

Earthquake Prone Building Policy



Revision 3



Earthquake Prone Building Policy

Required under s.131 of the Building Act 2004

The territorial Authority must adopt a policy on earthquake prone buildings within 18 months after commencement of this section.

Review of policy – s.132 of the Building Act 2004

Policy must be reviewed within 5 years of adoption and then at intervals of not more than 5 years.

Original Policy

1st report to Council - Approval to commence consultation 23 March 2006.

Submissions closed 8 May 2006.

Hearings of submissions by the Hearings Committee – 2 August 2006.

Approved by Council 7 September 2006.

Revision 1

1st report to Environment and Policy Committee – Approval to commence consultation – 2 November 2008.

Submissions closed 29 January 2009.

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Revision 2

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Approved by Council .

Due for review

Before 1 December April 2016.

Contents

1. Policy Approach.. 1

[1.1 Policy Principles 1](#)

[1.2 Overall Approach. 1](#)

[1.3 Heritage Buildings 3](#)

[1.4 Bridges 3](#)

[1.5 Identifying Earthquake Prone buildings 3](#)

[1.6 Assessment Criteria. 4](#)

[1.7 Strengthening Criteria. 5](#)

[1.8 Taking action on earthquake-prone buildings 5](#)

[1.9 Interaction between EPB policy and Related Sections of Building Act 2004 and the Resource Management Act 5](#)

[1.10 Dealing with Building Owners 6](#)

[1.11 Recording a Building's EPB Status 7](#)

[1.12 Economic Impact of Policy. 7](#)

[1.13 Access to EPB information. 7](#)

2. Priorities. 7

3. Heritage Buildings. 9

[3.1 Special Considerations and Constraints 9](#)

[3.2 Rural Churches 9](#)

4. Post Disaster Assessment. 10

Abbreviations and Terms. 11

[Moderate Earthquake. 11](#)

[Liquefaction. 11](#)

[Amplification. 12](#)

[Earthquake Liquefaction Zones 13](#)

Policy on earthquake prone buildings under section 131 of the Building Act 2004

1. Policy Approach

1.1 Policy Principles

Gisborne District Council (GDC) has noted that the provisions of the Building Act in regard to earthquake-prone buildings (EPB) reflect the government's broader concern with the life safety of the public in buildings and, more particularly, the need to address life safety in earthquakes.

The GDC has also noted that the development of EPB policies is up to each Territorial Authority (TA) and has responded accordingly. This policy has been developed after due consultation with the GDC ratepayers and stakeholders in accordance with section 83 of the Local Government Act 2002.

1.2 Overall Approach

The GDC is in a zone of moderate to high seismicity and its buildings comprise a range of types and ages reflecting steady development over the last 100 years from unreinforced masonry buildings to modern multi-storey steel and concrete buildings. The Gisborne Central Business District (CBD) is built on an area that has a low to high susceptibility to liquefaction (predominantly low – see attached map of CBD) but a high susceptibility to earthquake amplification. A high liquefaction potential increases the risk of building settlement or toppling but is viewed as a lesser risk to life. Earthquake amplification increases the risk of building collapse and consequential deaths. In spite of the relatively small size and moderate to high seismicity of the Gisborne District, the GDC has actively pursued a policy of strengthening unreinforced masonry building. It thus has experience of the social and economic implications of implementing earthquake prone building legislation.

The GDC assessed all non-reinforced masonry buildings for earthquake risk in the late 1980s under section 624 of the Local Government Act 1974. The section stipulated that buildings were earthquake risk buildings if they would have their ultimate load exceeded in a moderate earthquake and thus cause a danger to occupants and passers-by. The Building Act 1991 changed the assessment criteria by stating that buildings were earthquake prone if they were to suffer 'catastrophic collapse' causing injury or death in a moderate earthquake. A large number of buildings that had been 'Earthquake Risk' were reassessed and dropped off the earthquake-strengthening schedule, as they did not meet this higher criterion.

The timetables for strengthening under the previous legislation reflected the economic and social constraints and were arrived at after considerable debate by the Council. The GDC's earthquake-prone building policy under the Building Act 2004 (BA04) embodies a similar approach and reflects the Council's determination to reduce earthquake risk over time in a way that is acceptable in social and economic terms to its ratepayers.

Gisborne city has suffered M6 or greater earthquakes at an average time period of eighteen years since 1932, with the shortest time span being fourteen years and the longest 27. The overall goal of this policy is to have a city resilient to this strength earthquake or higher before the occurrence of the next event.

While the occurrence of earthquakes is sporadic, the closeness of the average and shortest time spans indicates that there is a probability that the city could experience another earthquake before 2025 (2007 + 18). It is therefore the intent of the Council, through the implementation of this policy, to have all buildings that are earthquake prone as defined by the Building Act 2004, strengthened by the end of 2022.

The GDC will:

- Conduct a tabletop exercise to review its whole building stock to identify buildings that fall within the scope of potential earthquake prone buildings under the Building Act 2004.

This tabletop will be conducted in stages:

- I. Buildings that were deemed earthquake prone under the Building Act 1991 and have yet to be strengthened.
- II. Buildings with special post-disaster functions including infrastructure that requires a building consent such as bridges; and buildings that contain people in crowds or contents of high value to the community.
- III. Buildings that were found to be earthquake risk under the Local Government Act 1974 but not earthquake prone under the Building Act 1991.
- IV. Buildings with parapets constructed prior to the implementation of New Zealand Standard 4203 'Code of Practice for General Structural Design and Design Loadings for Buildings'.
- V. Buildings built prior to the implementation of New Zealand Standard 4203 'Code of Practice for General Structural Design and Design Loadings for Buildings'.
- VI. Buildings strengthened to 2 thirds of New Zealand Standard 1900 that may not meet the requirements of this earthquake policy (as near as reasonably practicable to the structural strength a new building).
- VII. Rural churches not part of I above.
- VIII. Buildings strengthened under previous legislations, the Local Government Act or the 1991 Building Act.

For the purposes of this policy the Gisborne District Council will -

- Assess broadly the performance of those buildings in relation to the new building Standard and, in particular, to the standard defined for earthquake prone buildings. This broad assessment will be done at the Council's cost.
- Determine and compile from this broad assessment a list of buildings that are potentially earthquake-prone in terms of the Building Act 2004.
- Advise owners of these buildings of the results of the Council's broad assessment and invite them, within a limited time-frame, to meet with and/or obtain further details from the Council on future requirements.
- Require owners to assess their buildings, using an agreed methodology and mutually agreed structural engineer. This assessment to be supplied to council by a stipulated date. Failing delivery of the required assessment Council will engage an engineer to carry out the work on their behalf and charge the owner for this service.
- Give written notices to all owners of earthquake-prone buildings once the deadline for meeting Council has passed and, subject to the results of discussions, to carry

out work to reduce or remove the danger or demolish the building within a specified time-frame.

- Take enforcement action when an earthquake prone building notice has passed its due date.
- Allow owners a right of appeal as defined in the Building Act 2004, which can include applying for a determination under section 177 of the Building Act.

1.3 Heritage Buildings

Heritage buildings are specifically addressed in section 3 of this policy. The GDC accepts that a degree of compromise may be appropriate where strengthening elements would destroy or mask the heritage characteristics of the building. This is current policy for the GDC and is often referred to as 'the sacrifice' needed to reach a solution that satisfies both objectives. Special efforts will be made to meet heritage objectives. Notwithstanding the special considerations for heritage buildings no particular timeframes will be given. Heritage buildings by their very nature are more likely to be unreinforced masonry or partially unreinforced masonry. The Gisborne District Council views public safety as its primary concern and it is of paramount importance that all earthquake prone buildings are strengthened in as short a timeframe as possible.

1.4 Bridges

For the purpose of this policy bridges, except those identified as having special post disaster recovery functions, are exempt if they are covered by an asset management plan, this includes GDC bridges as well as those administered by Transit NZ. Bridges deemed to have a special post disaster recovery function are the Transit NZ Gladstone Road Bridge and Waipaoa River Bridge on Whararata Rd (SHW2), the rail bridge across the Turanganui River, and the Gisborne District Council Bridges that carry essential utility services.

1.5 Identifying Earthquake Prone buildings

The GDC will:

- Review the current earthquake prone strengthening schedule and reschedule the strengthening criteria where appropriate.
- Undertake an initial desktop review of council files to assess which buildings could be earthquake-prone.
- Follow this with a brief inspection of each building, where necessary.
- Carry out initial evaluation of performance in earthquake based on information obtained by using the New Zealand Society of Earthquake Engineers (NZSEE) Initial Evaluation Method process.
- Require building owners to do a detailed assessment on buildings identified as earthquake-prone in the initial evaluation, unless otherwise agreed in discussion following the initial evaluation.
- Assemble a list of earthquake-prone buildings according to the results of the assessments.

- Evaluate potential earthquake-prone buildings according to the following:
 - Unreinforced masonry buildings that have overdue strengthening requirements.
 - Buildings with special post-disaster functions including infrastructure that requires a building consent such as bridges; Importance Level 4.
 - Buildings that contain people in crowds or contents of high value to the community; Importance Level 3.
 - Buildings that were classified as “Earthquake Risk’ under the initial assessment by the GDC under the Local Government Act and later removed from the strengthening schedule due to the raised threshold in the 1991 Building Act.
 - Buildings with an Importance Level less than 3.
 - Buildings with parapets that were not constructed to New Zealand Standard 4203. The parapets only will require strengthening. This ‘interim’ strengthening will not affect the timeframe to strengthen the whole building (if required). This category is a subset of all other categories.
 - Buildings and structures damaged in an earthquake but not deemed dangerous under the provisions of the Building Act.
 - Rural churches not part of category 1 or 4 in the priorities section.

 **Note:** *Importance levels are defined in AS/NZS 1170.0:2002.*

1.6 Assessment Criteria

- 1.6.1 For practical purposes, the GDC will define EPBs as those that, when subject to moderate earthquake shaking, do not meet or exceed the criteria for ultimate limit state as defined in the loadings and materials standards for new buildings. The GDC will use the NZSEE recommendations as its preferred basis for defining technical requirements and criteria. These recommendations are designed to be used in conjunction with AS/NZS 1170 Loadings Standard, NZS 3101 Concrete Structures Standard, NZS 3404 Steel Structures Standard and other relevant materials Standards. A copy of the assessment criteria will be provided to the owners of buildings identified as being potentially EPB in the desktop assessment.
- 1.6.2 For the purposes of this policy the Gisborne District Council accepts the Geological and Nuclear Science assessment that the Poverty Bay flats are ‘Class D – Deep or Soft Soil Sites’ unless proved to be another classification by a detailed geotechnical investigation. The detailed ‘geotechnical investigation’ may be satisfied, either wholly or in part, by a desktop analysis of data held by the Gisborne District Council for sites within an acceptable radius of the subject site. An acceptable radius is defined as up to 300 metre provided that at least three prior reports within this area are analysed and considered. The location of these reports is critical and this analysis should be discussed with the Gisborne District Council before commencing the desktop evaluation.
- 1.6.3 For the purposes of this policy any IEP for a building that reports greater than 33% but less than 40% NBS in either direction will be subject to a peer review by a CPEng engineer. This peer review may be commissioned by the building owners and may be an engineer of their choice. The proposed choice must be approved by council before the peer review is carried out. If the building owner has no preferred engineer the council will commission the peer review. All peer reviews are at the building owners cost.
- 1.6.4 For the purposes of this policy the due date for strengthening is the date by which the Code Compliance Certificate must be issued. To enable this to occur, the building consent application should be received no later than 18 months prior to the expiry date of the earthquake prone building notice period.
- 1.6.5 For the purposes of this policy any initial evaluation procedure or full Chartered Professional Engineer assessment of the building submitted for the purposes of

removing the building from the register must be received by the Council at least two years before the date stipulated for work to be completed.

Note: Clause 1.6.4 and 1.6.5 are to prevent de facto extensions of timeframes by way of late building consent application and/or an initial evaluation procedure being commissioned late in the time period because the owner assumed the building would pass and then finding there is not enough time for design work, building consent processing and issuing, and the build process before the time period expires.

1.7 Strengthening Criteria

The Gisborne District Council requires buildings, or parts of buildings, as identified in the priorities section of this policy, to be strengthened to as near as reasonably practicable to the current structural loading standard. The GDC accepts that a level of at least two thirds of the current structural loading code will satisfy this requirement. The Gisborne District Council encourages building owners to strengthen to 100% of NBS if it is achievable.

1.8 Taking action on earthquake-prone buildings

The GDC will:

- Advise and liaise with owners of buildings identified as earthquake-prone.
- Encourage owners to carry out an independent assessment of the structural performance of those buildings identified as earthquake-prone.
- Serve formal notices on owners of earthquake-prone buildings in accordance with the Building Act 2004, requiring them to remove the danger.
- Allow owners to appeal against the classification within 12 months of receipt of notice.
- Work with owners of heritage buildings, and HPT, to facilitate strengthening of heritage buildings without detracting from the aesthetic and historic qualities of that building if that can be done within the strengthening criteria of BA04.

1.9 Interaction between EPB policy and Related Sections of Building Act 2004 and the Resource Management Act

1.9.1 Building Act 2004

Any work that alters the structural performance of a building requires a building consent under BA04.

1.9.2 Section 112: Alterations to existing building

Whenever a building consent application is received for significant upgrading or alteration of a building that is or could be earthquake-prone, then, irrespective of the general priorities set by the GDC for dealing with earthquake-prone buildings, the Council will not issue a building consent unless it is satisfied that the building is not earthquake-prone and that the building work will not detrimentally affect the building's compliance with the Building Code. If the building is shown to be earthquake-prone, then the Council will require that the building be strengthened to comply fully with this policy and as nearly as is reasonably practicable with the other provisions of the Building Code.

1.9.3 Section 115: Change of use

Whenever a building consent application is received for change of use of a building that is or could be earthquake prone, then, irrespective of the general priorities set by the GDC for dealing with earthquake prone buildings, it will be a requirement of the building consent that the owner bring the building to:-

- (i) *comply, as nearly as is reasonably practicable, with every provision of the building code that relates to either or both of the following matters:*
 - (a) *means of escape from fire, protection of other property, sanitary facilities, structural performance, and fire-rating performance:*

My emphasis:

The term 'as nearly as is reasonably practicable' has traditionally been accepted to be at least two thirds of the current structural building standard by the GDC.

The provisions outlined in sections 1.8.2 and 1.8.3 are requirements of the Building Act 2004 and are current practice of the GDC.

If the building is shown to be earthquake-prone then the Council will require that the building be strengthened to comply as nearly as is reasonably practicable with every provision of the Building Code that relates to structural performance as is required by section 115(b)(i)(A). (In this instance the requirement for earthquake-prone buildings would be the same as that for non-earthquake prone buildings).

1.9.4 Requirements of the Resource Management Act

Buildings listed as either category A, B or C in the Proposed Combined Regional Land and District Plan will require a resource consent for any building work to the exterior of the building and in some cases work to the interior.

1.10 Dealing with Building Owners

The steps in the process are outlined in 1.7 above.

1. Before exercising its powers under section 124 BA04, the GDC will seek, within a defined time-frame, to discuss options for action with owners with a view to obtaining from the owner a mutually acceptable approach for dealing with the danger, leading to receipt of a formal proposal from owners for strengthening or removal.
2. In the event that discussions do not yield a mutually acceptable approach and proposal, the GDC will serve a formal notice under section 124 BA04 on the owner to strengthen or demolish the building within a given timeframe.

1.11 Recording a Building's EPB Status

The GDC will keep a register of all earthquake-prone buildings noting the status of requirements for improvement or the results of improvement as applicable. In addition, the following information will be placed on the LIM for each earthquake-prone building:

- Address and legal description of land and building.
- Statement that the building is on the Council's register of earthquake-prone buildings.
- Date by which strengthening or demolition is required (if known).
- Statement that further details are available from the Council to those who can demonstrate a genuine interest in the property.
- General overview of Council's Earthquake Prone Building Policy.

1.12 Economic Impact of Policy

Council considers that there is a long history of earthquake strengthening provisions in the region and that building owners and buyers routinely factor these requirements into sale/purchase agreements. The GDC also feels that protection against significant natural disaster damage for the majority of the CBD is essential for the post disaster recovery of the City and region.

1.13 Access to EPB information

Information concerning the earthquake status of a building will be contained on the relevant LIM. In addition, the Council will keep a record of the NZSEE grade of all buildings assessed, and will encourage all owners of significant buildings to have them assessed and graded. The Council recognises the long-term benefits of increased public awareness. The GDC will

not require earthquake prone buildings to have an identifying plaque. We believe that having the information available at the Council offices is sufficient notice at present. In granting access to information concerning earthquake prone buildings, the Council will conform to the requirements of the relevant legislation.

2. Priorities

The GDC has prioritised both the identification and the requirement to strengthen or demolish buildings as follows. Specific times will be assigned for action according to the assessment of structural performance and the nature of the concerns.

The GDC has had an unofficial moratorium on strengthening requirements for buildings due in the last 18 months due to the discrepancies between the NZS 1900 and the current NZS 1170 structural standard. The GDC had no desire to enforce a level of strengthening that may be found to be inadequate when assessment against the current code was carried out. Any building owner enquiring in regard to the standard of strengthening required was advised to either strengthen to 'as near as reasonably practicable' to the current code or wait until this policy was in place.

Any building identified as an immediate risk during the assessment phase will have a Dangerous Building Notice issued against it and this notice will override any other strengthening requirements under this policy.

Figures in brackets indicate the latest date for identification and notification and the maximum time for strengthening or demolition respectively. Times required for strengthening or demolition commence on the date of issue of formal notice.

The order will be as indicated below.

1. Buildings that are overdue for strengthening from the previous register. (December 2006, 2 years).
 - 1A. Parapets on buildings that were not constructed to New Zealand Standard 4203 or NZS 1170 (March 2009, 2 years).
2. Buildings with special post-disaster functions as defined in AS/NZS 1170.0: 2002, Importance Level 4 (December 2007, 5 years).
3. Buildings that contain people in crowds or contents of high value to the community as defined in AS/NZS 1170.0: 2002, Importance Level 3 (December 2008, 5 years).
4. Unreinforced masonry buildings that were classified as 'Earthquake Risk' under the initial assessment by the GDC under the Local Government Act and later removed from the strengthening schedule due to the raised threshold in the 1991 Building Act. (December 2007, 10 years).
5. Removed in amendment 2 – November 2011
6. Buildings with an Importance Level of less than 3 as defined in AS/NZS 1170.0: 2002 (December 2011, 10 years).
7. Rural churches not part of 1 above. (December 2015 for assessment, strengthening to be complete three years after final agreement on strengthening has been met.).

8. Buildings damaged in a seismic event that are not dangerous under the provisions of the Building Act. (No less than 2, no more than 5 years.)
9. Buildings that have been strengthened under the previous governing legislations (the 1991 Building Act or Local Government Act) to a percentage of NZS 1900 (December 2012, 10 years).

Once each category has been reviewed and the earthquake-prone buildings within it identified, the process of liaising with owners and serving notice on them will commence. Identification of buildings in each category will proceed according to the priorities identified above. The overall approach and timetable is summarised in the accompanying Outline Implementation Programme.

3. Heritage Buildings

3.1 Special Considerations and Constraints

The GDC believes it is important that its heritage buildings have a good chance of surviving a major earthquake. For the purpose of this policy heritage buildings include, but may not be limited to, Buildings on the NZHPT register, buildings listed as category A, B, or C in the Proposed Combined Regional Land and District Plan CBD Heritage Schedule or Post European Contact Schedule (Appendixes 3 and 4 respectively) and buildings of significance to iwi.

However, The GDC does not wish to see the intrinsic heritage values of these buildings adversely affected by structural improvement measures.

Heritage buildings will be assessed in the same way as other potentially earthquake-prone buildings and discussions held with owners and the Historic Places Trust to identify a mutually acceptable way forward. The GDC accepts that a degree of compromise may be appropriate where strengthening elements would destroy or mask the heritage characteristics of the building. This is current policy for the GDC and is often referred to as 'the sacrifice' needed to reach a solution that satisfies both objectives. Special efforts will be made to meet heritage objectives.

Following this consultation period, notices will be served requiring improvement or demolition within a stated (and preferably agreed) time frame. In particularly important cases, public consultations will be included.

3.2 Rural Churches

Rural churches (including those in townships) with a low occupancy rate will be required to have an earthquake prone building risk assessment carried out by a structural engineer by December 2015. If the building is found to be earthquake prone but not dangerous, as defined by the Building Act 2004, the Council will determine the strengthening level required on a case-by-case basis. Any building found to be dangerous as defined by the Act will be required to be immediately strengthened and/or repaired to remove the danger.

Final strengthening requirements will be subject to agreements between the building owner and/or their agents and Council. Required strengthening must be completed within three years of the date of the agreement. In cases where an agreement cannot be met an appeal may be made against the strengthening requirements. This appeal will be heard by Council's Hearing Committee.

An appeal against the Committee's decision may be made by way of a Determination under the Building Act 2004 to the Department of Building and Housing. Determinations are binding on all parties.

4. Post Disaster Assessment

Buildings that were not earthquake prone, or had been identified as earthquake prone but have a number of years until strengthening is required, may be damaged in a moderate to strong seismic event. The Council reserves the right to reclassify these buildings after an event and require strengthening in a much shorter timeframe. While some of these buildings will be captured by the provisions of clause 1.9.2 of this policy others may be weakened but not require repairs under the Building Act. Such buildings may not meet the tests under the Act that allow a building to be classified as dangerous but could be subject to collapse when subjected to a mild earthquake (the Dangerous Building provisions of the Act preclude the consideration of earthquakes as a risk). These building will be given a short timeframe to strengthen. Time periods will be no less than two but no more than five years.

Abbreviations and Terms

CBD	central business district
CPEng	chartered professional engineer
CSW	critical structural weaknesses
EPB	earthquake-prone building
IEP	initial evaluation process
LIM	land information memorandum
NZSEE	New Zealand Society for Earthquake Engineering
PIM	project information memorandum
RR	relative risk
SPS	structural performance score
TA	territorial authority
AS/NZS	Joint Australian and New Zealand Standard

Moderate Earthquake

For the purposes of section 122 (meaning of earthquake-prone building) of the Act, moderate earthquake means, in relation to a building, an earthquake that would generate shaking at the site of the building that is of the same duration as, but that is one-third as strong as, the earthquake shaking (determined by normal measures of acceleration, velocity, and displacement) that would be used to design a new building at that site (definition from Building Regulations Specified Systems 2005).

Liquefaction

Occurs when unconsolidated, water-saturated regolith (soil and loose rock fragments overlying the bedrock), soil, or landfill loses its strength and behaves like a fluid when shaken by an earthquake. Liquefied soils are unable to support buildings and other structures. Liquefaction most strongly affects areas with shallow water tables, subsidence occurs as a result and subsequently buildings and structures can be tilted (taken from Earth's Dynamic Systems, 2004).

The act or process of transforming cohesion less soils from a solid state to a liquefied state as a consequence of increased pore pressure and reduced effective stress (taken from GNS, 1997).

Amplification

Refers to ground shaking during earthquakes. Ground shaking results from the dissipation of earthquake energy by the radiation of earthquake waves. The larger the magnitude of the earthquake, the greater the amount of energy releases. As the waves travel away from the earthquake source they gradually lose energy, thus locations further from the source feel a lower level of shaking than locations near the epicenter. In addition to the main factor of distance from the earthquake source, some ground conditions may amplify the earthquake waves. Thus different levels of shaking may be felt within even quite a small area.

Studies of the effects of earthquake ground shaking have found that the most "hazardous" site condition is typified by geologically young, unconsolidated, often water saturated, fine-grained sediments. These materials, often referred to as "soft soils" or "flexible sediments", have a high ground shaking amplification capability. In contrast, weak to strong rock, of gentle topography, has a low to very low ground shaking amplification capability. Alluvium and very weak rocks have an intermediate ground shaking amplification capability (taken from GNS, 1997).

Earthquake Liquefaction Zones

