups • Ensure and co-ordinate the provision of emergency	Health Welfare agencies		CDEM Group Welfare Plan

TABLE 1

Function	Functional lead agency	Role	Support Agencies	Role	Supporting Documents
		shelter / evacuation sites			
Commuter Management	TAs	• Co-ordinate evacuation to safe locations • Provide information to commuters • Provide for commuters stranded en-route within local area	Transit NZ Police Transport operators Traffic Management	• Identify and co-ordinate evacuation routes • Gather and disseminate information from across the region • Implement and enforce safe evacuation • Co-ordinate and prioritise transport needs of emergency workers	

6. Warning Processes & Procedures

6.1 National Warning Procedures

It is the responsibility of the Ministry of CDEM to assess information (from PTWC) and other sources, and issue an advisory or warning. These will be issued to:

- CDEM Groups
- Emergency Services; and
- Territorial Local Authorities (in accordance with the National Warning System)

The type of advisory / warnings and the action to be taken are as follows:

		Action	
Type of Notification	**Group CDEM Office**	**TA's**	**Evacuation Partners**
National Advisory – Tsunami: No threat to NZ	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public	No action
National Advisory – Tsunami: Potential Threat to NZ	• Confirm receipt • Activate GEOC on skeleton basis • Advise Group Controller • Advise evacuation partners • Monitor • Prepare to activate Distant Source Tsunami Evacuation Plan • Provide call centre staff with information to	• Confirm receipt • Activate EOC on skeleton basis • Advise Controller • Advise local evacuation partners • Monitor • Prepare to activate local evacuation plans • Provide call centre staff with information to provide to public	• Confirm receipt • Activate EOC on skeleton basis • Prepare to activate evacuation plans

	provide to public		
National Warning – Tsunami: Threat to NZ	• Confirm receipt • Activate GEOC • Advise Group Controller • Advise evacuation partners • Activate Distant Source Tsunami Evacuation Plan	• Confirm receipt • Activate EOC • Advise Controller • Advise local evacuation partners • Activate local evacuation plans	• Confirm receipt • Activate EOC • Activate evacuation plans
National Warning – Tsunami: Tsunami Cancellation Message	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public • Stand down GEOC staff	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public • Stand down EOC staff	• Confirm receipt • Stand down EOC staff
National Advisory – Tsunami: Tsunami Cancellation Message	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public • Stand down GEOC staff	• Confirm receipt • Check media exposure and manage as appropriate • Provide call centre staff with information to provide to public • Stand down EOC staff	No action

Refer to Annex B of National Tsunami Advisory and Warning Plan for content of notifications.

The response indicators used to identify the appropriate advisory or warning are detailed in the following table:

Region	Location	Thresholds	Template Used by MCDEM (Refer Annex B National Tsunami Advisory and Warning Plan)
1	South West Pacific (includes NZ local source)	Mw≥9.0 **and** Depth <50km **Or** PTWC Warning for NZ	National Warning – Tsunami: Threat to NZ
		Mw≥7.0 - ≥8.9 **and** Dept <50km **Or** PTWC Watch for NZ	National Advisory – Tsunami: Potential Threat to NZ
2	South America	Mw≥8.0 **and** Depth <100km **Or** PTWC Watch or Warning for NZ	National Advisory – Tsunami: Potential threat to NZ
3	Central America		
4	Cascadia		
5	Aleutians Rat Island	PTWC Watch or Warning for NZ	National Advisory – Tsunami: Potential threat to NZ
6	Kurile Islands Kamchatka		
7	Japan		
8	Other		

6.2 Validate Informal Warning

Any informal warning received by the Group must be validated through MCDEM.

MCDEM validation is to be completed by the CDEM Group Office in the first instance.

It is assumed that the media will report on informal warnings received, and possibly on information from the PTWC which has been misinterpreted. Public over reaction cannot be planned for and any disruption occurring due to a mass uncoordinated evacuation will be managed through normal emergency services protocols. The National Tsunami Advisory and Warning Plan makes provisions for media management at a national level.

6.3 Confirm Official Warning Receipt

The CDEM Group Office will confirm receipt of an official warning to MCDEM. (Refer Wellington Region CDEM Group - Standard Operating Procedure (SOP1) - Warning Receipt and Dissemination)

6.4 Advice to Territorial Authorities and Other Agencies

The CDEM Group Office will advise Territorial Authorities within the Group, Emergency Services and agencies with a role to facilitate the response at all stages of the notification process, whether informal or official warnings have been received.

6.5 Territorial Authority Warning Processes

Each Territorial Authority within the Group has in place appropriate warning processes to advise the population at risk of the need to evacuate. The following table details the warning processes by each Territorial Authority:

Territorial Authority	Main Warning System	Warning Procedures
Wellington City Council	Public Address System	In place
Hutt City Council	Sirens	In place
Upper Hutt City Council	PA systems, emergency services	In place
Porirua City Council	PA systems, emergency services	In place
Kapiti Coast District Council	PA systems, emergency services	In place
South Wairarapa District Council	PA systems, emergency services	In place
Masterton District Council	PA systems, emergency services	In place
Carterton District Council	PA systems, emergency services	In place

7. Activation and Operational Priorities

7.1 Activation Activities

Once notification of either an informal or official warning has been received the GEOC may activate at a level to be determined by the Group Controller. All Local EOCs may

activate to a level to be determined by Local Controllers based on the likely threat to their district. The following considerations should be given to whether or not to call an evacuation.

✓	EVACUATION DECISION CONSIDERATIONS	INFORMATION SOURCE
	Probability of impact	NIWA, Metservice, GNS, MCDEM
	Estimated effects—geographic area to be evacuated	Impact models
	Timing of event	MCDEM, GNS
	Lead time for an evacuation	Evacuation Partners
	Timing of notifications/orders	Local EOCs
	Weather and tide conditions	NIWA, Metservice
	Condition and availability of evacuation routes	Evacuation partners
	Evacuation decision by neighbouring Groups	Other Group EOCs
	Populations potentially impacted	Maps, Impact models
	Availability and safety of personnel to support an evacuation	Evacuation partners, EOCs
	Selection of staging areas that may include transportation facilities	Evacuation partners, EOCs
	Ability to stage transportation assets for movement of those who cannot self-evacuate	Evacuation partners, EOCs
	Ability to coordinate traffic control devices	Police, Territorial Authorities
	Plan for shut down and/or movement of highway work zones, non-essential commercial vehicle traffic including oversize loads, hazardous materials, etc.	Police, Transit NZ, EOCs
	Ability of EOCs to move into evacuation readiness status	EOCs
	Ability to implement contra flow if required	Transit NZ & Police
	How to evacuate while enabling incoming response personnel, equipment, and supplies	Transit NZ & Police
	Transportation resources available to conduct evacuation and move evacuees, including availability of assets through Group Office, mutual-aid, or regional agreements	Evacuation partners, Police, and EOCs

✓	EVACUATION DECISION CONSIDERATIONS	INFORMATION SOURCE
	Number of first responders in impact zone and whether they can move their families out of affected areas before reporting for duty	Evacuation partners
	Location of shelters/reception sites	EOCs
	Ability of planned shelters/reception sites to receive evacuees	EOCs

Once activated the GEOC and Local EOCs will conduct the following activities (where appropriate Emergency Services and evacuation partners should be consulted):

- Identifying specifics of evacuation plans, including:
  - What areas will be activated?
  - What type of order will be issued?
  - Will evacuation be phased?
  - When public will be notified?
  - What resources can be used?
  - What public information management is required?
- Communicating decisions with Group EOC, Emergency Services and supporting agencies

7.2 Operational Priorities for the GEOC

Operational priorities of the GEOC for a tsunami threat:

✓	Actions
	Activate the GEOC
	Confirm receipt of warning to MCDEM
	Consider the need for a declaration (see Section 9)
	Liaise with MCDEM for scientific and technical advice
	Confirm receipt of advisories and warnings to Local EOCs and evacuation partners

✓	Actions
	Consolidate public information in conjunction with Local EOCs and evacuation partners
	Provide co-ordination assistance to evacuation partners
	Consider and co-ordinate the allocation of resources necessary to support the response actions taken
	Provide monitoring and co-ordination assistance to Local EOCs with regard to welfare support
	Consider resource requirements for response following the tsunami impact and co-ordinate availability and/or activation

7.3 Operational Priorities for Local EOCs

Operational priorities of Local EOCs for a tsunami event:

✓	Actions
	Activate the Local EOC
	Confirm receipt of warning to GEOC
	Initiate the appropriate local response to the level of warning received
	Co-ordinate local evacuation partners
	Confirm evacuation routes with evacuation partners
	Advise those people within identified evacuation zones of the need to commence evacuation, via warning systems (see Section 3.5)
	Co-ordination of welfare response
	Development and release of media and Public Information messages

7.4 Operational Priorities for Evacuation Partners

Operational priorities of evacuation partners for a tsunami event:

✓	Actions
	Activate organisational response arrangements in accordance with own functional plans and/or SOPs
	Confirm receipt of warning to: • the agency who issued the warning • GEOC
	Advise the GEOC and/or Local EOCs of decisions made and activities undertaken or planned
	Liaise with GEOC and/or Local EOCs with regard to priorities and key activities
	Provide 'key messages' information to GEOC and/or Local EOCs for inclusion with public information messages

8. Tsunami Inundation Risk Zones

Inundation risk zones have been produced for the Wellington Region to assist Local EOCs to plan for and support evacuation (see Appendix A).

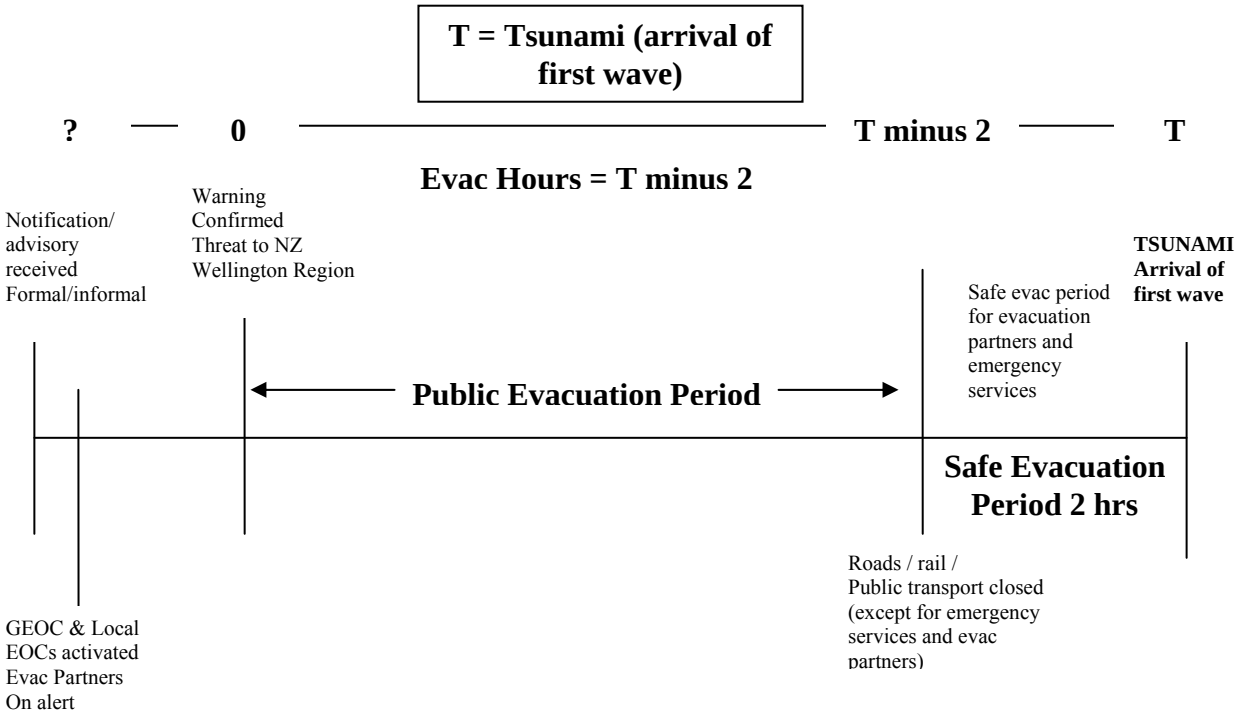
This plan covers evacuation of the red and orange zones shown on the maps.

9. Declaration Decision Process

On receipt of a "National Warning – Tsunami: Threat to NZ" being received from MCDEM a Group Declaration will be made by the appropriate authorities if that warning requires an evacuation of the red and orange zones referred to in Section 8.

10. Evacuation Timeline

The following diagram details the timeframes to conduct activities once a potential tsunami threat has been received. It has been agreed with evacuation partners that a 2 hour **safe evacuation period** will be required in order that people and resources can be moved out of the affected areas; therefore the evacuation of public must be completed at least 2 hours before the arrival of the first wave (T).



Examples:

1. Tsunami warning received at 10:00 with an expected arrival time of 18:00 = 8 hours:

   8 minus 2 (**safe evacuation** period) = 6 hour **public evacuation** period

2. Tsunami warning received at 21:30 with an expected arrival time of 04:00 = 6.5 hours

   6.5 minus 2 (**safe evacuation** period) = 4.5 hour **public evacuation** period

11. Communication

Normal operating procedures for Group Communications to be followed

12. Public Information Management

12.1 Principles

The principles associated with public notification and which form the basis of the section of the Plan includes:

- Local EOCs are responsible for the development and release of media and other public information within their districts
- The PIM Manager at the GEOC co-ordinates key messages from all TAs and evacuation partners and liaises with the PIM Manager at the MCDEM
- The media is a key partner in the evacuation process and should be involved as early as possible
- The public are to be advised as early and as often as possible
- As many public notification channels as possible are to be used

12.2 Notification Stages

The GEOC will notify Local EOCs at the onset of, and regularly during, each of the following stages:

1. Hazard Impact / Hazard threat notification
2. Declaration
3. Pre-evacuation notification
4. Evacuation (voluntary or recommended) notification
5. Evacuation (mandatory) notification
6. During evacuation notification
7. Evacuation complete notification
8. Return notification

Some stages may not occur e.g. an evacuation may be mandatory rather than voluntary or recommended.

12.3 Templates and Content of Public Messages

These templates are under development and will be added as appendices when available (Appendix 3).

13. Evacuee Re-entry

Many of the same agencies may be involved in the activities required to ensure evacuees can return to areas which are deemed safe. Local EOCs will identify areas safe for return and manage such within their own district in coordination with GEOC and other Local EOCs.

14. Public Education

14.1 Public Education

A critical element of the safe evacuation of people from areas of risk is the readiness education they have been provided with. As this plan can only be effective in situations where there is sufficient time to co-ordinate a safe evacuation, the public education strategy must include enough information to allow people to self evacuate under certain circumstances, particularly for a locally generated tsunami from an earthquake on the Wellington or Wairarapa fault. Specifically, education should include:

- The types of tsunami, i.e. distant, regional, local and the actions to be taken for each
- Potential ‘evacuation zones’ across the region
- Key warning processes and messages / information regarding evacuation procedures (this will vary from TA to TA)
- What signage to look for and what it means
- Link closely with national tsunami public education messages

14.2 Signage

To support public education, signage (based on nationally agreed guidelines Appendix 4) may be installed in areas identified as at risk on the inundation maps.

Appendix 1: Tsunami Risk Zones and Inundation Maps

Greater Wellington first commissioned a study into tsunami risk facing the Wellington region in 2001 as part of its responsibilities under the Regional Policy Statement to reduce the risks from natural hazards. The report focussed on identifying past events and categorising the return period probabilities of future events. It also highlighted the gaps in our knowledge regarding tsunami risk.

Following this, it was recognised that work was required to identify the coastal areas that could be inundated by a range of tsunami events. This work dovetailed with a growing recognition from Civil Defence and Emergency Management of the tsunami hazard and the need for well organised evacuation planning. This requires detailed maps that identify potential inundation and evacuation zones and possible egress routes.

The current project started with production of digital terrain models in GIS of the urban areas in the region for which aerial LiDAR surveys had been conducted. LiDAR survey data provides extremely accurate topographic information of the coastal elevation. These terrain models were used to identify the low lying zones in populated areas that could be affected by tsunami.

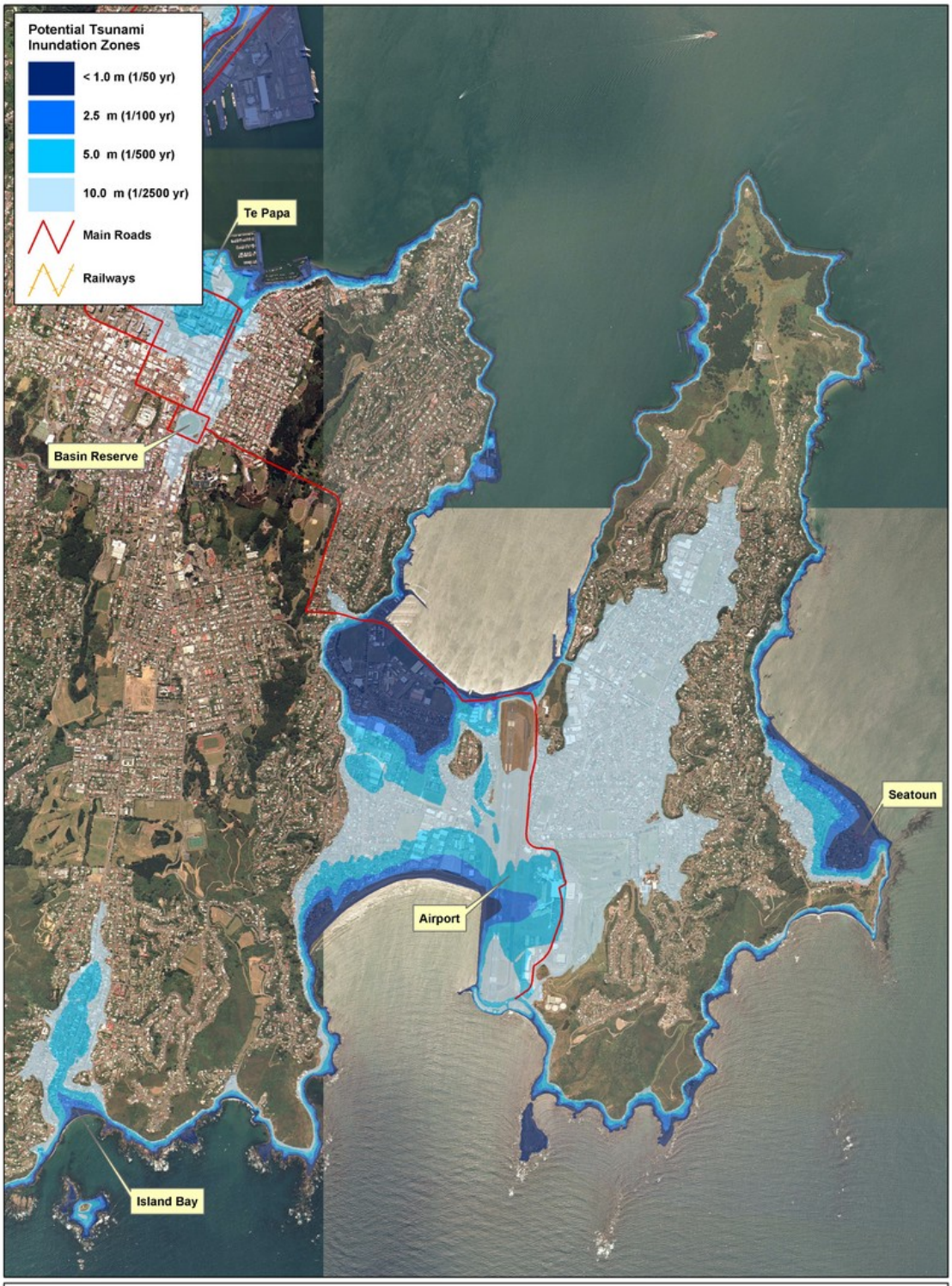
Ministry guidelines for identifying these areas have previously been set at 35 m high and 1 km inland. In addition, similar criteria were used for an evacuation mapping project coordinated by GNS in Northland. Whilst this may be suitable for small rural communities, it was agreed by the Wellington Region CDEMG that these levels were excessive, especially in heavily populated urban areas. Moreover, research indicates that the tsunami hazard risk is not equal around the Greater Wellington region, but decreases from east to west. Thus, it was decided that new criteria were needed that could more accurately and reasonably classify evacuation areas.

A meeting was called to discuss the zones that should be used for tsunami evacuation planning in the region, recognising the unique difficulties faced by emergency planning or planning an evacuation in densely populated urban areas. This meeting become a subcommittee of the national tsunami planning committee. It was agreed at this meeting that a 1:500 yr tsunami run-up height would be an appropriate level to prepare evacuation zones, with a higher zone beyond this to be a self-evacuation zone. It was decided that evacuation planning could only effectively be done for a distant source event in which there is sufficient warning time to effect an evacuation.
GNS were also asked to reassess the 500yr risk to region from distant source tsunami using new data from the Solomon Island tsunami event. This resulted in slight increases in the 500 yr wave

height to Wellington and the Kapiti coast, based on work published by GNS in 2005 that assessed the national tsunami risk.

Following this a series of maps have been produced that employ basic inundation modelling based on LiDAR data and high quality topographic data (Wairarapa) for the whole region. The zones were derived from a bathtub inundation model, that assumes run-up will be approximate to twice the wave height at shore and includes the area above the mean water mark. The modelling was based on a 1:500 yr distant source tsunami, with the wave height drawn from the 84th percentile on the probability curve. In other words, it is based on a worst case scenario 500 yr event.
These are currently provisional zones. GNS have been commissioned to produce a slightly more sophisticated series of maps that model tsunami run-up using a basic run-up algorithm, based on empirical field observations of tsunami run-up. This work will be finished by August.
Nevertheless, the current maps provide a good indication of the potential inundation and of the areas that we can begin tsunami planning.

As a final stage in refining these maps the LiDAR coverage will be merged with a 3D digital terrain model of region onto which more sophisticated numerical modelling will be performed.



TITLE: COASTAL ELEVATION & POTENTIAL TSUNAMI INUNDATION ZONES, WELLINGTON CITY

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Appendix 2: Public Information Templates

Under Development

Appendix 3: Tsunami Signage