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Submission on "Unreinforced Masonry and other Earthquake-prone Buildings – Requirements for Seismic Strengthening"

14 October 2011

Canterbury Earthquakes Royal Commission
PO Box 14053
Christchurch Mail Centre 8544
Christchurch

(sent via email to Canterbury@royalcommission.govt.nz)

In response to the Commission's request of 8 September for evidence and submissions on "Unreinforced Masonry and other Earthquake-prone Buildings – Requirements for Seismic Strengthening", I attach a submission on the Department of Building and Housing's behalf.

I would also like to express the Department's wish to appear before the Royal Commission to present this submission. Department staff will certainly be available at any stage required during the two-week hearing period commencing 7 November.

Yours sincerely

Dave Kelly
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Department of Building and Housing

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Department of Building and Housing ("the Department") Submission on "Unreinforced Masonry and other Earthquake-prone Buildings – Requirements for Seismic Strengthening"

1 This paper is in response to the Canterbury Earthquakes Royal Commission's request, made on 8th September 2011, for evidence and submissions on **Unreinforced Masonry and other Earthquake-prone Buildings – Requirements for Seismic Strengthening,** to be provided by 14th October 2011.

2 The Department of Building and Housing is the Government's policy agency for building and housing matters. It administers the Building Act 2004 ("the Act") as well as related legislation.

3 To date, the Department has provided to the Royal Commission with:
   a. A background of the Building Regulatory Framework (May 2011)
   b. The Stage One expert panel report covering the Pyne Gould Corporation, Forsyth Barr and Hotel Grand Chancellor buildings (30th September 2011) , and
   c. A submission on the GNS report "Canterbury Earthquakes sequence and implications for seismic design levels" (30th September 2011).

4 The Canterbury earthquakes have highlighted that there is a significant health and safety risk to society arising from buildings not being designed and built to current earthquake standards. Dealing with this policy issue requires careful consideration of:
   a. The risks that society is prepared to accept, the risks that it wants to mitigate, and the price it is prepared to pay for mitigating those risks
   b. The fundamental economics of building ownership in New Zealand, particularly in areas where economic returns are marginal
   c. The opportunity costs of earthquake-prone building mitigation against other building improvements such as fire safety, disabled access and weathertightness, and
   d. The level of regulatory intervention necessary to achieve the desired outcomes.

5 Accordingly, the Department will be conducting a review of the specific earthquake-prone building provisions of the Act. This will consider the broader economic issues relating to ownership of earthquake-prone buildings as well as the appropriateness of the tools used for risk management. Draft terms of reference for this review are included as Appendix A.

Legislative background

6 One of the main purposes of the Act is to ensure that people can use buildings safely and without endangering their health. This purpose is primarily achieved by requiring all new building work to comply with the Building Code. The Act is not retrospective and does not require the performance of existing buildings to be improved, except in certain specific circumstances. One of these circumstances is if an existing building is earthquake prone. Where this is the case, the Act empowers territorial authorities to require the building owner to strengthen the building. It is a criminal offence, with a maximum fine of $200,000, if the building owner fails to comply with such a requirement.

7 The Act defines an earthquake-prone building as one which will have its ultimate capacity exceeded in a 'moderate earthquake' *and* which would be likely to collapse causing: injury or death to persons in the building or to persons on any other property; or damage to any other property[1]. This definition does not cover residential buildings unless they are at least two storeys high *and* contain at least three household units. However, this still goes substantially further than previous legislation (Building Act 1991), which limited the definition of earthquake-prone buildings to those built wholly or substantially of unreinforced concrete or masonry.

8 Regulations made in 2005[2] define a 'moderate earthquake' for the purposes of the Act as one that would generate shaking at the site of the building that is of the same duration, but a third as strong, as the earthquake shaking used to design a new building at the same site. Earthquake shaking is to be determined by normal measures of acceleration, velocity and displacement.

9 The Act requires territorial authorities to have a policy on how they will exercise their powers to require earthquake-prone buildings to be upgraded. The authorities were required to finalise their initial policies by 30th May 2006 following public consultation, to submit these policies to the Department, and to review them at least every five years[3]. In 2005, the Department issued a guidance document[4] to help the territorial authorities develop their policies. This included suggestions on the approach taken and a model policy for "Quaketown".

10 The Department, in partnership with the New Zealand Earthquake Commission (EQC) and Local Government New Zealand, conducted a workshop in June 2010 to assist territorial authorities in the imminent five-yearly review of their initial policies. Most territorial

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1 Section 122 of the Building Act 2004
2 Section 7 of the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005 (SR 2005/32)
3 Sections 131 and 132 of the Building Act 2004
4 Available at: http://www.dbh.govt.nz/UserFiles/File/Publications/Building/Building-Act/e-quake-policy.pdf

authorities, property owners and developers, insurers and engineers participated. This successful initiative is an example of ongoing initiatives and strategic partnerships between the Department and other agencies and organisations including EQC, the New Zealand Society for Earthquake Engineering and the New Zealand Geotechnical Society that have occurred over the years to improve New Zealand's seismic performance.

11 A summary of the approach taken by the territorial authorities, both in their initial policies and at their first five-yearly review, is included as Appendix B.

Issues

12 The Commission has indicated a number of issues it wishes to consider. These are set out in bold below with some corresponding commentary from the Department. The Department's approach in this submission is to describe the issues arising in the current legal and regulatory framework to assist the Royal Commission in this Inquiry rather than taking a particular policy view as to future changes, if any, in the area of building regulation and enforcement. The Department's future policy development will be informed by the Royal Commission's output and any further public submission on the Department's consultation processes.

'Moderate earthquake' definition: the criteria for earthquake prone

The legal requirements for buildings that are "earthquake prone" under section 122 of the Act, including:

- **The buildings that are, and those that should be, treated by the law as "earthquake prone",**
- **Existing buildings that are or should be required by law to meet a defined minimum proportion of the seismic standards for the design, construction and maintenance of new buildings, and**
- **The enforcement of legal requirements for such buildings including the period allowed for compliance.**

13 The legislation provides for a tiered approach to dealing with earthquake-prone buildings. The first tier is the power for the territorial authority to require earthquake-prone buildings to be upgraded. The Act gives strong powers to local authorities to require upgrading (or prevent the building from being occupied). The second tier is deciding which buildings are 'earthquake-prone'. This is done by the Government defining the term 'moderate earthquake' in regulation. A building that would collapse in a moderate earthquake is

earthquake prone. The regulation[5] defining moderate earthquake was developed in 2004 by the Government in close consultation with the engineering profession.

14 At the time of the regulation development policy process, three alternative thresholds for determining a 'moderate earthquake' were considered: 16% of the new building standard (the level of the pre-2005 threshold), 33% (ie the threshold of one third that was eventually used) and 50%. The New Zealand Society for Earthquake Engineering recommended the 33% threshold but also recommended that, ideally, buildings should be brought up to 67% of the new building standard (equivalent to about three times the risk of serious damage or collapse compared to a new building).

15 Buildings with less than one third of the strength of a new building would have at least 10 times the risk of serious damage or collapse when compared to a new building. By comparison, buildings that just met the standard at that time (as prescribed in the previous Building Act 1991) represented at least 25 times the risk of a new building. Therefore, a threshold of one-third of the new building standard potentially would result in a significantly larger number of buildings being considered earthquake-prone than previously.

16 The threshold for defining a building as earthquake prone needed to target those buildings that were the least safe to be in during an earthquake. An appropriate balance was sought between providing a greater level of safety on the one hand (given the risk and probability of a more-than-moderate earthquake event occurring), and avoiding imposing excessive costs on building owners on the other hand. The Government also wanted to set a clear threshold (number) that would not be open to interpretation and that would be clear for territorial authorities to implement.

17 The threshold, at whatever level it was set, would have a major economic impact on the country's commercial building stock. This had to be carefully balanced against the life safety risk and the probability of a more-than-moderate earthquake occurring. The Government decided that the threshold of one-third met these policy objectives.

18 The third tier in the legislation is local implementation and enforcement of the earthquake-prone provisions in the Act. The intent of the legislation was for territorial authorities to consult with their communities about earthquake risks and the buildings in their area that may be earthquake prone. The outcome of this consultation was to be the development of territorial authority policies that set levels of local earthquake strengthening requirements (including the time period for implementation).

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[5] Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005 (SR 2005/32)

Dealing with existing buildings which are not Building Code compliant but which are not defined as earthquake prone

The requirements for existing buildings that are not "earthquake prone" but do not meet current legal and best practice requirements for the design, construction and maintenance of new buildings; including whether, to what extent, and over what period, they should be required to meet those requirements.

19 The Act is not retrospective. The performance of existing buildings may only be required to be improved (not necessarily fully upgraded) if:

a. The building is dangerous, insanitary or earthquake prone (all terms are defined in the Act and effectively mean that the building must present an immediate health or safety danger to its occupants)
b. The building is altered[6] and that alteration requires a building consent, or
c. The use of the building changes[7] (for example, if an office building is converted to apartments).

20 Even if a building is required to be upgraded (and most buildings do not meet the requirement to upgrade during their economic life), the owner will not be required to make the building comply fully with current Building Code standards:

a. Dangerous, insanitary or earthquake-prone buildings only have to be upgraded to the extent necessary to remove the dangerous, insanitary or earthquake-prone condition
b. Altered buildings only have to upgrade the means of escape from fire and access for persons with disabilities 'as nearly as is reasonably practicable' to current Building Code standards, and
c. Buildings with changed uses only have to upgrade 'as nearly as is reasonably practicable' to current Building Code standards.

21 The Government intended that the increased transparency (of having local policies) and the information it provided to territorial authorities (about the provisions in the 2004 Act) would help to generate a greater understanding of earthquake risks to existing buildings. This greater understanding would, in turn, assist owners and users of existing buildings that were above the earthquake-prone building threshold to make more informed choices about the costs and benefits of voluntarily earthquake-strengthening their buildings. This would lead to more buildings being strengthened than just those that were earthquake prone.

22 There is evidence that, in some specific cases, buildings have received structural upgrades outside of that which may be required by the Act. However, this is not common. Until the Canterbury earthquakes, structural upgrades did not generally attract a market return.

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6 Section 112 of the Building Act 2004
7 Section 115 of the Building Act 2004

While a full analysis has not yet been completed, the empirical evidence from the recent Canterbury earthquakes shows that buildings strengthened to 67% generally performed adequately. Some buildings strengthened to less than this level collapsed. The Department will be looking at this more closely as part of its review (see Appendix A).

23 Anecdotal evidence is that, since the Canterbury earthquakes, the market (at least, in areas with earthquake risk) has shifted and there is now a higher value placed on buildings that are not earthquake prone. However, it is not known how long this shift in the market will last, nor is there any current data to provide a reliable framework for analysing the impact of setting a higher threshold for earthquake-prone buildings. This is also an issue the Department will be looking at in its review.

Seismic strengthening of existing buildings

Existing and new methods for the seismic strengthening or "retro-fitting" of existing unreinforced masonry buildings.

24 At this stage, the Department has not had the opportunity to fully evaluate the lessons from the Canterbury earthquakes in terms of existing and new buildings. It is aware of some studies underway in this area and will be using these as inputs into its review.

Immediate action on high-hazard elements

The desirability of immediate action in respect of restraining parapets, chimneys, and other high-hazard elements.

25 Earlier generations[8] of earthquake-prone building guidance talked of ideas of 'interim security', where owners were encouraged to secure more vulnerable parts of a building (such as parapets, and floor and roof connections) early in return for being granted longer timeframes for more substantive strengthening.

26 While these ideas are not ruled out in current legislation, it does not encourage or suggest them either as the legislation is focused on whole buildings, not part of buildings. The Department will be looking more closely at this issue as part of its own review of the Act's earthquake-prone provisions (see Appendix A).

27 The Department is currently reviewing its guidance to territorial authorities with a view to identifying some practical, easily-implemented ways for building owners to look at high-hazard building elements. The first of these was the Practice Advisory on Egress Stairs (Practice Advisory 13), issued on 30th September. The consideration of a stronger legislative

8 Before the Building Act 2004

basis for taking more specific action on high-hazard elements will be part of the Department's review.

Respective roles of central and local government

The respective roles of central and local government in respect of earthquake-prone buildings and their seismic strengthening.

28 As described in paragraphs 13 to 18 above, the legislation gives separate roles to central and local government. Central government's role is to set the technical standard for when a building is considered earthquake prone (by defining the term 'moderate earthquake' in regulations). Local government's role is to apply that standard to buildings in its area and to implement local policies for upgrading the buildings that fall below the standard.

29 The provisions for earthquake-prone buildings set out in the Act differ from most other provisions as they permit some flexibility by territorial authorities in their application. This flexibility is needed in the system as the life-safety risk and economics for an individual building is, to some extent, driven by its location[9].

30 The provisions in the 2004 Act are similar to those in the 1991 Act as they recognise that local economic, social and other factors have a bearing on their implementation. They also recognise the need for a consistent, transparent and accountable approach to their implementation (by requiring the development and publication of policies on the use of powers) in order to protect the interests of both building users and owners.

31 The initial policies set by the 73 territorial authorities in May 2006 ranged from 'active' (action required to a timeframe) to very 'passive' (action required when a building consent is applied for) in their approach and in the timeframes required for strengthening[10]. The Department's review will consider whether the timeframes for remediation that can be given in a local policy should be limited by statute or by some other central government device.

32 The legislation allows any territorial authority that is satisfied that a building is earthquake prone to require the owner to take action to 'reduce or remove the danger'. This can include the demolition of all or part of the building[11].

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9 For example, two identical buildings, one on Lambton Quay and the other on the main street of Featherston (which has the same seismic risk), have different societal risks as well as fundamentally different economics of ownership.

10 For some this means only requiring strengthening when a change of use occurs, an unlikely event for many buildings, and in any event the Act requires a building after a change of use to comply as nearly as is reasonably practicable with the structural provisions of the Building Code, which is arguably a higher test.

11 Sections 124 and 127 of the Building Act 2004

33 Nearly a third of territorial authorities have elected to specify a strengthening level of two thirds or more of the new building standard. However, there is some legal debate as to whether the Act enables a council to require that earthquake-prone buildings are made 'stronger' than a third of the new building requirement. A summary of a legal analysis of this issue is included as Appendix C.

Appendix A: Draft terms of reference for Department of Building and Housing policy review of earthquake-prone building provisions of the Building Act 2004

Background

1. New Zealand's building standards have evolved over a number of years as new seismic hazards have been identified and as building technology has improved the understanding of the impact of earthquakes on buildings and, in turn, improved design solutions to mitigate that impact. It is now generally considered that most buildings designed and built before 1976 are of a design standard which results in an increased risk to life safety for occupants of those buildings.

2. In order to mitigate this risk, the Building Act 2004 ("the Act") created a threshold below which buildings are regarded as earthquake prone. It also gave territorial authorities responsibilities and powers to mitigate the risks in their area. The provisions of the Act do not apply to buildings that are used for residential purposes unless the building comprises two or more stories and contains three or more household units.

3. The earthquake-prone building policy provisions of the Act:
    a. Define an earthquake-prone building as one which will have its ultimate capacity exceeded in a moderate earthquake and which would be likely to collapse causing: injury or death to persons in the building or to persons on other property; or damage to any other property
    b. Give local authorities a limited, but stringent, range of powers to deal with such buildings in their area
    c. Require territorial authorities to have a policy outlining how they will exercise their powers. These policies are reviewed every five years so that, for most territorial authorities, 2011/12 is the first review period.

4. Regulations made under the Act define the term 'moderate earthquake' as an earthquake that would generate shaking at the site of the building that is of the same duration, but 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 the site.

5. Buildings that are at the earthquake-prone building threshold (one third the new building standard) are judged to be at least 10 times the earthquake risk of a new building. Those below the threshold are at greater risk.

6. With five years since the territorial authorities' initial earthquake-prone policies were implemented, and given lessons arising from the Canterbury earthquakes, it is timely to review the current policy as implemented through the Act. It is also likely that the

Canterbury Earthquakes Royal Commission will be making recommendations on earthquake-prone buildings.

7. The Department wishes to review whether the earthquake-prone building provisions in the Act have achieved the policy objectives sought by the regulation and, if not, how the legislation could be changed to better meet the policy objectives.

Critical issues

8. The Canterbury earthquakes have highlighted that there is a significant health and safety risk to society arising from buildings not being designed and built to current earthquake standards. Dealing with this policy issue requires careful consideration of:
    a. The risks that society is prepared to accept, the risks that it wants to mitigate, and the price it is prepared to pay for mitigating those risks
    b. The fundamental economics of building ownership in New Zealand, particularly in areas where economic returns are marginal
    c. The opportunity costs of earthquake-prone building mitigation against other building improvements such as fire safety, disabled access and weathertightness, and
    d. The level of regulatory intervention necessary to achieve the desired outcomes.

Scope

9. The Department's review will consider whether the current provisions of the Act adequately address the critical issues. The review will include consideration of the broader economic context of the ownership of earthquake-prone buildings to understand the economic incentives and disincentives for building owners to upgrade their buildings. This will include the impacts of taxation, heritage policies and resource management policies on earthquake-prone building ownership.

10. The Department will also look at lessons arising from the Canterbury earthquakes in terms of building performance. In particular, it will review research on the performance of buildings at varying percentages of the new building standard.

11. The review will identify a range of instruments (both regulatory and non-regulatory) that could be used to mitigate the risk arising from buildings not constructed to current design standards.

12. The Department will then identify whether the current regulatory approach remains an appropriate tool for risk management of the higher-risk buildings. Specifically, it will review:
    a. The current definition of 'moderate earthquake'
    b. The appropriateness of territorial authorities having no requirement in the Act to mitigate earthquake risk but only to have a policy around their exercise of powers

c. Whether there are other legislative or non-legislative mechanisms that could be used under the Act to accelerate, in a cost-effective manner, the reduction in risk from buildings not meeting current design standards, and
d. Whether the regulation appropriately and adequately supports market responses to addressing earthquake risk, including the provision of information to consumers.

Tasks

13. Appoint a reference group from building owners (including central government as a significant building owner) and investors, Insurance Council of New Zealand, National Infrastructure Unit, heritage and engineering interests, and local government to provide advice and insights on the issues.

14. Identify current economic issues facing building owners when investing in building work on earthquake-prone buildings.

15. Develop a quantitative model of the size, location and risk profile of New Zealand's earthquake-prone building stock to serve as a basis for reviewing decisions on the most appropriate threshold for 'moderate earthquake'.

16. Produce discussion paper identification and options.

Appendix B: Summary of territorial authority policies for earthquake-prone buildings as required under the Building Act 2004

Initial earthquake-prone building policies

Following the introduction of the Building Act 2004, the 73 territorial authorities were required to supply earthquake-prone building policies to the Department. Some key features of these policies are provided below. This information has been compiled from a summary of the territorial authorities' policies (which is on the Department's website at: http://www.dbh.govt.nz/UserFiles/File/Building/information%20for/ta-earthquake-prone-building-summary.xls) and should be read with care, as most policies have a number of variables that it is not possible to capture in a general overview. The full policies for each territorial authority should be checked for the details.

Note that policies described as 'active' require the identification of earthquake-prone buildings to be carried out within a timeframe. Policies described as 'passive' require action only at the time of a building consent application.

Identifying EQP buildings (number of policies)	**Active**	**Passive**	**Active/passive**
Identification method	33	23	17

Policy features	**Yes**	**No**
Recommended improvement greater than 40% NBS*	34	39
Recommended improvement greater than 67% NBS*	21	
Timetable given for strengthening	45	28
Different timing required for heritage buildings	26	47
Different improvement level for heritage buildings	17	56
TA seismicity or risk assessment summary in policy	56	

*New building standard

Policy ranges	Minimum time required (years)	Maximum time required (years)
Identifying EQP* buildings	0.25 - 5.5 (average 2.1)	0.25 – 25 (average 5.4)
Initial assessment	0.25 – 11 (average 2.2)	0.25 – 14 (average 4)
Strengthening	1 – 26 (average 9.9)	3 – 50 (average 21.1)

*Earthquake-prone

Who pays	Council	Building owner	Council or owner
Identification	63	8	2
Initial assessment	44	25	2
Detailed assessment	2	66	3

Revised earthquake-prone building policies

Territorial authorities are required to revise their earthquake-prone building policies every five years. A limited number of revised policies have been received by the Department to date. These are summarised below.

Territorial authority	Main policy points		Type of policy change
	Initial policy	Amended policy	
Grey District Council (policy received by the Department 21 Feb 2011)	Category A & B buildings require minimum strengthening to 67% and Category C to 33%, although 67% strongly recommended. Timelines for strengthening dependent on the level of potential risk posed by the building.	Most buildings require a minimum strengthening of 67% NBS. Time periods for strengthening depend on the importance level of the building - 1 year for Category A buildings constructed before 1935, to 25 years for Category D buildings constructed after 1976. GDC has reduced the period in which building owners can object to the classification, from 12 to 6 months.	**Strength Level Changed?** No **Timeframe Changed?** Yes **Active Policy**

Territorial authority	Main policy points		Type of policy change
	Initial policy	Amended policy	
Hurunui District Council (received 5th July 2011)	Minimum level of earthquake strengthening is 33% of NBS. No timelines for strengthening stipulated.	Require a target of at least 67% of NBS. Category A buildings to be improved/demolished within 15 years; Category B within 20 years; Category C within 25 years; and Category D within 30 years.	**Strength Level Changed?** Yes **Timeframe Changed?** Yes **Active Policy**
Rangitikei District Council (received 20th May 2011)	Minimum level of earthquake strengthening is 33% of NBS. Although, the Council will encourage owners to upgrade to 67%. Timeline for strengthening will be negotiated between the building owner and the Council.	Building owners must have parapets and masonry chimneys checked, strengthened or removed within 5 years. Other modifications to buildings may proceed without requiring additional strengthening work, provided the work undertaken does not further weaken the building. Buildings in this TA generally do not exceed 3 storeys. They have assessed the highest risk as being parapets and masonry chimneys.	**Strength Level Changed?** No **Timeframe Changed?** Yes **Active Policy**
Southland District Council (received 31st May 2011)	Accepted 34% as the minimum strength requirement, unless there is a change of use, where the requirement was as near as practicable to 100% of NBS. Timeline negotiated between Council and building owner.	Minimum level of earthquake strengthening is 34% of current NBS, with a recommendation to building owners to consider 67%. Category A buildings have to be strengthened within 15 years of 1 July 2012; Category B within 20 years; and Category C within 30 years. This approach has changed from the previous passive policy, where assessment/strengthening was directed at building owners seeking a change of use consent.	**Strength Level Changed?** Yes **Timeframe Changed?** Yes **Active Policy**

Territorial authority	Main policy points		Type of policy change
	Initial policy	Amended policy	
Waimakariri District Council (received 4th October 2011)	Strengthening requirements set at "as nearly as is reasonably practicable" to NBS if consent for change of use applied for. If an alteration is undertaken then strengthening required to be at least 33%. Otherwise no minimum strengthening requirement and timeframes negotiated on a case by case basis.	If building identified as earthquake-prone, building owner has 24 months to undertake a detailed assessment. Council encouraging building owners to strengthen to 67% of NBS. Category A buildings have 10 years to upgrade/demolish; Category B 15 years; Category C 15 years; and Category D 20 years.	**Strength Level Changed?** Yes **Timeframe Changed?** Yes **Active Policy**
Christchurch City Council (adopted 10th September 2010, not yet formally submitted to the Department)	Timeframes and minimum strengthening requirements set on an individual basis.	The new target for structural strengthening is 67% of code. That is a target. Assessments will need to be worked through on a case by case basis. It may not be practicable for some repairs to meet that target. Category A Category A buildings have 15 years to upgrade/demolish; Category B 20 years; and Category C 30 years.	**Strength Level Changed?** Yes **Timeframe Changed?** Yes **Active Policy**
Wellington City Council (2009: not yet formally submitted to the Department)	No set target outlined in policy - assessed on a case by case basis when building consent application for strengthening work is received. Category A buildings have 5 years to upgrade or demolish; Category B 10 years; Category C 15 yrs.	Still no set target outlined in policy. Timeframes have been extended: Category A buildings have 10 years to upgrade/demolish; Category B 15 years; and Category C 20 years.	**Strength Level Changed?** No **Timeframe Changed?** Yes **Active Policy**

Territorial authority	Main policy points		Type of policy change
	Initial policy	Amended policy	
Gisborne District Council (2008: not yet formally submitted to the Department)	Strengthening requirements set at "as nearly as is reasonably practicable" to NBS, which it accepted as at least two-thirds of the NBS. Had 6 categories with differing timeframes ranging from buildings overdue for strengthening from the previous register (2 years) through to low-risk buildings (25 years).	Strengthening requirements remain at at least two-thirds of NBS. Priority list for timeframes remains and has been extended to 8 different categories, ranging from 2 to 25 years.	**Strength Level Changed?** No **Timeframe Changed?** No **Active Policy**

Appendix C: Legal analysis of issues relating to the earthquake-prone building provisions in the Building Act 2004

The following legal analysis addresses the issue: **What level of strengthening is required by the words "reduce or remove the danger" in s124(1)(c)(i) of the Act?**

1. Once a building has been declared earthquake-prone a territorial authority has a number of powers it can exercise in respect of such a building. A territorial authority can put up a fence preventing people from approaching the building, put up a notice warning people not to approach the building, or give notice requiring work to be carried out on the building to "reduce or remove the danger".

2. These words have given rise to a number of different approaches to the level of strengthening a territorial authority can require to be carried out on an earthquake-prone building. The different approaches and the basis for each approach are summarised below.

Strengthen the building only to the extent that it can no longer be defined as earthquake-prone under s122 of the Act

3. This approach emphasises the definition of an earthquake-prone building in s122 and reasons that if the building is strengthened so that it can no longer be defined as earthquake-prone then that is sufficient to comply with the requirements of s124 to reduce or remove the danger. An earthquake-prone building is one that is one third or less the structural performance required of a new building. Applying this approach, upgrading an earthquake-prone building to 40% the strength of a new building complies with the requirements of s124 of the Act. Some of the reasons cited in support of this approach are:

    - Upgrading the structural performance of a building to, say, 40% the strength of a new building will mean the building is no longer earthquake-prone. If a building is not earthquake-prone then a territorial authority cannot require the structural performance of a building to be upgraded unless there is a change of use (s115).

    - Strengthening work will not generally be exempt from obtaining a building consent, and a building consent will only be issued if the proposed work complies with the Building Code (s49). Such alterations also have to comply with the requirements of s112 that requires that, after the alteration, the building as a whole complies to the same extent as before the alteration and the means of escape from fire and access and facilities for persons with disabilities are upgraded to comply as nearly as reasonably practicable with the Building Code. Any additional requirement to upgrade the structural performance of a building beyond what is proposed in the

building consent to ensure the building is no longer earthquake-prone would be contrary to s112.

- A territorial authority's earthquake-prone building policy is 'unenforceable' – i.e., there is no basis in the Act for a territorial authority to use its earthquake-prone building policy (s131) to increase the strengthening requirements of the Act beyond what the Act already provides for in ss122, 49 and 112.

The level of strengthening will vary according to the characteristics of the particular building and the local conditions but is definitely more than just ensuring the building is no longer defined as earthquake-prone

4. This approach gives greater emphasis to the words "reduce or remove the danger" and how those words might apply to a particular earthquake-prone building, as well as the requirements of the Act and the Building Code in respect of the building consent that is likely to be required for any strengthening work.

5. Ultimately, the issue of whether proposed strengthening work will satisfactorily reduce or remove the earthquake danger associated with a building will be a factual matter to be determined taking into account the particular circumstances of the building, its locality and the nature and effect of the proposed remedial work on the performance of the building. There may be particular features relating to the soil, the foundations, the original design, or the materials used in the construction of the building that make certain solutions more feasible than others and limit the options available to a building owner to strengthen an earthquake-prone building. The reasons cited in support of this approach are:

    - Parliament deliberately used words ("reduce or remove the danger") to describe the level of strengthening required in section 124(1)(c)(i) of the Act that are very different to the test used to define when a building is earthquake-prone (s122). If Parliament had intended the level of strengthening to be only what was needed to ensure the building was no longer earthquake-prone it would have used those words.

    - The power of a territorial authority under s124(1)(c)(i) is to require a building owner to carry out work to "reduce" the danger associated with a building being earthquake-prone. It would be hard to say that the danger has been "reduced" when a building that is 30% the strength of a new building is strengthened to 34% the strength of a new building. While the building no longer falls within the definition of an earthquake-prone building, the reduction in the danger associated with the building being earthquake-prone has been insignificant. The ordinary meaning of the words "reduce the danger" would require the danger to the appreciably reduced and not just in a minimal or insignificant way.

    - Further, the phrase "reduce the danger" is not susceptible to a precise definition of a level of strengthening. The danger reduces as the building is strengthened, although the danger doesn't suddenly diminish at any particular point. Even a new building

will retain some element of danger, albeit very small, as the risk of the building collapsing during a moderate earthquake and causing injury or death will be very significantly lower than a building that is an earthquake-prone building.

- Any alterations to improve the structural performance of a building will require a building consent and such work must fully comply with the building code. Where the structural performance of a building element is being upgraded the whole of the element (e.g., a wall, floor, roof or foundation) may need to be upgraded. The way these types of building code obligation impact on the proposed strengthening of a building is likely to mean that more work rather than less work to improve the structural performance of the building will need to be undertaken and will result in varying levels of strengthening depending on the particular characteristics of the building, the materials used and the ground conditions etc.

- Allowing for local circumstances including seismicity, local resources, the historical approach to upgrading earthquake-prone buildings, and social and economic factors to have a role in the level of strengthening required for earthquake-prone buildings is consistent with the Act's requirement that territorial authorities develop and implement earthquake-prone building policies that state "the approach that the territorial authority will take in performing its functions" in respect of earthquake-prone buildings, and the territorial authority's priorities in performing those functions (s131). A territorial authority must consult before adopting its policy and must review its policy at least every five years. Territorial authority earthquake-prone building policies cover matters such as the process and priorities to be used for identifying earthquake-prone buildings, the criteria for assessing whether a building is earthquake-prone, the process and priorities for taking action in respect of a building found to be earthquake-prone, the standards that will be required to reduce or remove the danger, the building consent process for strengthening earthquake-prone buildings, record keeping and access to information requirements.

- Strengthening a building only to the extent that it can no longer be defined as earthquake-prone fails to have proper regard to the emphasis the Act places on the safety of buildings (see the purpose of the Act in s3(a), the principles a territorial authority must have regard to when adopting its earthquake-prone building policy in s4(2)(c), (e), (f), (j) and (l), and the provisions of s381 that enable a Court to grant an injunction if a building is earthquake-prone and a territorial authority is failing to take appropriate action).

- Adopting one of the other standards in the Act such as the as nearly as reasonably practicable test from ss112 and 115 (see below) is inappropriate when Parliament has specifically used other words (reduce or remove the danger) to define the level of strengthening for an earthquake-prone building. (The as nearly as is reasonably practicable test was also expressly rejected by the select committee during consideration of the Building Bill 2003.)

6. This is broadly the approach set out in the Department's publication, "Earthquake-Prone Building Provisions of the Building Act 2004: Policy Guidance for Territorial Authorities", at page 16:

As the legislation does not set any particular level of performance to which affected buildings are to be upgraded, TAs should state clearly in their policies what levels of improvement they consider appropriate for particular categories of building in order to reduce or remove the danger. It is clear that, in order to reduce or remove the danger the building will have to be upgraded to a standard that is at least above that which would mean that the building is still earthquake-prone. However, a TA will not be able to require a building to be upgraded to a standard significantly in excess of what would be earthquake-prone, as this would require the building to be upgraded to a higher standard than other buildings that are not earthquake-prone. The actual level to which a building is upgraded will depend on the particular circumstances of the building and the nature and effect of the remedial work on the performance of the building. The policy should set out the TAs reasoning for the approach it proposes to take. In establishing the appropriate level of strengthening, TAs may wish to consider the view of the NZSEE that recommends strengthening to levels above the minimum requirements. It considers 67 percent of the new building standard is an appropriate level for the requirement to reduce or remove the danger.

Strengthen the building so its structural performance complies as nearly as reasonably practicable with the Building Code

7. This is the approach taken by a number of territorial authorities in their earthquake-prone building policies, the 'Model Policy' in the Department's policy guidance document, and the New Zealand Society for Earthquake Engineering (NZSEE).

8. The upgrading standard is adopted from ss112 and 115 of the Act and requires a balancing of the costs of complying as nearly as reasonably practicable with the Building Code against the benefits of improving the structural performance of the building to that level. The test is generally seen as a reasonably onerous test as the benefits are usually considered to outweigh the costs of complying as nearly as reasonably practicable.

9. The approach of the NZSEE is set out in its recommendations on earthquake risk buildings "Assessment and Improvement of the Structural Performance of Buildings in Earthquakes" (June 2006). The NZSEE actually states the initial target level for improvement should be 100% of the new building standard but that in many cases this will not be practicable and it will be necessary to establish a reasoned reduction to an acceptable level. The NZSEE opts for two thirds the strength of a new building as the minimum to be achieved by any structural improvement measures.

10. This approach provides for a substantial improvement in the strength of a building based on the following:

    - The earthquake risk associated with the structural performance of a building is not linear. The relative risk of a building that is two thirds the strength of a new building is 3 times that of a new building, whereas the relative risk of a building that is 33% the strength of a new building standard is 20 times that of a new building.

- A building that is strengthened to just over the threshold for an earthquake-prone building still represents a significant risk.
- All buildings that are less than two thirds the strength of a new building are at considerable risk and should be seriously considered for improvement of structural performance.
- The Act allows territorial authorities to give full effect to their earthquake-prone building policies in combination with the requirements of s124(1)(c).