Information for Ministry Units

Earthquake Prone Buildings

1. Introduction

The Building Act 2004 has several provisions/requirements relating to earthquake resistance and performance of existing buildings. In 2017, the system for managing earthquake prone buildings was updated.

Under the new system for managing earthquake prone buildings, territorial authorities, engineers and building owners have key roles to play. These are set out fully in the Building Act and can be summarised as:

1.1 Territorial authorities identify potentially earthquake prone buildings. They notify building owners that they must obtain engineering assessments of the building carried out by suitably qualified engineers.
1.2 Territorial authorities determine whether buildings are earthquake prone, assign ratings, issue notices, and publish information about the buildings in a public register.
1.3 Owners are required to display notices on their building and to remediate their building.

The Building Act divides New Zealand into three seismic risk areas – high, medium, and low.
There are set time frames, based on these seismic risk areas, for territorial authorities to identify potentially earthquake prone buildings and for building owners to remediate earthquake prone buildings.

2. Terms

2.1 **Initial Evaluation Procedure (IEP)**
The IEP is a screening process developed by the New Zealand Society for Earthquake Engineering, based primarily on a visual inspection of the exterior of the building. Additional information such as original construction drawings and calculations or interior inspections can also be considered if available. The procedure seeks to identify potentially critical structural weaknesses in the earthquake resistance of the building. The result is a score for the building in terms of the percentage of new building standard (%NBS) achieved in each of two assumed orthogonal directions of earthquake loading.

2.2 **Detailed Engineer's Assessment (DEA)**
A quantitative, in-depth assessment and report by structural engineers, with appropriate geotechnical engineering input. It considers building plans and involves calculations and can also involve structural computer modelling.

2.3 **New Build Standard (NBS)**
This is the earthquake standard that would apply to a new building of similar type and use if the building were constructed to meet the latest design Codes of Practice. It is commonly referred to as NBS. Where the standard varies from NBS, this is expressed as a percentage, i.e. 34%NBS represents a standard that is 34% of that which would be specified for a similar new building in the latest building code.

2.4 **Earthquake Risk Building (ERB)**
An earthquake risk building is one that is considered to present a risk in earthquakes that is greater than desirable. It is relatively easy to achieve a high level of earthquake resistance in a new building. The same does not apply to upgrading an existing building. The New Zealand Society for Earthquake Engineering considers that the community would accept a higher level of risk in an existing building when compared with new and suggests that buildings that can be shown capable of resisting an adverse event corresponding to greater than two-thirds of new building standard (greater than or equal to 67%NBS) should be considered low risk. It follows that any building meeting a standard of less than 67%NBS should be considered an earthquake

risk building. A building just meeting 67%NBS is expected to present a risk to occupants of the order of five times that for a similar new building.

2.5 **Earthquake Prone Building (EPB)**

As defined in the Building Act 2004 an earthquake prone building is one that achieves an earthquake standard of less than one-third of new building standard, i.e. less than 34%NBS. This is a low standard and intended to identify buildings that are expected to have poor earthquake performance. A building just meeting this requirement is expected to present a risk to occupants of the order of 10 times that for a similar new building.

2.6 **Priority Buildings**

Priority buildings are certain types of earthquake prone buildings that are considered to present a higher risk because of their construction type, use or location.

Priority buildings need to be identified and remediated within half the time available for other buildings in the same seismic risk areas.

There are two key categories of priority buildings:

1. Those that are prescribed in the Building Act, which include certain hospital, emergency, and education buildings.
2. Those that are described in the Building Act and determined with community input, which include parts of unreinforced masonry buildings that could fall in an earthquake onto a thoroughfare with sufficient pedestrian or vehicle traffic to warrant prioritisation, and buildings that could impede transport routes of strategic importance if they were to collapse in an earthquake.

2.7 **Earthquake Strengthening/Upgrade/Retrofit**

These are all terms used to describe the process of improving the earthquake performance of existing buildings.

3. Seismic risk areas and time frames

The system categorises New Zealand into three seismic risk areas – high, medium, and low. These are defined using the 'Z' factor, which is the seismic hazard factor for each area of New Zealand. The Z factor is used when designing new buildings to comply with the Building Code.

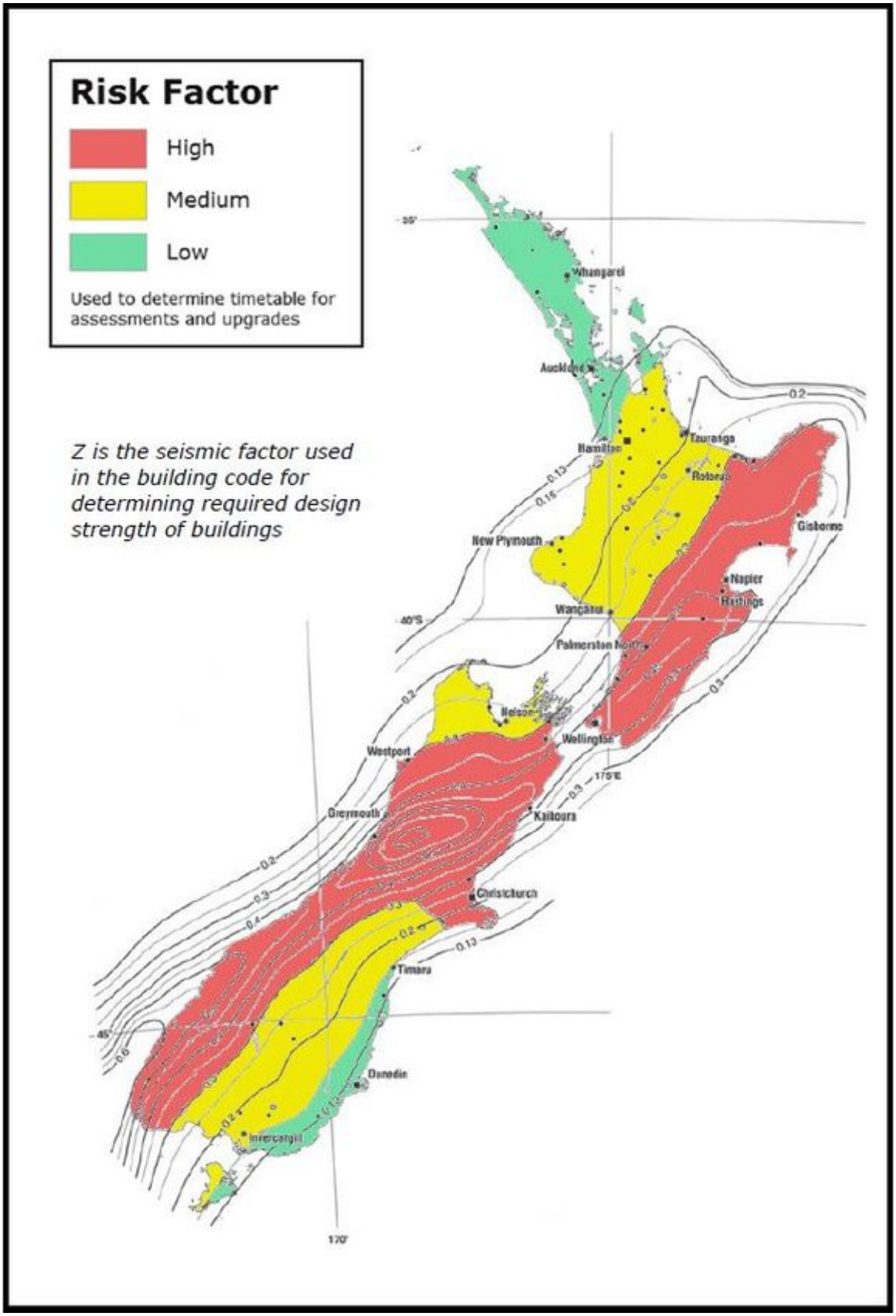
These seismic risk areas are used to set time frames (see page 5) for identifying and remediating earthquake prone buildings.

Territorial authorities have been set time frames to identify potentially earthquake prone buildings using the profile categories in the EPB methodology.

Owners of earthquake prone buildings are required to take action to remediate their buildings within certain time frames depending on the seismic risk area their building is located in.

Some territorial authorities (Councils) recognise the value of heritage buildings to the community and the costs associated with their restoration, refurbishment, and seismic retrofit, and offer financial assistance to owners. This assistance is typically limited and linked to contributing to investigation phase costs.

Map of seismic risk areas



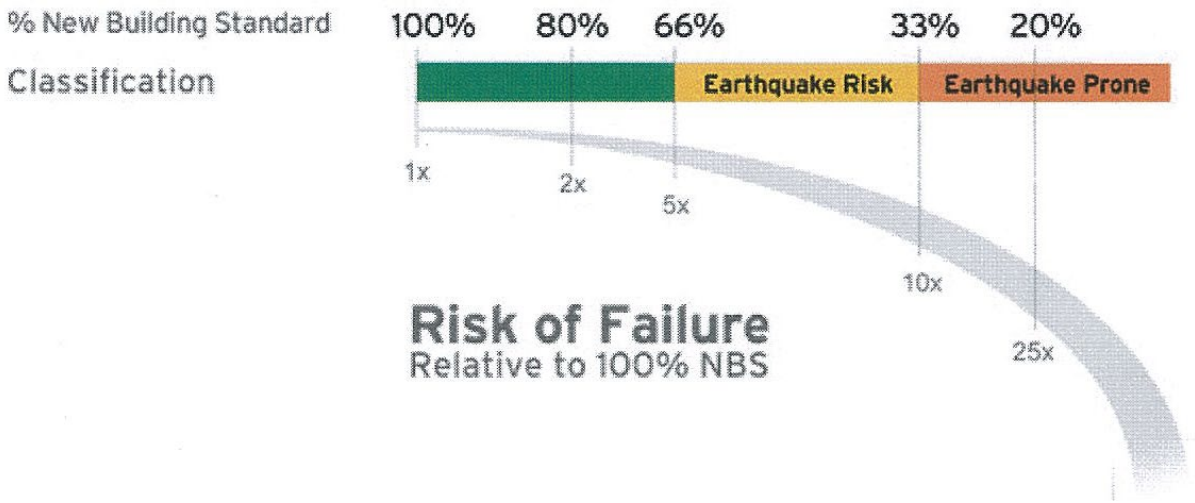
Above is the map that shows the Anglican Diocese of Auckland is in the low-risk and medium-risk areas. The following table shows that a time frame of 35 years has been given for the seismic strengthening work to be carried out on non-priority buildings from the time of the issue of earthquake prone building notice has been issued.

Time frames for action

Seismic risk area	Territorial authorities must identify potentially earthquake prone buildings by		Owners of earthquake prone buildings must carry out seismic work within (time from issue of EPB notice)	
	Priority Buildings	Other	Priority Buildings	Other
High	1 January 2020	1 July 2022	7.5 years	15 years
Medium	1 July 2022	1 July 2027	12.5 years	25 years
Low	N/A	1 July 2032	N/A	35 years

There has been some indication that time frames may change for priority buildings; this to date has not been confirmed.

To further understand the % NBS and what risk is associated with the percentage rating given to your building, please see below.



4. Heritage buildings

Many churches are listed as heritage buildings. The risk relating to heritage buildings and earthquake can be summarised as follows:

- Heritage buildings could arguably be categorised as priority buildings by virtue of them having contents of high value to the community. A high degree of earthquake resistance is therefore warranted to protect the building for future generations.
- They may be arguably categorised as priority buildings by virtue of the number of people that they can hold even though there may be infrequent occasions when the occupancy is at or near this maximum level.
- They are often deemed difficult to retrofit in a manner that is sympathetic to the heritage values. For example, there would be little point in attempting to obtain a high standard of earthquake resistance if this could only be achieved through the loss of significant items making up the heritage value of the building.
- The retrofits can be expensive to implement and therefore become a burden on the churches/congregations.

When considering the earthquake resistance of a heritage building it will be necessary to balance the often-competing objectives.

Churches/congregations contemplating assessment and/or seismic retrofit of a heritage building should attempt to establish and clearly articulate the objectives and intended outcomes early in the process. They should establish what importance level is appropriate and understand the cost implications of the choice. They should identify the heritage values of the building and the priorities for retention. This will often require the advice of a heritage architect as many of the values will not be readily apparent but final approval of the Historic Places Trust and territorial authorities will generally be required before any construction work can be approved.

5. Steps to achieve earthquake strengthening

1) Obtaining an Initial Evaluation Procedure (IEP) – The first step is to obtain an IEP from your territorial authority or an instruction to provide the territorial authority with an IEP. If the building is classified by the territorial authority to be earthquake prone, then Diocesan Council and the General Trust Board will need to be notified. Please contact the Property Manager to discuss these notifications.

2) Obtaining a Detailed Engineer's Assessment (DEA) – If the new building standard %NBS is not 34%NBS or higher, and the building is deemed to be earthquake prone (EQP) a DEA will be required to identify and outline steps to strengthen the building to 67%NBS or higher.

3) Engage an architect (heritage) – At the stage above, while the engineer is carrying out the DEA and suggesting ways in which to strengthen the building, it may be necessary to engage an architect, particularly if the building is a heritage building, to ensure that all heritage aspects are considered. It would also be a good idea at this stage to involve the Faculties Committee and apply for a faculty.

4) Engage a quantity surveyor (QS) – Once a plan to strengthen the building has been completed with sketches etc., then a quantity surveyor can be engaged to cost the project.

5) Obtain funding – If funding is required this is the stage when options can be investigated, knowing now what the budget would be. It would also be a good time to inform Diocesan Council of the plan to strengthen the building, also to request access to any funds held by the ministry unit for the project. The Diocesan Office will be able to assist with this process.

6) Project commencement – Once funding has been arranged and all internal and external approvals have been granted the project can go ahead.

It is worth remembering that the Property Manager is a resource to ministry units and is available to assist or guide ministry units through this process.