



Improving the system for managing earthquake-prone buildings

Agency Disclosure Statement

This Regulatory Impact Statement (RIS) has been prepared by the Construction Market Policy Team in the Ministry of Business, Innovation and Employment. It provides an analysis of options intended to improve the current system for managing earthquake-prone buildings in New Zealand.

Parameters for development of options

The earthquake-prone building policy review (the review) seeks to ensure earthquake-prone building policy settings and standards:

- adequately balance life and safety against economic, heritage and other considerations
- are effectively implemented and administered.

Terms of reference for the review were published in March 2012 (www.mbie.govt.nz).

Both the Canterbury Earthquakes Royal Commission and the review have identified problems with current system for managing earthquake-prone buildings, including significant information gaps and consistency of practice problems. A clear view has emerged that from a societal perspective the current system for managing earthquake-prone buildings is not achieving an acceptable level of risk. Many earthquake-prone buildings are not being dealt with in a timely and cost effective manner.

Limitations on analysis undertaken

A key limitation of the analysis in this RIS is that, overall, there is poor information about the seismic performance of New Zealand's existing building stock. In addition, earthquake risk is not certain, but based on probabilities. While the best available information has been used, because of these issues there is uncertainty about the cost and benefit estimates that have been quantified in this RIS.

This RIS also highlights the limitations of monetary NPV analysis when considering low probability/high impact risks. Monetary NPV analysis comparing estimates of indicative quantifiable direct costs of strengthening with direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) indicates that the direct costs of the proposals strongly outweigh the direct benefits (based on the best available information and reasonable assumptions) under any scenario, including under the current system.

It is important to note that many of the costs and benefits associated with the proposals are difficult to quantify.

Despite these limitations, it is expected that the proposals considered in this RIS will give rise to incremental benefits and costs beyond those of the current system for managing earthquake-prone buildings.

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Status quo and problem definition

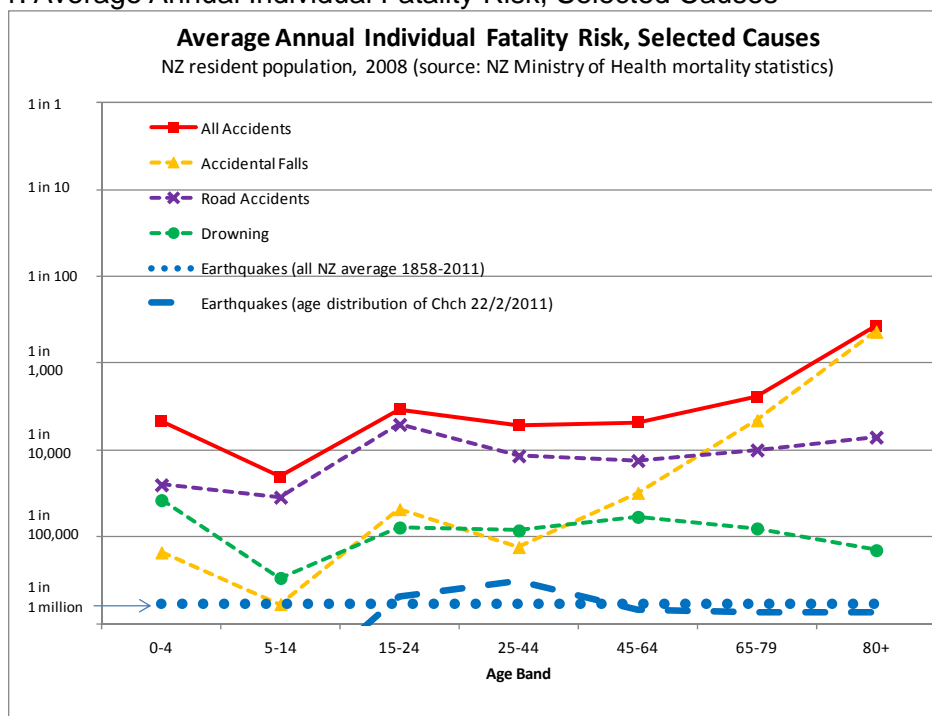
Context

- 1 The Canterbury earthquake sequence and the resulting Canterbury Earthquakes Royal Commission have resulted in public scrutiny of the adequacy of current policy settings and regulations for addressing earthquake-prone buildings, and the effectiveness of their implementation and administration.
- 2 The Ministry of Business, Innovation and Employment, with support from the Ministry for Culture and Heritage and the Ministry for the Environment (and other relevant agencies), has been reviewing the current policy settings and regulations for managing the seismic performance of existing buildings in New Zealand. Terms of reference for the review were published in March 2012.
- 3 Addressing the issue of seismic performance of existing buildings requires careful consideration of:
 - 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 (this includes considering the value communities place on the contributions that heritage buildings make to cultural values)
 - the fundamental economics of building ownership in New Zealand, particularly in areas where economic returns are marginal
 - the opportunity costs of earthquake-prone building mitigation against other building improvements such as fire safety, disabled access and weathertightness, and
 - the level of regulatory intervention necessary to achieve the desired outcomes.

Risk of harm to people from earthquakes

- 4 Advice the Ministry has received from GNS Science and international risk experts is that individual risk from earthquakes is small when it is averaged over the whole population – other day-to-day activities pose more immediate risks to life safety, for example, fatality risk from road accidents (see Figure 1 below).

Figure 1: Average Annual Individual Fatality Risk, Selected Causes



- 5 Outside the Canterbury region earthquake risk has not changed following the Canterbury Earthquakes.
- 6 While rare, in New Zealand major earthquakes stand out from other hazards in terms of the very large impact they have had as single events (both in terms of fatalities and injuries, as well as economic costs). For example, the worst ever road traffic accident in New Zealand was the Northland bus accident killing 15 people in 1963; the vast majority of road fatalities involve one, two or three fatalities per event. However, the 1931 Napier Earthquake killed 256 people, and 185 people were killed in the 22 February 2011 Christchurch Earthquake¹.
- 7 Typical new buildings in New Zealand, e.g. a typical hotel, office building or apartment building, are designed for a one-in-500 year earthquake². New Zealand Society of Earthquake Engineering (NZSEE) guidelines suggest that buildings at the current earthquake-prone building threshold present about 10 times the relative risk to occupants compared to a new building (buildings below the current earthquake-prone building threshold present greater risk)³.
- 8 The Canterbury Earthquakes demonstrate that there can be significant health and safety risks to society arising from buildings in earthquakes:
 - unreinforced masonry (URM) buildings can be particularly hazardous, not only for those in the buildings, but also for those in the path of falling masonry outside the buildings. In Volume 4 of its Final Report, the Royal Commission notes that of the 42 fatalities from the 22 February 2011 earthquake associated with individual buildings (other than the Canterbury Television building or the Pyne Gould Corporation building):
 - 35 were the result of the façade or walls of URM buildings collapsing onto:
 - pedestrians or persons in vehicles (26)
 - people in a neighbouring building (6)
 - people who had run out of a building to escape (3)
 - 4 people were killed inside a URM building
 - parts of buildings can be particularly vulnerable in an earthquake (parapets for example) – the overall seismic performance of the whole building is not the only consideration when assessing risk.

System for managing the seismic performance of existing buildings in New Zealand

Regulatory settings under the Building Act 2004 (and associated regulations)

- 9 One of the main purposes of the Building Act 2004 (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 (a regulation under the Act).

¹ Earthquake risk issues are discussed in more detail in a risk framework report available at www.mbie.govt.nz. Note: in Budget 2013 the Canterbury rebuild is estimated to cost \$40 billion, *Budget Economic and Fiscal Update 2013*, Treasury.

² Note: Some buildings, for example schools, hospitals and power stations, are designed for larger earthquakes.

³ NZSEE, *Assessment and Improvement of the Structural Performance of Building in Earthquakes*, 2006. See Box 1 for the definition of an 'earthquake-prone building' under current legislative settings.

- 10 The Act is not retrospective and does not require the performance of existing buildings to be upgraded as standards increase, except in certain specific circumstances. One of these circumstances is if an existing building is classified as 'earthquake-prone' (sections 121-132 of the Act). Two other circumstances are where buildings are altered (requiring a building consent), or where the use of the building is changed – these issues are discussed in more detail later in this RIS.
- 11 Where a building has been classified as 'earthquake-prone', the Act empowers territorial authorities (TAs) to require the building owner to 'reduce or remove' the danger. It is a criminal offence, with a maximum fine of \$200,000, if the building owner fails to comply with such a requirement. TAs also have powers to undertake work themselves (where the owner fails to do so) and recover costs from owners. The work required to 'reduce or remove' the danger is not prescribed, it is performance-based so the requirement is that the building owner strengthen the building to a point where it is no longer earthquake-prone. Work taken can include demolition. Box 1 below discusses the definition of an earthquake-prone building in more detail.
- 12 The Act requires TAs to have a policy on earthquake-prone buildings. The policy must state:
 - (a) the approach that the TA will take in performing its functions under the Part of the Act relating to earthquake-prone buildings
 - (b) the TA's priorities in performing those functions, and
 - (c) how the policy will apply to heritage buildings.
- 13 TAs were required to finalise their initial policies by 30 May 2006 following public consultation, and to review them at least every five years⁴. As well as being held at the local level, a copy of all council policies are held by the Ministry of Business, Innovation and Employment.

Box 1: The definition of an earthquake-prone building under the Building Act 2004

The Building Act 2004 defines an 'earthquake-prone' building as one which would 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 property⁵.

While the definition in the Act does not cover residential buildings unless they are at least two storeys high and contain at least three household units, it goes substantially further than the preceding Building Act 1991, which limited the definition of earthquake-prone buildings to those built wholly or substantially of unreinforced concrete or masonry⁶.

Regulations made under the Act in 2005⁷ 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 determined by normal measures of acceleration, velocity

⁴ Sections 131 and 132 of the Building Act 2004.

⁵ Section 122 of the Building Act 2004.

⁶ Before the Building Act 1991, the Local Government Act 1974 (and the Municipal Corporations Amendment Act 1968 before that) included provisions to enable local authorities to require the strengthening or removal of earthquake-prone buildings.

⁷ Section 7 of the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005 (SR 2005/32).

and displacement)⁸. Because the definition relates to the site of the building, it takes into account the different levels of seismicity around New Zealand.

A Determination, issued by the former Department of Building and Housing in 2012, concluded that where the provisions in the Act relating to earthquake-prone buildings referred to a building, they can also be applied to part of a building (such as parapets)⁹.

Buildings with less than one third of the strength of a new building have at least 10 times the risk of serious damage or collapse in an earthquake when compared to a new building (according to NZSEE guidelines). By way of comparison, buildings that were at the earthquake-prone building threshold under the Building Act 1991 represented at least 25 times the risk of collapse compared to a new building (being approximately 16% (or one sixth) of the strength of a new building under today's Building Code). Therefore, a threshold of one-third resulted in a significantly larger number of buildings being considered earthquake-prone than previously.

The regulation defining 'moderate earthquake' was developed in close consultation with the engineering profession (public consultation was also undertaken). At the time, three alternative thresholds for determining a 'moderate earthquake' were considered: 16% (the level of the threshold under the Building Act 1991), 33% (the threshold of one third that was eventually used), and 50%.

In practice, the definition of earthquake-prone building has become condensed over time to the shorthand of 33% or less of the new building standard (NBS).

Alterations and change of use

- 14 As noted earlier, the Act is not retrospective and does not require the performance of existing buildings to be upgraded to current standards, except in certain specific circumstances. Two instances where buildings can be required to be upgraded are when buildings are altered (requiring a building consent), or where the use of the building is changed.
- 15 Where earthquake strengthening work requires a building consent, the alteration provisions of the Act are triggered. Under section 112 of the Act, a Building Consent Authority (BCA) can only grant a building consent for an alteration to an existing building where it is satisfied that the building will:
 - comply as nearly as is reasonably practicable with the Building Code for means of escape from fire, and access and facilities for people with disabilities (if the building is one to which the public has access)
 - continue to comply with the other provisions of the Building Code to at least the same extent as before the alteration.
- 16 These provisions mean that building owners can face additional costs when undertaking earthquake strengthening work. Because the Act involves a test of what is 'reasonably practicable' there is some flexibility in how BCAs can apply the provisions. If an affected owner disagrees with the BCA's decision, they can apply to the Ministry of Business, Innovation and Employment for a Determination that is binding on the parties.

⁸ NZS 1170:5 2004 is referenced in Compliance Documents issued by the Ministry of Business, Innovation and Employment for designing new buildings for earthquake loadings.

⁹ A Determination is a binding decision made by the Ministry of Business, Innovation and Employment. It provides a way of solving disputes or questions about the rules that apply to buildings, how buildings are used, building accessibility, health and safety.

- 17 Change of use provisions in the Act (section 115) are not triggered by earthquake strengthening work¹⁰. The effect of these provisions is that where the use of a building is changed (for example from an office building to residential apartments), a building could potentially need to be strengthened and any strengthening would be to levels higher than required under the earthquake-prone building provisions, with other aspects of the building also upgraded (for example, fire) – the level of upgrading required under these provisions is ‘as nearly as is reasonably practicable’.

Other legal obligations

- 18 It is important to note that the Act does not set out all of the legal obligations of an owner of an earthquake-prone building. Building owners have other legal obligations, for example, a building owner may have legal obligations under other legislation, in particular, the Health and Safety in Employment Act 1992, at common law or under contract, for example conditions in their lease agreement. Resource Management Act 1991 (RMA) requirements may also apply, particularly in regard to heritage buildings.

Financial assistance available

- 19 Central government, through the New Zealand Historic Places Trust’s Heritage Incentive Fund (for example), does make available some limited funding to owners of heritage buildings that can be used to assist with the costs of earthquake strengthening. Some TAs also provide some limited assistance.
- 20 In September 2012, central government agreed to establish the legislative framework for a National Historic Landmarks List (the List) comprising heritage places of greatest significance to New Zealand that will be a priority for central government involvement in conservation and promotion. In late 2012, the Minister for Arts, Culture and Heritage introduced a Supplementary Order Paper amending the Heritage New Zealand Pouhere Taonga Bill, introducing the framework to create the List. The Bill is currently being considered by Parliament.

Market responses

- 21 Prior to the Canterbury Earthquakes, the market had largely underestimated the risk that buildings with low seismic performance present. However following the Canterbury Earthquakes there is some evidence of an over-correction, particularly as actual risk outside Canterbury has not changed. In summary, anecdotally the market response in the aftermath of the Canterbury Earthquakes has involved:
- large increases in insurance premiums for older buildings, particularly in areas of perceived risk (e.g. Wellington)
 - increased demand (rent premium) for newer, stronger or strengthened buildings
 - evidence of some older buildings being evacuated/closed when this does not appear justified by the actual risk to occupants
 - reports of an impact on the capital values of earthquake-prone buildings.

Guidance issued by the Ministry of Business, Innovation and Employment, and others

- 22 Under the current regulatory system much of the decision making is devolved to TAs and central government has a limited role in oversight and monitoring. However the Ministry can issue guidance under section 175 to assist TAs to carry out their functions.

¹⁰ Although, change of use may trigger earthquake strengthening requirements.

- 23 In 2005, the Ministry of Business, Innovation and Employment (then the Department of Building and Housing) issued a guidance document to assist TAs to develop their initial policies. This guidance material included a template policy that councils could modify/adapt for their area.
- 24 The guidance noted that in determining strengthening levels to 'reduce or remove' danger for earthquake-prone buildings, councils may wish to consider the views of the NZSEE which recommended strengthening affected buildings to 67% NBS. This guidance also introduced the concept of 'active' and 'passive' implementation approaches (combined 'active/passive' approaches are also possible). The active approach includes identification and detailed assessment of the potential earthquake-prone buildings, followed by either retrofitting or demolishing the identified earthquake-prone buildings within a relatively short time period. In contrast, under the passive approach seismic strengthening is triggered by the application for a building alteration, change of use and the extension of the building's functional life.
- 25 In addition to guidance issued by the Ministry of Business, Innovation and Employment, guidance has also been issued by professional organisations. In 2006, the NZSEE issued a document titled *Assessment and Improvement of the Structural Performance of Building in Earthquakes*. This guidance has been adopted and used by many TAs and sets a framework for evaluation that is well known in the sector. Broadly, this guidance provides for an Initial Evaluation Process (IEP) to ascertain the basic strength of an existing building, to be followed by a detailed assessment.

Policy approaches/policies adopted by TAs

- 26 An analysis undertaken by the former Department of Building and Housing of initial earthquake-prone building policies adopted by TAs (73 total)¹¹ following the commencement of the Act found that:
- 33 TAs had adopted active policies, 23 had adopted passive policies, and 17 had adopted combined active/passive policies
 - where specified in TA policies, timeframes for strengthening varied (both minimum and maximum), with maximum timeframes of up to 50 years in one instance, with a 30 year maximum timeframe being more typical
 - 26 TAs adopted different timeframes for strengthening for heritage buildings
 - 34 TAs had indicated that they recommended improvement much greater than 33% NBS.
- 27 Second generation earthquake-prone building policies being adopted by councils have moved on (following the experience of the Canterbury Earthquakes), with passive policies now in the minority.
- 28 Varying approaches have also been taken by TAs with regard to how they deal with earthquake-prone heritage buildings under the RMA. For example, as of May 2011, demolishing heritage buildings was a permitted activity in one district plan; discretionary in 32, non-complying in 32, and prohibited in 9. This means that owners who wished to demolish a heritage building could do so relatively easily in one area, while finding it very difficult to do so in others. An owner with experience with heritage buildings in one city may move to another, only to be faced with the uncertainty of completely different rules.

¹¹ The number of TAs has reduced following the Auckland amalgamation.

Stocktake of information on the seismic performance of buildings in New Zealand (non-residential and multi-storey/unit residential buildings)

29 Information about the quality of New Zealand’s building stock, in particular the seismic performance of buildings, is limited.

- A survey of all TA building stock was undertaken as part of the review. Figure 2 on page 9 shows the results of the survey (2012) and compares those results to Quotable Value (QV) data for the numbers of buildings that are pre-1976 (in general, the seismic performance of older buildings is much lower than more recent buildings because of improvements to design standards). While work has progressed since the survey was undertaken, the results highlight the information problems. It is likely that many earthquake-prone buildings are currently being used or occupied.
- New Zealand has listed approximately 7,161 non-residential heritage buildings as at June 2012, (i.e. buildings scheduled or listed on a district plan either individually or as part of an identified heritage precinct or area). This includes, for example, churches, wharehau and memorials. There is insufficient information to determine how many of these buildings are earthquake-prone under the current legislative settings.
- For the purposes of the review, Table 1 gives the assumptions that have been made about the seismic performance of buildings (non-residential and multi-storey/unit residential).

Table 1: Seismic Performance of buildings (non-residential and multi-storey/unit residential buildings) – assumed

Seismic performance (assumed)* (Pre-1976 buildings only)	Indicative estimate/(indicative range) – numbers of buildings/units	Percent of total
Earthquake-prone (<33% NBS)	19,000 / (15,000 to 25,000)	10% / (8% to 13%)
34-67% NBS	23,000 / (15,000 to 30,000)	12% / (8% to 16%)
>68% NBS	39,000 / (26,000 to 51,000)	20% / (13% to 26%)
Total buildings/units Pre-1976	81,000	42%
Buildings post-1976 (not assessed)	112,000	58%
Total buildings/units	193,000	100%

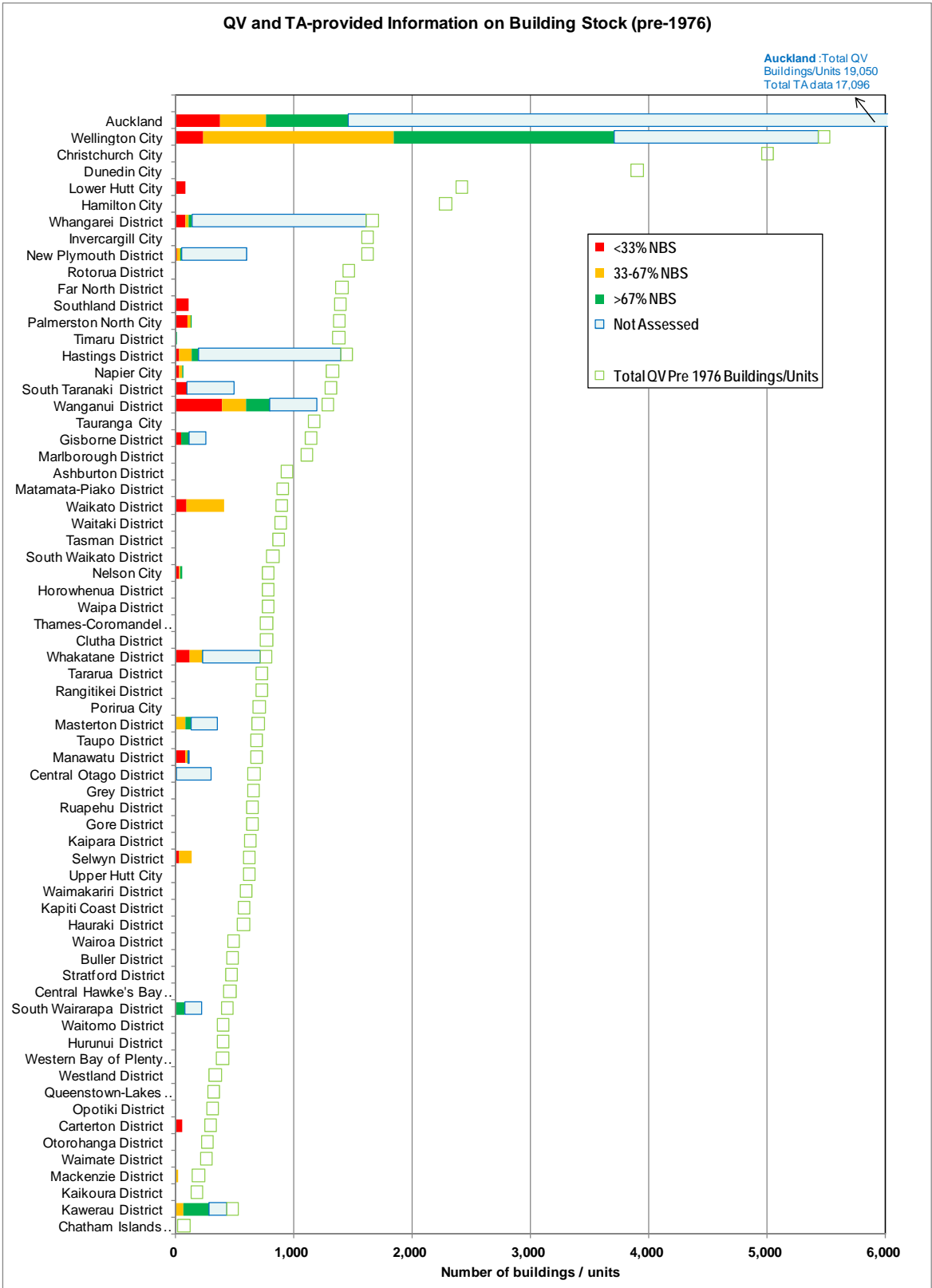
* Working Assumptions

- Only pre-1976 buildings have been assessed and estimated. There are likely to be substantial numbers of post-1976 buildings falling between 34% and 67% NBS but these have not been measured
- Earthquake-prone (<33% NBS): Indicative estimates from 23 councils, average % applied to others
- 34% to 67% NBS: Indicative estimates from 6 Councils, average % applied to others
- Total buildings/units per QV database.
- Table 2 (on the following page) provides an indication of the costs associated with strengthening a particular building to different NBS levels per m2 of floor area. The indicative cost figures in the table below were used in the base case of the cost/benefit model developed for the earthquake-prone policy review, and were derived from advice from engineers. The output of the cost/benefit model is discussed later in this RIS.

Table 2: Indicative costs of strengthening buildings per m² of floor area

	34% NBS	67% NBS	100% NBS
Pre 1935 buildings	\$300	\$510	\$615
1935 – 1976 buildings	\$416	\$640	\$807

Figure 2: TA survey results (2012) and QV information on building stock



Approaches adopted in overseas jurisdictions

- 30 As part of the work on this issue, an analysis has been undertaken into the policy approaches taken in other jurisdictions that also have high levels of seismicity. This analysis considered how they identify and manage seismic risk in existing buildings, including the way they deal with the differences between new and existing construction. The jurisdictions considered were parts of the United States of America (California, Washington, Oregon, Alaska), Japan, Chile, Taiwan, Turkey, Italy, Canada, and Australia.
- 31 The jurisdictions analysed have differing characteristics of their building stock, with some countries having a significantly higher proportion of older building stock and heritage buildings. All jurisdictions that have suffered major seismic events, particularly with loss of life, have had high levels of community awareness and interest in the aftermath of major events. Many countries/states have used this awareness to drive policy changes. This has impacted the priority given to seismic hazard mitigation and the way the market values buildings with higher and lower levels of seismic strength.
- 32 In summary, some key learnings from analysis of overseas jurisdictions are as follows.
- Seismic retrofit and seismic hazard mitigation tends to have the purpose of reducing the life safety hazard of a seismic event.
 - The type of approach for upgrading used varies between a performance-based building control system and a prescriptive system. For those that require upgrade of existing buildings, some use the same standard/requirements as for new buildings, and other countries use specific standards (generally prescriptive) for existing buildings.
 - Of the jurisdictions' policies analysed that have mandatory requirements for upgrading, these requirements tend to be based on either building use, for example, school, hospital; building profiles/type, for example, URM buildings; or triggered by an intention to undertake a major alteration or change of use. In addition to mandatory requirements for upgrading based on building profiles, San Francisco, California has an ordinance requiring facades to be periodically inspected and repaired if necessary. New Zealand and Italy are the two countries for which the requirements for earthquake-prone buildings are not restricted to a particular building use or construction type (e.g. masonry buildings).
 - Other jurisdictions apply a range of funding and incentive programmes, and most with mandatory requirements have some kind of programme or funding assistance mechanism available to building owners.
 - Heritage and historical buildings are valued differently in different countries. In countries such as the USA, heritage/historical buildings tend to be an integral part of where the community lives, works, and visits. In some countries, such as Japan and Taiwan, heritage/historical buildings tend to be fewer, and more monumental, in the form of shrines and temples for example, but with less residential and commercial use. This is due to high rates of urban development, and other factors, such as earthquakes and war, damaging old building stock.

Problems identified with the current system for managing earthquake-prone buildings and the consultation document

- 33 Both the Canterbury Earthquakes Royal Commission and the review have identified problems with the current system for managing earthquake-prone buildings. A clear view has emerged that from a societal perspective the current system for managing earthquake-prone buildings is not achieving an acceptable level of risk. Many earthquake-prone buildings are not being dealt with in a timely and cost effective manner.
- 34 Issues identified with the current system for managing earthquake-prone buildings include:
- too much variability in local practice
 - individual TAs have very different approaches to implementing the current policy requirements. Some TAs are not actively identifying earthquake-prone buildings or requiring building owners to deal with them. Other TAs have taken some action, but have given building owners very long timeframes to resolve problems. Still other TAs have taken strong action, including requiring higher strengthening than required by law. Variable approaches have also been taken with managing heritage buildings. Generally, however, TAs have been more active about dealing with earthquake-prone buildings since the Canterbury Earthquakes
 - public confusion about risk
 - poor understanding of the risks posed by earthquake-prone buildings, and of how these compare to other risks commonly faced in life
 - lack of good data
 - poor-quality information on the number and specific location of earthquake-prone buildings across the country, due to inadequate data collection
 - poor information on individual buildings
 - information on building strength is not widely available or easy to find and use, making decision-making difficult for local authorities, building owners and building users
 - inconsistent market responses
 - because information on building strength and public understanding of the risks associated with buildings of different strengths is poor, the property and rentals markets have responded inconsistently – sometimes too cautiously, sometimes not cautiously enough – but often with little direct reference to the actual risks posed by individual buildings
 - lack of central guidance
 - central government has provided limited information and guidance to local authorities to support good practice and decision-making in support of stronger buildings. A related problem is limited central monitoring and oversight of the sector.

Objectives

- 35 This objectives of the earthquake-prone building policy review are to ensure that:
- policy settings and standards adequately balance life and safety considerations against economic, heritage and other considerations (by determining whether current policy settings and regulations provide an adequate level of safety when balanced against other considerations and, if not, what changes are required to achieve the desired level of safety and create certainty for property owners and tenants)
 - policies and standards are effectively implemented and administered (by determining whether there is sufficient oversight, technical support, capacity and guidance for those administering the policies and regulations, and whether policy is being effectively and consistently administered across New Zealand).
- 36 Achieving these objectives requires consideration of a range of factors, as outlined above and in paragraph 3.

Regulatory impact analysis

- 37 In addition to the matters outlined earlier, the concepts of prescriptive versus performance-based approaches to regulation, and the role of market in driving improvements to the seismic performance of buildings in New Zealand have been considered in the development of viable options for analysis.

Prescriptive versus performance-based approaches to regulation

- 38 The current system for managing earthquake-prone buildings relies on a performance-based regulatory approach as its foundation.
- 39 Replacing the current system with one that is based on a highly prescriptive rules-based approach (that specifies particular strengthening solutions for all affected buildings based on specific features) is not considered to be a viable option for New Zealand. While the main advantage of a highly prescriptive approach is that it would help to provide absolute certainty to affected owners about what is required to meet minimum seismic performance requirements, it has several disadvantages including:
- it would be inconsistent with the regime adopted for new buildings (which is performance-based)
 - it would hinder innovation, which can help lower the costs of strengthening buildings and result in better performance through scientific and technological improvement
 - central government would need to develop a comprehensive suite of solutions for multiple circumstances as a precondition for this type of approach – the costs of doing this are likely to be very high, and given site/building specific conditions it is unlikely that generic solutions could be developed for the full range of building situations.
- 40 Some of the benefits of this type of approach can be achieved by central government providing some specific strengthening solutions as guidance.

Role of the market

- 41 The market plays a significant role in the current system for managing earthquake-prone buildings, and will continue to play significant role in any new approach.

- 42 However, replacing the current system with one that relies only on market mechanisms (largely demand and/or insurer driven) to drive improvements in the seismic performance of buildings (either through strengthening, demolition, or replacement) is not considered to be a viable option.
- 43 A completely market-based approach would rely on all parties (including building owners, users/public, and insurers) having access to the information they need in order to make appropriate risk management and/or investment decisions. It would also rely on all parties being able to understand the relevant information and having the capacity/capability to act on it. This could be assisted, for example, by education initiatives and/or voluntary rating and disclosure of building performance. However, in this case it may be unrealistic to expect that all of these conditions could be met in practice at the same time.
- 44 There are also questions about whether, in the absence of government intervention, improvements in seismic performance of buildings would be sustained over time. It is reasonable to expect that interest may fade over time given the frequency of significant earthquake events.

Options (packages) considered

- 45 The table on the following page outlines the options (packages) that have been considered during the review, and their relationship to the objectives. These are: the current system for managing earthquake-prone buildings; the system recommended by the Royal Commission; the consultation document proposals, and; the proposed system.
- 46 It is important to note that several on balance decisions are required in the proposed system. These decisions (identified by italic text in the table) are: the timeframes for strengthening earthquake-prone buildings; whether time-extensions for certain earthquake-prone heritage buildings should be limited or not, and; the appropriate way to deal with issues identified in relation to upgrades to access and facilities for people with disabilities. Several options to address these issues are identified and discussed later in this RIS (options that are not considered viable are also discussed). Identifying a preferred option requires judgement about whether the expected benefits of the option are justified given the anticipated costs/risks.

Table 3: Options (packages) considered

	Current system (status quo)	Royal Commission	Consultation document	Proposed system
Key Features				
Definition of earthquake-prone building (threshold)	Section 122 of Building Act 2004 (and associated regulations) – in practice this definition is often referred to as 33% or less of the new building standard	Same as status quo	Same as status quo	Same as status quo (see discussion in paras 47 to 49 for alternative threshold options considered)
		Clarifies that the law applies to whole buildings or parts of buildings	Clarifies that the law applies to whole buildings or parts of buildings.	Clarifies that the law applies to whole buildings or parts of buildings. Also clarification of Section 122(1)(b) around ‘likely to collapse’
Identification of building performance (trigger for upgrade)	Can be active or passive (set by council policies)	Active – seismic capacity assessment by TAs in 5 years (in 2 years for URM buildings)	Active – seismic capacity assessment by TAs in 5 years, using a methodology specified by central government (certain buildings prioritised for assessment)	Active – seismic capacity assessment by TAs in 5 years, using a methodology specified by central government (certain buildings prioritised for assessment)

Notification/ Disclosure	Section 124 notices issued to owners	Section 124 notices issued to owners	Section 124 notices issued to owners	Section 124 notices issued to owners
	Some TAs have a publicly searchable register (many do not)	Voluntary disclosure and better information sharing, in addition to current system	National register – publicly searchable	National register – publicly searchable
Exemptions/ extensions of time	N/A – heritage buildings special case in policies (some TAs give them more time)	Exemptions for buildings where consequence of failure low	Exemptions from strengthening timeframes where consequence of failure low (opt-in)	Exemptions from strengthening timeframes where consequence of failure low (opt-in)
		Did not specifically recommend any exceptions for earthquake-prone heritage buildings, but noted the importance of heritage values	Did not specifically recommend any exceptions for earthquake-prone heritage buildings, but noted the importance of heritage values	In response to wider public consultation, opt-in time extension for certain earthquake-prone heritage buildings proposed. Requirement to manage/reduce risk. <i>See discussion in paras 53 to 58 for further information on possible sub-options around limiting extensions</i>
Mandatory upgrade level	'Reduce or remove the danger' used in Act – 34% of the requirements for a new building (but not clear)	Strengthen buildings to 34% (certain parts of URM buildings to be strengthened to 50% (e.g. external walls))	Strengthen buildings so they are not earthquake-prone – 34% of the requirements for a new building (greater clarity)	Strengthen buildings so they are not earthquake-prone – 34% of the requirements for a new building (greater clarity)

Timeframes for upgrade	Set in council policies (an estimated 28 years on average)	Within 15 years of legislation taking effect (URM buildings within 7 years of legislation taking effect)	Within 15 years of legislation taking effect (i.e. assessment by TAs within 5 years, strengthening within 10 years of assessment)	<i>Several options have been identified. Status quo and the consultation document proposal are not proposed (these were not supported in wider public consultation). See discussion in paras 50 to 52 for further information on viable timeframe options</i>
			TA powers to require certain buildings to be strengthened faster (i.e. strategically-important buildings).	TA powers to require certain buildings to be strengthened faster (i.e. buildings likely to have a significant impact on public safety (including buildings with high risk elements such as falling hazards) and strategically-important buildings), after following special consultative procedure in Local Government Act 2002
Central government/ local government role	Central government role limited (largely devolved model)	Central government role much greater than status quo, however local government still has critical role	Central government role much greater than status quo, including providing direction and guidance to TAs, owners and the public (including better information on risk), and to monitor overall system performance. However local government still has critical role	Central government role much greater than status quo, including providing direction and guidance to TAs, owners and the public (including better information on risk), and to monitor overall system performance. However local government still has critical role

TAs able to issue consents for earthquake strengthening without requiring upgrades to access and facilities for people with disabilities	N/A	Yes – TA discretion	N/A – However, views and evidence sought on Royal Commission recommendation	<i>Several options have been identified to address the underlying issue. See discussion in paras 59 to 67 for further information on options</i>
TA powers to require hazardous elements of houses to be dealt with, e.g. URM chimneys	N/A	Yes	N/A – However, views sought on Royal Commission recommendation	N/A – but additional guidance, information and education on benefits (No clear majority view on Royal Commission recommendation in wider public consultation)
TA powers to require higher levels of strengthening	N/A	Yes, for all or some buildings, after following special consultative procedure in Local Government Act 2002	N/A – However, views sought on Royal Commission recommendation	N/A – but additional guidance, information and education on benefits (Royal Commission recommendation was not supported through wider public consultation)
TA powers to require faster timeframes for strengthening than mandated by central government	N/A	Yes, for all or some buildings, after following special consultative procedure in Local Government Act 2002	N/A – with the exception of the certain buildings referred to in the timeframes for upgrade row above. Views also sought on Royal Commission recommendation	N/A – with the exception of the certain buildings referred to in the timeframes for upgrade row above (which was supported in wider public consultation)

	Current system (status quo)	Royal Commission	Consultation document	Proposed system
Relationship to Objectives				
<p>The objectives of the earthquake-prone building policy review are to ensure earthquake-prone building policy settings and standards adequately balance life and safety against economic, heritage and other considerations, and are effectively implemented and administered.</p> <p>This requires consideration of 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. Consideration of the level of regulatory intervention necessary is also required.</p>	<p>This option does not meet the objectives of the review well</p> <p>There are significant information gaps and consistency of practice problems under the current system. As a result many earthquake-prone buildings are not being addressed in a timely and cost effective manner</p> <p>Based on submissions on the public consultation document, and the report of the Royal Commission, a clear view has emerged that from a societal perspective the current system for managing earthquake-prone buildings is not achieving an acceptable level of risk</p>	<p>This option would help to deal with the information gaps and consistency of practice problems. It also provides for limited exemptions where the consequence of failure is low.</p> <p>However, the timeframe proposals were not supported through public consultation, and with the exception of one recommendation, the Royal Commission's recommendations that extend beyond the consultation document proposals were either not supported or there was not clear majority view, suggesting that key elements of this option do not meet wider public expectations about achieving acceptable risk</p>	<p>This option would help to deal with the information gaps and consistency of practice problems. It also provides for limited exemptions where the consequence of failure is low.</p> <p>However, the timeframe proposals were not supported through public consultation (many of the concerns relate to workforce capacity/capability and costs/affordability). This option also does not explicitly deal with the issue of earthquake-prone heritage buildings. This suggests that key elements of this option do not meet wider public expectations about achieving acceptable risk</p>	<p>This option would help to deal with the information gaps and consistency of practice problems (including by reassigning central and local govt roles to make best use of capability and resources). It also provides for limited exemptions where the consequence of failure is low, and explicitly deals with the issue of earthquake-prone heritage buildings. The timeframe proposals in this option are expected to help manage the associated costs/risks of dealing with earthquake-prone buildings</p> <p>This option is expected to best meet the overall objectives, including better meeting public expectations for achieving acceptable risk and better ensuring that affected buildings are dealt with in a timely manner nationwide</p>

Additional information on options considered in relation to the earthquake-prone building threshold

- 47 The table below outlines the full range of options considered during the review in relation to the threshold for defining an earthquake-prone building.
- 48 The table compares estimates of indicative quantifiable direct costs of strengthening with direct benefits of reduced fatalities and injuries (and estimates of reduced property damage). The table is only a partial analysis – it does not compare all of the costs and benefits of the proposals in a quantitative manner (a more detailed examination of costs and benefits is outlined later). A full summary of the methodology used to generate these figures is available at www.mbie.govt.nz.

Table 4: Summary of indicative direct cost/benefits of some alternative threshold/strengthening and timing options*

	Cost (NPV) \$million	Benefit (NPV) \$million	Net (NPV) \$million
Cost/benefit to achieve 34% under the current system (estimated average of 28 years)	958	25	-933
Cost/benefit to achieve 34% in 15 years (consultation document proposal)	1,717	37	-1,680
Other Options:			
Cost/benefit to achieve 67% for all buildings in 15 years	7,692	89	-7,603
Cost/benefit to achieve 34% in 10 years	2,194	47	-2,147
Cost/benefit to achieve 67% for all buildings in 10 years	9,829	114	-9,715
Cost/benefit to achieve 34% in 5 years	2,798	60	-2,738
Cost/benefit to achieve 67% for all buildings in 5 years	12,533	145	-12,388

* These figures are midpoint estimates based on extrapolated local authority data and are indicative only. Benefits are affected by the probability of a major seismic event occurring (MM8 to MM11 earthquakes have been modelled taking into account their respective probabilities in each local authority), and are discounted over 75 years.

- 49 The table indicates that higher thresholds (and levels of strengthening) would result in additional life safety benefits; however it would also result in substantially increased costs. While strengthening buildings above 34% is desirable, it becomes more about preserving buildings or reducing the broader social and economic impacts associated with earthquake damage. Retaining the current threshold is consistent with the Royal Commission's recommendations and was generally supported by submitters on the consultation document. For the reasons outlined above, it is considered appropriate to retain the current threshold (i.e. 33%).

Additional information on options considered in relation to timeframes for strengthening earthquake-prone buildings under the proposed system

50 The table below outlines the full range of options considered during the review in relation to timeframes for strengthening earthquake-prone buildings.

51 The table also compares estimates of indicative quantifiable direct costs of strengthening with direct benefits of reduced fatalities and injuries (and estimates of reduced property damage). The table is only a partial analysis – it does not compare all of the costs and benefits of the proposals in a quantitative manner (a more detailed examination of costs and benefits is outlined later). A full summary of the methodology used to generate these figures is available at www.mbie.govt.nz.

Table 5: Indicative direct costs of strengthening (to 34%) compared to direct benefits of reduced fatalities and injuries (and estimates of reduced property damage), under alternative timeframe options*

	Costs (NPV \$million)	Benefits (NPV \$million)	Net (NPV \$million)
Current system (timeframes vary across New Zealand – estimated average of 28 years)	958	25	-933
Option 1 – one national timeframe (15 years) – the consultation document proposal	1,717	37	-1,680
Option 2 – one national timeframe (20 years)	1,359	29	-1,330
Option 3 – one national timeframe (25 years)	1,075	23	-1,052
Option 4 – Timeframes specific to each TA based on a risk profile generated by central government (e.g. including: location risk ¹² , building profiles, number of people at risk)	1,206**	36**	-1,170**

* The figures are midpoint estimates based on extrapolated local authority data and are indicative only (e.g. they do not consider proposed transitional provisions, and assume earthquake-prone heritage buildings are treated the same as other earthquake-prone buildings). Benefits are affected by the probability of a major seismic event occurring (MM8 to MM11 earthquakes have been modelled taking into account their respective probabilities in each local authority), and are discounted over 75 years.

** A range of assumptions (beyond those used for Options 1 to 3) were made to generate these estimates, and their reliability is highly uncertain.

¹² Note, because the definition of an earthquake-prone building in the Act relates to the site of the building, issues of local seismic risk are considered as part of the decision to classify a building as being earthquake-prone.

- 52 The table suggests that options with shorter timeframes for strengthening will result in higher benefits, but also higher costs. Shorter timeframes also increase workforce capacity/capability risks. Other issues to note include:
- In light of submissions on the consultation document, and the report of the Royal Commission, retaining the current system is not considered to be a viable option. A clear view has emerged that from a societal perspective the current system for managing earthquake-prone buildings is not achieving an acceptable level of risk. Many earthquake-prone buildings are not being dealt with in a timely and cost effective manner.
 - Option 1, that buildings be strengthened or demolished within 15 years (i.e. assessment by TAs within 5 years, strengthening within 10 years of assessment), was not supported by a majority of submitters on the consultation document (many of the concerns relate to workforce pressures (insufficient capacity and capability) and costs/affordability).
 - The modelling for option 3 suggests that it will produce roughly similar benefits (but lower) compared to the current system (note the distribution of benefits across TAs will be different).
 - As noted in the table on the previous page, the reliability of figures produced for option 4 is highly uncertain.

Additional information on options considered in relation to earthquake-prone heritage buildings under the proposed system

- 53 The following high level options were considered in relation to earthquake-prone heritage buildings during the course of the review:
- treating earthquake-prone heritage buildings the same as other buildings
 - providing the 'most-significant' heritage buildings (or all heritage buildings) more time to strengthen than other buildings
 - exempting the 'most-significant' heritage buildings (or all heritage buildings) from strengthening timeframes.
- 54 One way to address concerns expressed by submitters on the consultation document (outlined in more detail later in the consultation section of this RIS) is to provide heritage buildings more time to strengthen than other buildings. However, providing a blanket exemption for all heritage buildings from strengthening timeframes is not recommended as it creates on-going life safety risks, and also creates a significant risk of 'demolition by neglect'.
- 55 The system proposed is:
- that owners of category 1 and 2 historic buildings listed on the register of historic places under the Historic Places Act 1993 may apply to the TA in their district for an extension of time to strengthen their building
 - the extension of time be agreed by the TA and the owner on a case by case basis
 - as a condition of being granted an extension of time, the owner will be required to manage/reduce the risk their building presents to users of the building, passers-by, and other property, to the satisfaction of the TA (e.g. by placing warning notices on the building, restricting use, and/or interim securing of high risk elements such as falling hazards).
- 56 Options considered during the review in relation to whether the extension of time should be subject to a maximum limit include: (a) a maximum of an additional 10 years, or (b) no maximum. Including a maximum limit would help owners manage costs while still ensuring affected buildings are dealt with in a timely manner nationwide (better meeting the review objectives), and the risk of demolition by neglect is reduced.

57 The Ministry of Business, Innovation and Employment will provide guidance to TAs to support the application of these provisions.

58 While being provided more time to strengthen, affected buildings will still be identified as earthquake-prone on the national register.

Additional information on options considered in relation to dealing with issues about upgrades to access and facilities for people with disabilities under the proposed system

59 As noted earlier, under section 112 of the Act, a BCA must not grant a building consent for the alteration of an existing building unless it is satisfied the altered building will:

- comply as nearly as is reasonably practicable with the Building Code provisions for means of escape from fire, and access and facilities for people with disabilities
- continue to comply with the other provisions of the Code to at least the same extent as before the alteration.

60 Because the current Act involves a test of what is 'reasonably practicable' there is some flexibility in how BCAs can apply the provisions, but there is also a lack of consistency between BCAs. If an affected owner disagrees with the BCA's decision, they can apply to the Ministry of Business Innovation and Employment for a Determination that is binding on the parties. Although there have been a number of Determinations on the application of this section that set out general issues and principles, comprehensive guidance on the test has never been provided by the Ministry of Business, Innovation and Employment.

61 The Royal Commission heard evidence that the upgrade provisions for people with disabilities can operate as an impediment to owners strengthening their buildings, particularly for old or historic buildings.

62 The Royal Commission recommended the Act be amended to enable BCAs to issue building consents for earthquake strengthening works without requiring upgrades to access and facilities for people with disabilities. They considered that such an amendment would strike an acceptable balance between cost and strengthening work, and the desirability of the latter actually being carried out.

63 The Royal Commission did not recommend any change to the upgrade provision related to fire in section 112. They considered it important that egress from a building at a time of fire or earthquake remains subject to this rule.

64 The Royal Commission's recommendation was supported by a majority of submitters on the consultation document including some TAs, owners and businesses who cited the high cost (including consultancy fees) as a barrier to strengthening. However, it was opposed by disability advocacy groups, the Human Rights Commission and some engineers. The Human Rights Commission suggested the proposed changes to disabled access could be inconsistent with the Human Rights Act 1993. There were also concerns by some submitters that the Royal Commission's recommendation could be inconsistent with the United Nations Convention on the Rights of Persons with Disabilities.

65 The following options have been considered in relation to dealing with issues identified by the Royal Commission and in submissions on the consultation document:

- continue with the current system (with greater guidance and monitoring)

- legislative amendment:

Either

- (a) to enable TAs (that are BCAs) to issue building consents for earthquake strengthening works for buildings that are earthquake-prone without requiring upgrades to access and facilities for people with disabilities

Or

- (b) so that no upgrades to access and facilities for people with disabilities are required when earthquake strengthening works are undertaken on buildings that are earthquake-prone.

66 As noted earlier, comprehensive guidance on the ‘as nearly as is reasonably practicable’ test has never been provided by the Ministry of Business, Innovation and Employment. This approach could help to provide greater certainty to owners about the extent of upgrades required. However, guidance and monitoring alone may not be sufficient to address the issues identified by the Royal Commission or in submissions on the consultation document.

67 The alternative approach involves legislative amendment:

- under Option (a) above TAs would determine whether, and the extent to which, they wish to require upgrades to access and facilities for people with disabilities when owners undertake earthquake strengthening works on buildings that are earthquake-prone¹³. Option (b) would remove any doubt for owners about whether, and the extent to which, an upgrade is required – it will be up to building owners to determine
- under both legislative options, upgrades to access and facilities for people with disabilities will continue to apply when other alterations are made to existing buildings (including earthquake strengthening works where buildings are not earthquake-prone), or the building has a change of use. However, the proposals are likely to mean that upgrades for people with disabilities will not be carried out on a significant number of buildings when required earthquake strengthening is undertaken. There is a risk that this could have a long-term legacy impact, if no other building work that triggers the upgrade provisions is ever undertaken on these buildings
- the legislative options, and in particular Option (b), are likely to meet with significant resistance from disability sector.

¹³ Under option(a) it is proposed that a regulation making power also be included in the Act that may be used to specify criteria for TAs to apply when making decisions about whether or not to require upgrades to access and facilities for people with disabilities, to help ensure the provisions are applied consistently.

Potential impacts of the proposed system

68 It is expected that the proposals will give rise to incremental benefits and costs beyond those of the current system for managing earthquake-prone buildings.

Benefits of the proposals (qualitative)

69 Some of the benefits associated with the proposals are difficult to quantify but can be very significant, as is evident following the Canterbury earthquakes. Qualitatively, the benefits associated with the proposals include:

- improved confidence in the system for managing, and the quality of, New Zealand's existing building stock in relation to seismic performance
- reduced fatalities and injury costs during and after a major seismic event
- reduced damage to property during and after a major seismic event
- reduced social costs and other impacts associated with earthquakes. These cost/impacts include:
 - impacts on sense of community and identity through loss of gathering places, places of employment, schools, hospitals, homes, heritage buildings and places to recreate and create (i.e. sports grounds, performance venues, galleries, museums etc.)
 - costs/impacts associated with the displacement of households
 - improved post-earthquake functioning of towns and cities and reduced economic loss¹⁴.

70 These benefits accrue directly to building owners and occupiers, as well as to insurers and wider society (including the public, and local and central government).

Costs of the proposals (qualitative)

71 The costs associated with the proposals include the following:

- identification of seismic performance of buildings (i.e. non-residential and multi-storey/unit residential buildings as defined under section 122 of the Act), and notification costs
- planning and strengthening (or demolition) costs
- enforcement costs
- information, education and monitoring costs
- set up and on-going costs of a national register of earthquake-prone buildings
- because there is a risk that strengthening some earthquake-prone buildings may not be viable (demolition may be the only practical option), there could be a loss of heritage values from the loss of heritage buildings¹⁵
- if a legislative amendment option is chosen around the issue of upgrades to access and facilities for people with disabilities, it is likely that upgrades to access and facilities for people with disabilities will not be carried out on a significant number of buildings when required earthquake strengthening is undertaken¹⁶. There is a risk that this could have a long-term legacy impact, if no other building work that triggers the upgrade provisions is ever undertaken on these buildings.

¹⁴ At higher levels of strengthening these benefits can become very significant.

¹⁵ Heritage values can have significant social and economic worth, for example, tourism related benefits.

¹⁶ Assuming that strengthening work would have otherwise been undertaken under the current system for managing earthquake-prone buildings.

- 72 Initial identification and notification costs will largely fall on local and central government, however there are also likely to be some costs for affected owners. Planning and strengthening costs will fall directly on building owners (including local and central government as building owners). Enforcement, information, education and monitoring costs will fall on local and central government. Costs associated with a national register will fall on local and central government.
- 73 There may also be some associated costs for some TAs in relation to reviewing planning and heritage listing processes under the RMA.
- 74 It is difficult to quantify all of the cost impacts of the proposal at this time. In part, this is because many of the costs impacts will depend on detailed design of many aspects of the system which is yet to be undertaken (this process will attempt to mitigate these costs as far as practicable). In addition, some of the costs identified have already been met (or would have been met) under the current system¹⁷.
- 75 However, compared to the current system there will be additional costs. For example, in addition to the extra costs to central and local government, in some cases, decisions about the viability of certain buildings may be brought forward, putting financial pressure on owners who may have previously anticipated a longer timeframe.
- 76 The distribution of costs around the country will depend in part on the numbers of earthquake-prone buildings in a particular district, the extent to which the relevant TA has already taken an active approach to identifying these buildings, and the extent to which owners of earthquake-prone buildings have already been active in addressing the risk their buildings presents.
- 77 In some cases, the proposals may place additional pressure on some communities where underlying economics may make strengthening difficult, e.g. Oamaru and Whanganui.

Estimates of costs and benefits (quantitative)

- 78 The quantitative costs and benefits of the proposals system will in part depend on the timeframe option that is chosen. Monetary NPV analysis comparing estimates of indicative quantifiable direct costs of strengthening with direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) indicates that the direct costs of the proposals strongly outweigh the direct benefits (based on the best available information and reasonable assumptions) under any scenario, including under the current system.
- If one national timeframe of 20 years is chosen, NPV figures for estimates of direct costs of strengthening compared to direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) are: costs \$1,359 million and benefits \$29 million, producing a net figure of -\$1,330 million.
 - If one national timeframe of 25 years is chosen, NPV figures for estimates of direct costs of strengthening compared to direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) are: costs \$1,075 million and benefits \$23 million, producing a net figure of -\$1,052 million.

¹⁷ Many local authorities are already in the process of a more detailed examination of their pre-1976 building stock. In Canterbury, over the next three years the Canterbury Earthquake Recovery Authority (CERA) will be progressively asking owners of non-residential (commercial) and multi-storey/unit residential buildings in greater Christchurch (comprising Christchurch City, Selwyn District and Waimakariri District) to have a Detailed Engineering Evaluation (DEE) prepared for their buildings. Building owners will be required to provide a copy of their DEE to CERA.

- If the option of a timeframes specific to each TA based on a risk profile is chosen, NPV figures for estimates of direct costs of strengthening compared to direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) are: costs \$1,206 million and benefits \$36 million, producing a net figure of -\$1,170 million.
- 79 Comparable NPV figures under the current system for managing earthquake-prone buildings are: costs \$958 million and benefits \$25 million, producing a net figure of -\$933 million.
- 80 Note that these figures do not compare all of the costs and benefits of the proposals in a quantitative manner. As noted earlier, these figures are midpoint estimates based on extrapolated local authority data and are indicative only (e.g. they do not consider proposed transitional provisions, and assume earthquake-prone heritage buildings are treated the same as other earthquake-prone buildings). Benefits are affected by the probability of a major seismic event occurring (MM8 to MM11 earthquakes have been modelled taking into account their respective probabilities in each local authority), and are discounted over 75 years. In addition, a range of assumptions beyond those used for the one national timeframe options were made to generate estimates for the TA specific timeframe option, and their reliability is highly uncertain.

Consultation

- 81 The review has been informed by:
- evidence submitters have provided to the Canterbury Earthquakes Royal Commission, and Volume 4 of the Royal Commission's Final Report
 - analysis of approaches adopted in other jurisdictions, including parts of the United States of America (California, Washington, Oregon, Alaska), Japan, Chile, Taiwan, Turkey, Italy, Canada, and Australia
 - advice from GNS Science and international risk experts
 - regular meetings (and testing of proposals) with a Sector Reference Group and an Officials Reference Group
 - technical investigations undertaken by the former Department of Building and Housing into four buildings that performed poorly in the 22 February 2011 earthquake (Pyne Gould Corporation building, Canterbury Television building, Forsyth Barr building, and the Hotel Grand Chancellor)
 - targeted meetings with a range of interested parties (including a heritage workshop) held over the course of the review
 - submissions on the Ministry of Business, Innovation and Employment's consultation document *Building Seismic Performance: Proposals to improve the New Zealand earthquake-prone building system*
 - public meetings held in Auckland, Wellington, Christchurch, Dunedin, Hamilton, Palmerston North, Napier in February 2013 to support the release of the consultation document.
- 82 The Sector Reference Group included representation from local government, building owners, the engineering and construction sector, the heritage sector, and the insurance industry (further information on the group is available at www.mbie.govt.nz).
- 83 The Officials Reference Group comprises the Ministry of Business, Innovation and Employment, Canterbury Earthquake Recovery Authority, the Department of Internal Affairs, the Ministry of Social Development (Government Property Management Centre of Expertise), Treasury, the Department of the Prime Minister and Cabinet, Ministry of

Culture and Heritage, and Ministry for the Environment. The following agencies have also been consulted on the proposals:

- Ministry of Health, Ministry of Education, Ministry of Justice, Ministry of Civil Defence & Emergency Management, Office for Disability Issues, Ministry of Social Development, Tertiary Education Commission, Land Information New Zealand.

Public consultation document

- 84 A consultation document outlining 9 proposals for improving the current system for managing earthquake-prone buildings was released by the Ministry of Business, Innovation and Employment on 7 December 2012, with a closing date for submissions of 8 March 2013.
- 85 Appendix 1 and 2 outline the proposals consulted on in more detail (and the Royal Commission recommendations that extend beyond the proposals), the overall themes from submissions and comments/concerns of submitters.
- 86 The Canterbury Earthquakes Royal Commission report is available at www.canterbury.royalcommission.govt.nz. The Ministry of Business, Innovation and Employment intends to publish a full summary of submissions received on the public consultation document on its website www.mbie.govt.nz.

Summary of outcome of public consultation

- 87 Most of the proposals in the consultation document were generally supported by submitters, albeit with some concerns.
- 88 However, the proposal that buildings be strengthened or demolished within 15 years (and the related proposal for owners to submit a plan within 12 months) was not supported by a majority of submitters. Many of the concerns relate to workforce pressures (insufficient capacity and capability) and costs/affordability. There is also a perception the timeframe proposal is a 'one size fits all approach' that does not adequately consider issues such as location risk, people at risk, economics and heritage.
- 89 The Royal Commission recommendations that extend beyond the proposals in the consultation document were either not supported or there was no clear majority view, with the exception of one recommendation relating to access and facilities upgrade requirements for people for disabilities.
- 90 Key themes raised by submitters regarding heritage buildings include:
- cost/affordability was seen as a key barrier to strengthening earthquake-prone heritage buildings by submitters – there is a risk of significant loss of heritage as a result
 - District Plans were perceived by some as a complicating factor in strengthening heritage buildings
 - there was no clear majority view on whether earthquake strengthening should take precedence over heritage issues
 - many submitters believed heritage buildings should have different consideration to other buildings.
- 91 These issues have been taken into consideration in the development of the proposed system.

Out of scope issues

- 92 The key out of scope issues raised by submitters included:
- concerns about insurance costs and availability
 - financial assistance/incentives
 - concerns about Health and Safety in Employment Act requirements being misaligned with requirements under the Building Act
 - concerns about buildings with key vulnerabilities that could result in catastrophic collapse in a 'major earthquake' (e.g. the Canterbury Television building). Because these buildings are unlikely to collapse in a 'moderate earthquake' they are not currently defined as earthquake-prone.
- 93 These out of scope issues are being considered separately.

Conclusions and recommendations

- 94 Both the Canterbury Earthquakes Royal Commission and the review identified problems with the current system for managing earthquake-prone buildings, including significant information gaps and consistency of practice issues. A clear view has emerged that from a societal perspective the current system for managing earthquake-prone buildings is not achieving an acceptable level of risk. Many earthquake-prone buildings are not being dealt with in a timely and cost effective manner.
- 95 It is expected that the proposals will give rise to incremental benefits and costs beyond those of the current system for managing earthquake-prone buildings (see discussion in paragraphs 68 to 80 for further information).
- 96 The costs and benefits will be significantly impacted by the on balance decisions required in the proposed system, i.e. decisions on the timeframes for strengthening earthquake-prone buildings; whether time-extensions for certain earthquake-prone heritage buildings should be limited or not, and; the appropriate way to deal with issues identified in relation to upgrades to access and facilities for people with disabilities. Several options to address these issues are identified and discussed earlier in this RIS (options that are not considered viable are also discussed). Identifying a preferred option requires judgement about whether the expected benefits of the option are justified given the anticipated costs/risks.
- 97 Monetary NPV analysis comparing estimates of indicative quantifiable direct costs of strengthening with direct benefits of reduced fatalities and injuries (and estimates of reduced property damage) indicates that the direct costs of the proposals strongly outweigh the direct benefits (based on the best available information and reasonable assumptions) under any scenario, including under the current system (see paragraphs 78 to 80 for further information).
- 98 It is important to note that many of the costs and benefits associated with the proposals are difficult to quantify.
- 99 Overall it is expected that the proposals considered in this RIS will:
- address the problems identified and better meet the review objectives than the current system for managing earthquake-prone buildings, including better meeting public expectations for achieving acceptable risk
 - better ensure that affected buildings are dealt with in a timely manner nationwide
 - help manage the associated costs/risks of dealing with earthquake-prone buildings, and
 - help ensure information necessary to support market decision making is available.

Implementation

- 100 The proposals would be given effect by:
- legislation amending the Building Act 2004
 - provision of information and guidance from the Ministry of Business, Innovation and Employment.
 - the establishment of a national register of information on earthquake-prone buildings.
- 101 Compliance costs will be minimised by maintaining some aspects of the current regulatory system, and through transitional provisions.
- 102 To further minimise compliance costs and implementation risks, seismic capacity assessments of all buildings will be undertaken progressively within a five year period using a cost-effective tool/methodology developed by the Ministry of Business, Innovation and Employment. Initial work with the building and construction sector and TAs on this issue has already begun. The practicality of undertaking seismic capacity assessments of buildings within a five year period has been tested as part of the consultation process, and in subsequent meetings with TAs and engineers.
- 103 Detailed scheme design underpinning the publicly searchable national register of information on earthquake-prone buildings is yet to be undertaken.
- 104 It is expected that the vast majority of building owners will comply with the requirement to address the danger their earthquake-prone buildings present. However, there is a risk that a small number of affected owners may refuse to deal with the issue (note that existing offence provisions under the current system for managing earthquake-prone buildings will continue to apply where an owner fails to comply – this includes a maximum fine of \$200,000). While the responsibility for dealing with earthquake-prone buildings rests with owners of the affected buildings, existing powers under the current system for managing earthquake-prone buildings that enable TAs to undertake work themselves (where the owner fails to do so) and recover costs from owners will also continue to apply. Work taken can include demolition.

Monitoring, evaluation and review

- 105 A monitoring and evaluation strategy would be put in place by the Ministry of Business, Innovation and Employment to assess the implementation and impacts of the selected policy approach. The purpose of the monitoring and evaluation would be to:
1. Determine whether the policy is working as intended (outcomes).
 2. Understand any constraints impacting on the implementation of the policy (processes).
 3. Describe any unintended consequences from the implementation of the policy, both positive and negative.
- 106 A longitudinal, mixed method approach will be required including both quantitative and qualitative data. The evaluation would occur in distinct phases as indicated below.
- 2013: Baseline data collection including an understanding of the current situation
 - 2014: Iterative monitoring of policy implementation begins
 - 2015: Process and early impact evaluation
 - 2019: Five year impact evaluation.
- 107 Data would be collected through:
- monitoring data provided by TAs, including the number of buildings assessed, number of buildings repaired, demolished, type of repairs undertaken

- cost data provided by TAs related to both the direct costs of implementing the policy and the impact on other work and activities
- key stakeholder surveys and interviews related to the constraints and consequences of the policy implementation, and
- analysis of a range of market data to determine influence of market.

Appendix 1: Themes from submissions on the proposals in the consultation document

Proposal in Consultation Document	Overall Theme	Comments / Concerns Raised in Submissions
<p>Proposal 1 and 2:</p> <ul style="list-style-type: none"> Compulsory seismic capacity assessment of buildings by TAs within 5 years (with certain buildings prioritised) 	Generally supported	<ul style="list-style-type: none"> Many of the concerns relate to the mechanics of how the assessments would be done and potential costs (e.g. questions of whether owners should be required to do this and provide results to TAs instead, concerns about potential assessment tools, and sector capacity/capability) No clear majority view on whether 5 years is sufficient
<p>Proposal 3:</p> <ul style="list-style-type: none"> Central register 	Generally supported	<ul style="list-style-type: none"> Many of the concerns relate to the quality of information to be disclosed and concerns about potential impacts on building values Some submitters supported TAs maintaining their own registers instead of, or in addition to, a central register
<p>Proposal 4:</p> <ul style="list-style-type: none"> Retain current threshold for defining an earthquake-prone building (33%) – strengthening ‘required’ so building is not earthquake-prone (34%) 	Generally supported	<ul style="list-style-type: none"> Some submitters noted the market is currently driving higher levels of strengthening Some submitters thought the proposal could be more aligned with specific areas of risk, others thought the threshold/strengthening level was too low
<p>Proposal 5 and 7:</p> <ul style="list-style-type: none"> Buildings to be strengthened (or demolished) within 10 years of assessment (owners submit plan within 12 months), i.e. within 15 years in total 	Not supported	<ul style="list-style-type: none"> Significant push back, particularly around the proposal to submit a plan within 12 months of assessment (proposal 7) Many of the concerns relate to capacity/capability, and costs/affordability Also a perception that the proposal is a ‘one size fits all’ approach (e.g. does not adequately consider people at risk, location risk, economic issues and heritage issues)

<p>Proposal 6:</p> <ul style="list-style-type: none"> • Certain buildings prioritised for strengthening (e.g. high risk/critical buildings, and high risk building elements such as falling hazards) 	<p>Generally supported</p>	<ul style="list-style-type: none"> • There is general support for this proposal
<p>Proposal 8:</p> <ul style="list-style-type: none"> • Exemptions from strengthening timeframes for certain buildings where consequence of failure is low 	<p>Generally supported</p>	<ul style="list-style-type: none"> • Many of the concerns relate to ensuring that any exemptions are clearly defined and risk based
<p>Proposal 9:</p> <ul style="list-style-type: none"> • Central government to provide more direction and guidance, and to monitor overall system performance 	<p>Generally supported</p>	<ul style="list-style-type: none"> • General support for a greater leadership role for central government

Appendix 2: Themes from submitters on the Royal Commission’s recommendations that extend beyond the proposals in Appendix 1

Royal Commission recommendations that extend beyond proposals in the consultation document	Overall Theme	Comments / Concerns Raised in Submissions
Unreinforced Masonry (URM) building recommendations (timeframes, and strengthening levels)	No clear majority view	<ul style="list-style-type: none"> No clear majority view on the recommendation that URM buildings be assessed faster than other buildings (within 2 years)
	Not supported	<ul style="list-style-type: none"> Recommendation that URMs be strengthened faster than other earthquake-prone buildings (within 7 years) is not generally supported General theme from submissions is that assessment and strengthening should be based on risk
	No clear majority view	<ul style="list-style-type: none"> No clear majority view on the recommendation that certain hazardous parts of URM buildings (e.g. chimneys and parapets) be strengthened to a higher level than a minimum of 34%
Provide TAs with the ability to require higher levels of strengthening mandated by central government	Not supported	<ul style="list-style-type: none"> Overall theme from submissions is that this recommendation is not supported
Provide building consent authorities with the ability to issue building consents for strengthening work without requiring upgrades to access and facilities for people with disabilities	Generally supported	<ul style="list-style-type: none"> Supported by a majority of submitters (including many owners and businesses) – opposed by disability advocacy groups and the Human Rights Commission
Provide TAs with the ability to require hazardous elements on residential buildings (houses) to be dealt with in a specified timeframe, e.g. URM chimneys	No clear majority view	<ul style="list-style-type: none"> Of concerns raised, some view the risks as not significant enough to justify regulation, others see guidance/education as appropriate