
Type: Procedure

Name: Earthquake Response Plan

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Immediate actions

During an earthquake

Protect yourself

- Get under something that will give protection from falling objects
- Watch for danger – be prepared to move out of the way if necessary

After an earthquake

Use the Earthquake Action Pack as a guide for the initial actions to follow – see the Emergency Management Document Pack in this folder

- Deal with life threatening problems such as serious injuries, fire, unsafe structures
- If the area is unsafe, evacuate
- If the area is safe, remain and follow the procedures in this plan

Initial post-earthquake actions

Earthquakes can inflict a wide range of damage, and it is difficult to prescribe a specific course of action to follow.

The initial assessment may be misleading, and the situation may change significantly over time, or as the result of the aftershocks that commonly follow a large earthquake.

- Even if an earthquake does not appear to have caused damage in the immediate area, other buildings on site (or other parts of the Region) may have suffered extensively
- Small breakages may cause significant damage in the long term (e.g. a burst water pipe causing flooding)
- While utility services may still be working immediately after an earthquake, they may be lost shortly after. For example water supplies may fail when the header tanks drain; and telephone and emergency lighting systems may fail when backup batteries are exhausted

The following actions are important initial steps after an earthquake that has caused damage. They are based on the assumption that initially, the most demand for assistance will be at hospitals.

Individual staff actions

Staff on duty at a hospital

Staff on duty at the time of an earthquake should remain at the hospital and assist with the initial response. This may include caring for any casualties in their own

areas; undertaking the evacuation of damaged areas; assisting with mass casualties arriving at the hospital; and restoring damaged services within their area.

Staff on duty in the community

Staff on duty in the community (at clinical, support, and corporate bases) should follow any specific earthquake procedures in their Service Mass Casualty Plan (usually related to the care of patients in the community). If there is no immediate need to continue with duties in the community, staff should try to make their way to a hospital and offer their assistance there.

Staff who are not on duty

Staff who are not on duty at the time of the earthquake are requested to return to duty as soon as possible. The following points should be noted:

- It is accepted that the first priority of staff will be to ensure the safety of their families and homes
- Staff should return to duty without being asked. It will probably not be possible to contact off duty staff in the first hours (or even days) after an earthquake
- Initially, if it is not possible to return to their normal workplace, staff should report to another appropriate centre (e.g. depending on their role - another hospital, GP surgery, or Civil Defence Centre)
- Identification may be required if it is necessary to pass through a cordon or to seek assistance with transport. Suitable forms of identification include a DHB identification card or a payslip
- Staff should be prepared to spend longer periods at work than usual, and to work differently (normal services and facilities may not be available and the initial focus is likely to be on the management of mass casualties)

Staff with senior management or Emergency Operations Centre roles

Senior management staff, and those trained in emergency management roles should report to the Emergency Operations Centre at either Wellington or Kenepuru Hospital as soon as possible.

Workplace actions

The initial actions that should be undertaken in each Ward, Unit, or Service Area immediately after a damaging earthquake are set out in the **Earthquake Action Pack** in the **Emergency Management Document Pack** in this folder.

The key points include:

Senior person to assume control

The person in charge of each area is expected assume responsibility for ensuring that the initial tasks are undertaken in their area.

In some areas there may be advantages in adjoining areas working together – it may be especially beneficial for small groups sharing one floor of a building to combine their resources.

Start actions immediately

Each area should undertake their initial actions without waiting for further direction.

It is unlikely that key staff will be able to visit all areas within a hospital shortly after a large earthquake – it may be hours before some areas can be advised of the extent of the damage.

IMPORTANT

It may be some time before emergency management systems are in place. Staff in each area should undertake the initial actions without waiting for further direction

Check the area

Undertake a methodical check of the whole area to ascertain what damage has been caused to people, to services, and to the building structure.

It is important to:

- Complete the check before deciding on a course of action
- Ensure that every part of the area is checked

Deal with life threatening problems

Deal with injuries, fires, exposed electrical components and other potentially life threatening problems as required.

If necessary, try to call for help by the usual means (dialling 777 and/or activating the fire alarms), or by sending runners; but do not depend on assistance arriving. Response Teams and Emergency Services may be overwhelmed or incapacitated.

Assess the extent of the damage

The **Post-earthquake Situation Report** form in the **Earthquake Action Pack** should be used as a guide for recording damage.

An initial damage assessment will assist staff in an area to decide whether to remain in the area or to evacuate; and it will be the first stage of compiling information on the overall status of DHB facilities.

Decide whether to evacuate or to remain in the area

IMPORTANT

The initial decision to evacuate an area will need to be made by staff on duty in each area at the time of the earthquake.

The decision should take account of factors such as:

- Any problems that may require immediate evacuation (e.g. uncontrolled fire, extensive building collapse)

- Whether or not the damage is to the structure of the building (load bearing walls, cross beams etc) or just to internal partitions, ceiling tiles and fittings
- The ability to evacuate the area unaided – especially if dependent patients are involved, and/or escape routes are damaged
- Whether or not there is a safer place to evacuate to – in some situations the adjoining areas may be in no better condition, and evacuating outside may pose additional problems

Evacuation guidelines

If a decision is made to evacuate an area, and there is time, the following points should be noted:

- At least 2 people should be sent to check that it is in fact possible to evacuate, and that the intended destination is still functional
- If injured or dependent people need to be evacuated, it may be best to evacuate in small groups so that available able bodied people can assist each group
- In some cases it may be necessary to first evacuate to an intermediate point
- Where possible, evacuation should be to an area where appropriate facilities and supplies are available (e.g. evacuate wards to other clinical areas; mental health units to alternate secure sites)
- The following areas have pre-designated evacuation plans – refer to the **Fire and Hazardous Materials Plan** in this folder for more information :
 - Operating Theatres (at both Wellington and Kenepuru)
 - Intensive Care Unit
 - Neonatal Intensive Care Unit
 - Delivery Suite
 - Call Centre
- The Emergency Operations Centre staff should be advised of the evacuation as soon as possible
- As soon as possible after arriving at the evacuation area, the measures outlined in the following sections should be followed

Remaining in the area

If it is decided not to evacuate, the following points should be noted:

- Expect aftershocks – consider what actions may be necessary to prevent further injuries or damage in the area. This may include :

- Cordoning off sections of the area that may pose a danger
 - Moving people away from glassed areas
 - Securing, moving, or demolishing equipment, partitions etc which may have become unstable in the initial shaking
- Limited supplies of equipment (ropes, gloves, dust masks etc) are available in most hospital buildings – see appendix 1 for further information
 - Commence water conservation measures (see the **Water Management** section)
 - Implement the Sewerage Management Plan (see the **Sewerage Management** section)
 - Complete the **Situation Report** in the **Earthquake Action Pack** and send it to the Emergency Operations Centre by whatever means are possible
 - Implement the Service **Mass Casualty Plan** if appropriate

Damaged utility services

It is expected that a large earthquake will cause widespread damage to utility services in the region.

While hospital buildings have backup systems in place for all essential services, it is still possible that they may be disrupted – either completely, if the backup systems are damaged; or partially, if there is damage to reticulation systems (pipes, cables etc)

Guidelines for dealing with failed utility services are set out in:

- The Essential Services Failure Plan in this folder
- Specific backup procedures operating in some wards or departments

After an earthquake, it is especially important that the following water and sewerage management measures are implemented – **even if it appears there is no damage to these systems.**

Water management

The careful management of water is critical after an earthquake.

It is expected that a large earthquake will cause extensive damage to the region's water supply system; and that damage to the water reticulation systems within hospital buildings could cause significant damage.

Water management measures include:

- Maintaining emergency supplies of potable water
- Dealing with water leaks as a high priority

- Conserving water through changed practices

Emergency water supplies

Emergency supplies of at least 100 litres of potable water are maintained in each inpatient area (and many other areas).

A 2.5M litre reservoir is maintained at Wellington Hospital.

100,000 litres of potable water are kept in stand alone tanks at the Porirua campus, and 50,000 litres is stored at the Kapiti Health Centre

In addition, various storage tanks within buildings hold another 114,000 litres at Wellington Hospital and 35,000 litres at Porirua.

Other possible sources of drinks include fruit juices, milk and soft drinks available from cafeterias and vending machines.

Managing water leaks

The reporting and management of water leaks following an earthquake is a **high priority**.

- Large amounts of water can be lost in a very short period – even through what appears to be minor damage
- Water can quickly cause extensive damage to buildings; equipment; and supplies

All staff are expected to:

- Report any water leaks to the Emergency Operations Centre or Technical Services staff as a matter of urgency
- Take whatever measures are possible to control or minimise any leaks. This may include :
 - Closing valves
 - Taping, blocking or crimping damaged pipes
 - Damming or diverting water away from vulnerable areas

Conserving water

Every effort must be made to conserve water after a damaging earthquake. The following measures should be **implemented immediately**, and **remain in place** until the Incident Controller advises that they are no longer required.

Hand washing

Do not use running water for hand washing. Where possible waterless cleaners such as antimicrobial hand gel and / or gloves should be used. Where hand washing is needed, the 'two bowl' method should be used:

- Two bowls should be filled with water – hands should be washed in one and rinsed in the other
- The water should only be changed when necessary, and if sufficient supplies are available

Washing and showering patients

Patients must not be showered, and washing is to be kept to the minimum necessary to maintain safe care.

Flushing toilets and sluice facilities

Toilets must not be flushed, and sanitisers must not be used (see the **sewerage management** measures for more information).

Automatic flushing systems on urinals must be shut down.

Sewerage management

The post-earthquake sewerage management guidelines are intended to:

- Assist with the conservation of water
- Minimise contamination and health problems arising from sewerage leaking from damaged pipes either within buildings, or in the surrounding grounds

The guidelines must be implemented **immediately** after a damage causing earthquake, and **remain in place** until the Incident Controller advises the sewerage system is safe to use, or other arrangements are made.

Specific actions

Toilets and urinals

The number of toilets in any area must be kept to the minimum (1-2 per floor). Other toilets and all urinals are to be locked off.

The toilets that are to be used are to be fitted with 'double bagged' standard plastic rubbish bags and used as latrines.

When they are ready to be changed, the bags should be tied securely and stored in an appropriate place in the area – possibly one of the toilet cubicles that are not being used.

Emergency Operations Centre staff will arrange for the bags to be removed from the building at regular intervals.

Bedpans

Bedpans should be fitted with plastic bags before use (and the waste collected in the bag).

The bags should be managed in the same way as the toilet bags.

Incident management

The management of the aftermath of a major earthquake will require a different organisational structure and procedures – at least until the expected mass casualties have been dealt with, and damaged services restored.

In general, the structures and relationships outlined in the **Mass Casualty Plan** will be followed. Some key elements of the management of such an incident would include the following:

Civil Defence declarations

A state of Civil Defence Emergency would be declared in areas affected by the earthquake. In the DHB region it is likely that declarations would be made by:

- **Locally** (Wellington and Porirua City Councils, and the Kapiti Coast District Council)
- **Regionally** (The Greater Wellington Regional Council)
- **Nationally** (The Ministry of Civil Defence and Emergency Management National Crisis Management Centre at Parliament Buildings)

Key locations

Details of the key contact points within the DHB are listed in the **Major Incident Directory** in the **Emergency Management Document Pack** within this folder.

Emergency communications

It is expected that telephone and computer network services will be lost immediately after an earthquake and may take some days to restore.

Handheld radios are available at both Wellington and Kenepuru hospitals to provide emergency on-site communications.

Base radios in the Emergency Operations Centres at both hospitals also provide communication with:

- Other hospitals in the region including private surgical hospitals
- Civil Defence centres at :
 - Wellington City Council
 - Porirua City Council
 - Kapiti Coast District Council
 - Greater Wellington Regional Council

Two satellite phones are held in the Wellington Hospital Emergency Operations Centre

Equipment and supplies available

Medical supplies, food and water

Stores of basic medical supplies, food, water, and some support items are available at hospital sites. Requests for supplies should be made to the **Logistics Coordinator** in the Emergency Operations Centre.

Rescue and clean-up supplies

Some basic supplies are available at both Wellington and Kenepuru hospitals. Refer to Appendix 1 for more information.

Obtaining supplies and other assistance

It is likely that normal supply arrangements will be disrupted by damage to roads, airports, and communications; and that demands for some services and supplies will be very high.

It is essential that the use of resources is coordinated to ensure 'the greatest good for the greatest number'.

All requests for supplies and services must be made through the Emergency Operations Centre.

In some cases Emergency Operations Centre staff will coordinate requests with Civil Defence Centres (especially if the supplies or services may be needed by a number of different agencies).

Damage assessment

A **Damage Assessment Coordinator** will be appointed by the Incident Controller to oversee the assessment of buildings and facilities as soon as possible after an earthquake.

The initial assessments will be focussed on:

- The need to provide facilities for the expected mass casualties, and current inpatients
- An engineering assessment of areas that have been damaged (and/or evacuated) to determine whether or not they are safe to occupy

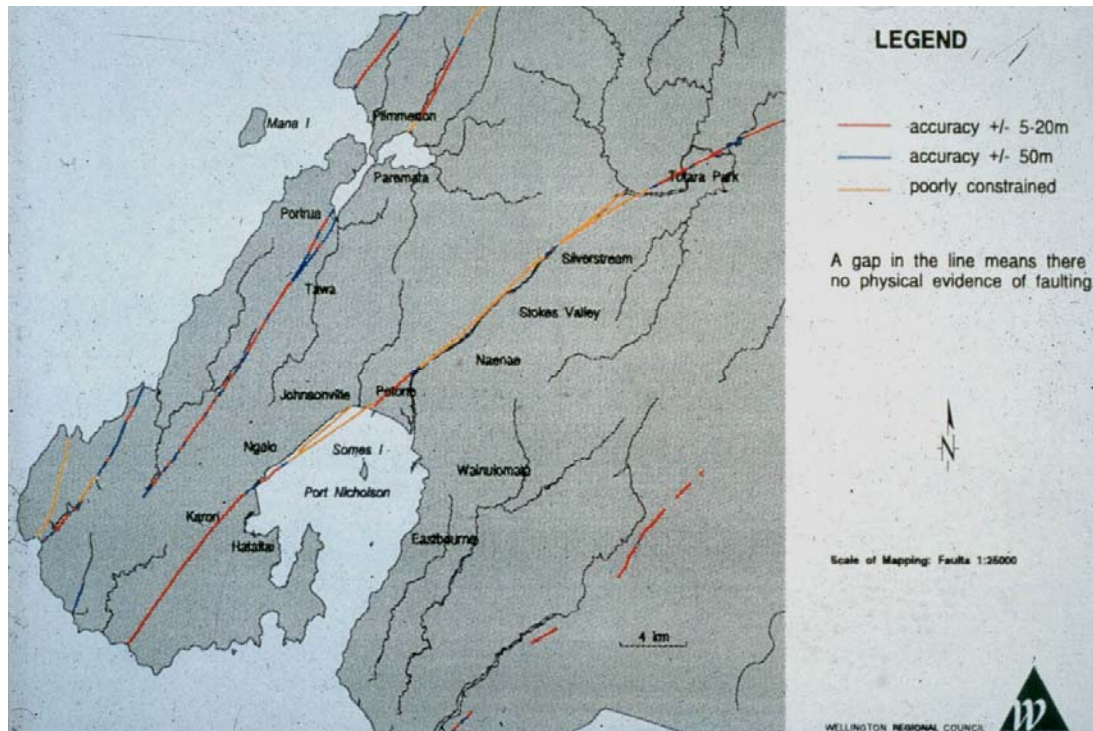
Further tasks will include:

- The ongoing assessment of damage following significant after shocks
- The coordination of (interim) repairs of services and facilities
- The identification of suitable alternate accommodation for essential services

Risk assessment

The earthquake risk in New Zealand, and in the Wellington Region in particular, is well documented.

There are a number of fault lines in the region. The most significant ones are shown in the diagram below.



Assessments of the likelihood of a damage causing earthquake occurring in the region include the following:

A **Geological and Nuclear Sciences Institute** assessment that there is a 15% chance of an earthquake of magnitude 7.5 or greater occurring on the Wellington fault in the next 50 years, and that such an event could result in up to 4000 casualties and between 200 and 600 deaths.

The Earthquake Commission advise in their public awareness programme that there is a 1:12 chance of being involved in a damage causing earthquake this year.

The Wellington Regional Council describes the earthquake risk in the region in the following terms:

“OUR BIGGEST QUAKE”

On January 23 1855, the Wairarapa Fault ruptured and the entire Wellington Region was tilted westward. About 5000 km² of land was shifted vertically, with uplift of 6m near Turakirae Head and 1-2m in the Wellington Harbour. Some subsidence (lowering of the ground) occurred in the Wairarapa. The greatest horizontal movement along the fault was 12m. Features like streams were displaced along the fault. The magnitude 8.1-8.2 quake caused 50 seconds of strong shaking and there were hundreds of aftershocks greater than magnitude 5 in the following weeks.

THE BIG ONE

Many of the Region’s faults can produce large earthquakes. A large, shallow quake along the Wellington Fault, say magnitude 7.4, would cause strong shaking and considerable damage around the Region. If it happened during the day there could be about 500 deaths, 4,000 injuries and perhaps 1,800 people trapped. If the quake

hit at night, fewer people would be hurt. We could expect about 2,800 homes and other buildings to be destroyed and another 100,000 buildings to be damaged in some way.”

Expected casualties

Estimates of casualty numbers vary, and would depend on a number of factors, but there is agreement that thousands would be injured in a large earthquake, and that primary health providers along with both public and private hospital resources would initially be overwhelmed .

It is expected that up to 2% of the population in the region could be injured or killed in a magnitude 7.5 earthquake:

- 95% of those injured would have comparatively minor injuries and could be treated with first aid or as outpatients
- At least 200-300 patients may require admission to hospital

Expected recovery time

It is generally accepted that Wellington’s geography, and the age of some parts of the infrastructure, pose significant challenges to the recovery from a large earthquake.

Of most concern in the short term are the restoration of water supplies and the opening of key roads.

The most recent assessments of the time to repair these services have concluded:

- For the first 3 weeks, water supplies to Wellington City would be extremely limited, and it would be up to six months before a reliable, treated water supply was restored to all users. Recovery times for Porirua and the Kapiti Coast are expected to be comparable
- It is expected to take approximately 10 days to open major roads to essential traffic, and many months before traffic could move freely around the region

Many other aspects of recovery are dependent on these services being available, so lack of water for clean up operations; and lack of access, is likely to contribute significantly to delays in repairs of equipment and buildings, and the replenishment of supplies.

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Appendix 1 – rescue and clean up equipment

Emergency Management stores

The following items are available from the Emergency management store situated on at Wellington and Kenepuru hospitals

- Blankets
- Camp stretchers
- Portable lighting
- Heaters
- Emergency shelters
- Portable generators
- Salvage kits

Earthquake cabinets

The cabinets illustrated below are available in all staff areas



CONTENTS

Stretcher
First aid supplies and foil blankets
Gloves
Dust masks
Goggles
Hard hats
Battery operated lamps
Broadcast radio
Basic tools
Ladder
Rope
Barrier tape
Tarpaulins
Buckets
Duct tape
2000 kg capacity Jack