



**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT**  
HIKINA WHAKATUTUKI



# Regulatory impact statement

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## Regulations under the Building (Earthquake-prone Buildings) Amendment Act 2016

# Agency disclosure statement

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This regulatory impact statement has been prepared by the Ministry of Business, Innovation and Employment (MBIE).

The Building (Earthquake-prone Buildings) Amendment Act 2016 (the Amendment Act), enacted in May 2016, establishes a nationally consistent system for managing earthquake-prone buildings. The Amendment Act, intended to commence on 1 July 2017, allows for the creation of regulations to facilitate effective application of the new system. The proposals described in this regulatory impact statement (RIS) set the design of regulations that have already been envisaged.

The primary objective for the new system introduced by the Amendment Act is **life safety**. The proposals for Regulations under the Amendment Act aim to support **administrative efficiency** and be **proportionate**: targeting the right building owners in districts, and buildings or parts of buildings that pose the greatest risk. The aim is to strike an appropriate balance between protecting people from harm and imposing seismic remediation costs onto building owners.

## Limitations on the analysis undertaken

A key limitation of the analysis in this RIS is that the full effect of each option considered is uncertain and cannot be accurately quantified. Challenges include:

- The unknown probabilities of events occurring or behaviour change:
  - the probability of an earthquake in any one area is unknown, and the exact location and impact of an individual earthquake is highly uncertain
  - the need to make assumptions about the likely behaviour of building owners, users and territorial authorities
- The difficulty to quantify exact costs to building owners, or benefits arising due to administrative efficiency, the general public's improved confidence in the regulatory system's ability to protect life and costs saved (by a wider set of building owners) due to effective targeting of requirements to upgrade buildings.

The quantitative impacts summarised in this RIS focus on the costs of the preferred option. The estimated net cost figures should be read with care: these do not include the substantial benefits of improved administrative efficiency and targeting the right buildings in the right places. Territorial authorities will be able to make decisions faster, and more consistently. Building owners will save time and have greater certainty when dealing with territorial authorities.

The net cost of the Amendment Act was estimated in 2015 by Martin Jenkins, via a cost benefit model, at \$750 million. The net cost of the regulations described in this RIS for substantial alterations and exemptions is estimated as an additional \$79 million. The negative net cost estimates are driven by the extremely low probability of a significant earthquake. Yet when they do occur, earthquakes stand out from other hazards in terms of the impact on life and economic costs.

Full consultation on the proposed regulations was carried out in September 2016 and stakeholder feedback taken into account.

Overall, MBIE is satisfied that the conclusions in this RIS provide a reasonable indication of the potential direction and significance of the effects of the options analysed.

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## Summary

1. The Building (Earthquake-prone Buildings) Amendment Act 2016 (the Amendment Act), enacted in May 2016, establishes a nationally consistent system for managing earthquake-prone buildings. The Amendment Act will commence on 1 July 2017.
2. Regulations are required to prescribe the detail of how the new requirements will work in practice. MBIE proposes regulations to:
  - define the meaning of '**ultimate capacity**', reflecting the following: ultimate capacity means the building's probable capacity to withstand earthquake actions and maintain gravity load support calculated by reference to the building as a whole and its individual elements or parts
  - define two distinct **categories of earthquake ratings**:
    - i. earthquake-prone buildings that are 20 to 33 per cent of New Building Standard (per cent NBS)
    - ii. earthquake-prone buildings that are less than 20 per cent NBS
  - define criteria for **substantial alterations**, so that a substantial alteration will be building work requiring a building consent (excluding seismic work) and has a value over 25 per cent of the rateable value of the building (excluding the land value)
  - define characteristics that a building must have **to be considered for an exemption from remediation requirements** as follows: the consequence of failure of an earthquake-prone building or part (in terms of life safety and damage to other property) must be low. Low consequence of failure will be assessed having regard to the use and occupancy characteristics of the building, and the expected mode of failure.
3. The Ministry of Business, Innovation and Employment (MBIE) also proposes three forms of earthquake-prone building notice be set in regulation: Notice A (for an earthquake rating of *20-33 per cent* NBS); Notice B (*less than 20 per cent* NBS) and Notice C (the per cent NBS *is not known*). MBIE will prescribe the form of these notices.
4. Public consultation on proposals for regulations closed on 10 February 2017. Fifty submissions were received on proposals to prescribe a definition of ultimate capacity, categories of earthquake ratings, the form of earthquake-prone building notices, criteria for substantial alterations, and characteristics a building must have to be eligible for an exemption from remediation requirements.
5. Submissions were generally supportive of the new regime for managing earthquake-prone buildings, and the proposals for regulations and the EPB methodology. Proposals on exemptions from remediation requirements have been revised following consultation to provide greater clarity and reduce the scope for inconsistent interpretation.
6. The cost of the proposed regulations falls on building owners, and the benefits also accrue to building owners (as fewer buildings are damaged) and to the public (as fewer lives are lost) - when earthquakes do occur. Significant earthquakes are rare, yet stand out from other hazards in terms of the impact on life and economic costs. The extremely low probability of an earthquake in any one location means the estimated benefits are minor in comparison to the costs.
7. The Amendment Act already allows for the creation of these regulations. This means that this current proposal is simply setting the design of regulations that have already been envisaged. Thus the additional cost of the proposed regulations is difficult to quantify. An indicative CBA model was prepared by Martin Jenkins in 2012 to measure the potential impacts of changes to

earthquake prone buildings policy. This was subsequently updated in 2014 and 2015 to extend the timeframe for the model and to include allowance for a shorter strengthening timetable for priority buildings. This analysis estimated a net cost of \$750 million for the Amendment Act’s proposals.

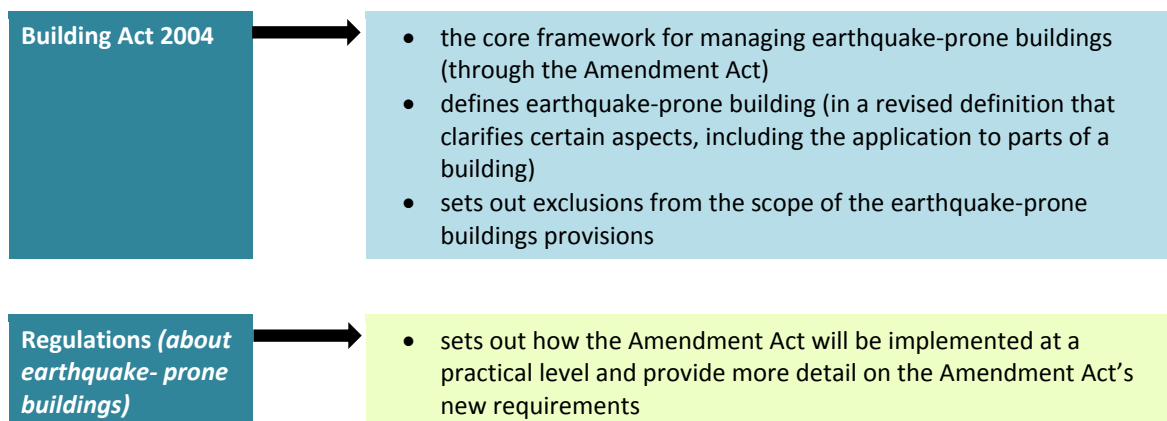
8. This current work builds on these earlier models, adding functionality to measure the impact of Substantial Alterations and Exemptions. The CBA model’s extension estimates the additional costs and benefits of adding the proposed regulations on Substantial Alterations and Exemptions as a net additional cost of \$79 million.
9. It is reasonable to presume that some regulations were anticipated by the Amendment Act. Therefore, the \$79 million figure estimated must be interpreted as an *upper limit to the overall impact*, as the counterfactual used for the CBA is having no regulations enacted.

## Context and Status Quo

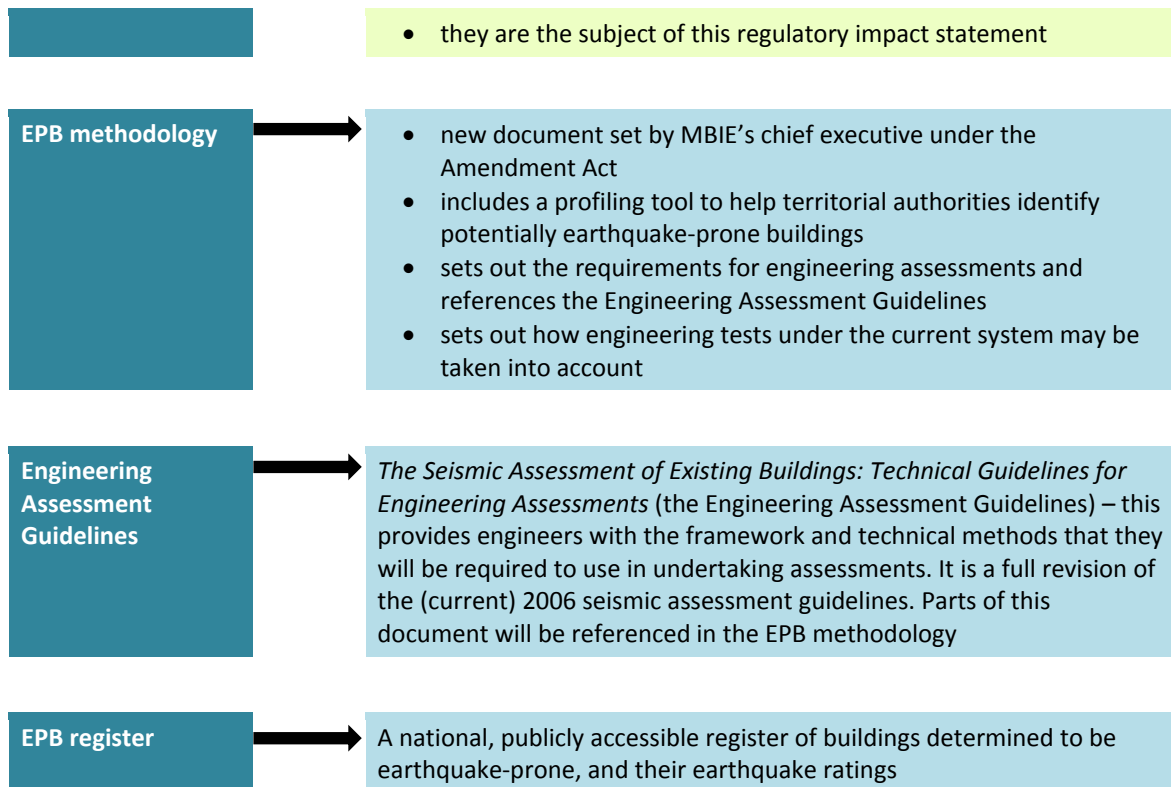
### A new system to manage earthquake-prone buildings

10. The 2010 and 2011 Canterbury earthquake sequence caused significant loss of life and extensive damage to residential and commercial buildings in the Canterbury region.
11. The Building (Earthquake-prone Buildings) Amendment Act 2016 (the Amendment Act) responds to lessons learned from the Canterbury earthquakes, the findings of the subsequent Royal Commission, and public submissions.
12. The Amendment Act makes extensive additions and changes to the current system for identifying and remediating earthquake-prone buildings under the Building Act 2004 (the Building Act)<sup>1</sup>, to improve the seismic performance of existing buildings in future earthquakes.
13. The Amendment Act defines the criteria for earthquake-prone buildings, establishes national timeframes and procedures for addressing earthquake-prone buildings, and provides for establishment of a publicly available national earthquake-prone building register. The provisions of the Amendment Act are anticipated to commence on 1 July 2017 by Order in Council.
- 14.
15. Figure 1 shows the structure of the new framework for managing earthquake-prone buildings.

**Figure 1: Framework for managing earthquake-prone buildings**



<sup>1</sup> The Amendment Act repeals the existing provisions in subpart 6 of Part 2 of the Act in relation to earthquake-prone buildings and creates a new subpart 6A in Part 2 of the Act to solely regulate earthquake-prone buildings. Currently, the provisions governing the management of earthquake-prone buildings are located alongside the provisions regulating dangerous and insanitary buildings.



## What is an earthquake-prone building?

16. Section 133AB of the Amendment Act defines an earthquake-prone building as one that would have its ultimate capacity exceeded in a 'moderate earthquake' and if it were to collapse, would cause injury or death to persons in the building or to persons on any other property or damage to other property.
17. Certain buildings are excluded from the system created by the Amendment Act, and so cannot be categorised as earthquake-prone buildings. Residential housing, farm buildings, retaining walls not integral to the structure of a building, fences, certain monuments, wharves, bridges, tunnels and storage tanks are excluded from the new system.
18. A moderate earthquake is a statutory construct used for the purpose of identifying an earthquake-prone building. A moderate earthquake is one that would generate shaking at the site of the building that is of the same duration as, but one third as strong as, the earthquake shaking that would be used to design a new building at that site if it were designed on the date the provisions of the Amendment Act commence. In practice, an earthquake-prone building is often referred to as one that is less than 34 per cent of new building standard (per cent NBS).
19. The requirements of the building code are different in areas of different seismicity in New Zealand. Therefore, because the definition of an earthquake-prone building is connected to the site of the building, it already takes into account the different levels of seismicity around New Zealand. For example, a building at 34 per cent NBS in Auckland will not be as strong in absolute terms as a building at 34 per cent NBS in Wellington because seismic risk is higher in Wellington.
20. The exact number of earthquake-prone buildings in New Zealand is not known. MBIE's indicative estimate (based on information from territorial authorities) is that in the order of around 15,000 to 25,000 buildings across New Zealand could be earthquake prone. This represents approximately eight to 13 per cent of all non-residential and multi-storey/multi-unit buildings.
21. The Amendment Act provides for the establishment of a national register of earthquake-prone buildings. Over time, the register will provide a clearer understanding of the number of earthquake-prone buildings, where they are located, and when they are due to be strengthened.

## Interface with unreinforced masonry initiative

22. On 28 February 2017 by Order in Council the government introduced a new requirement for owners of certain unreinforced masonry (URM) buildings to secure street-facing parapets and facades. This was in response to the 2016 Hurunui/Kaikōura earthquakes.
23. The four councils of Wellington City, Hutt City, and the Marlborough and Hurunui Districts will issue notices for these buildings, requiring owners to ensure street-facing URM parapets and facades are secured within a specified timeframe. Building owners will then have 12 months to complete the work. URM buildings are also considered under the Amendment Act's framework.

# Problem definition and objectives

## Problems addressed by the Amendment Act

24. The Royal Commission Enquiry into Building Failure caused by the Canterbury Earthquakes, and technical investigations carried out by the Department of Building and Housing (now MBIE) both recommended changes to the legislation, policies and practices underpinning how New Zealand addresses the issue of earthquake-prone buildings. This was to address problems identified that included:
  - poor understanding of the risks posed by earthquake-prone buildings, and of how these compare to other risks commonly faced in New Zealand
  - different approaches across territorial authorities to implementing current policy requirements
  - decision-making being difficult for local authorities, building owners and building users as information on building strength not widely available or easy to find and use
  - a lack of central guidance and limited central monitoring and oversight of the sector.
25. Benefits attributed to the Amendment Act's new system are difficult to quantify but estimated to be significant. For example, reduced loss of life and social and economic costs when earthquakes do occur, and an overall level of confidence in the quality of New Zealand's buildings and the regulatory system protecting life safety.
26. There is, however, a lack of detail for how certain provisions of the Amendment Act will be implemented in practice.

## Problems remaining to be addressed by these proposals

27. **Key terms and concepts in the Amendment Act are currently undefined.**
28. Sixty-seven territorial authorities will be responsible for implementing the new system for managing earthquake-prone buildings. Their performance is crucial to how the system operates. Without central government direction, the implementation of the Amendment Act risks being interpreted differently in each territorial authority, resulting in:
  - inconsistent decision making
  - unclear roles, responsibilities and obligations
  - unclear powers and requirements.
29. The administrative cost borne by territorial authorities in interpreting the legislation will also be higher if each decides alone how to interpret it.
30. Further guidance on interpretation of the Amendment Act's new requirements will support effective implementation of the new system and ensure the original policy objectives can be achieved. Sections 38 and 39 of the Amendment Act provide for regulations to be made by inserting a new section 401C into, and amending section 402 of, the Building Act.

## Objectives

31. The primary objective for the new system for managing earthquake-prone buildings that will commence when the Amendment Act enters into force is **life safety**: people are adequately protected from the risk posed by earthquake-prone buildings in a moderate earthquake.
32. The current proposals for regulations under the Amendment Act also aim to:



- support **administrative efficiency**: an effective nationally consistent framework to identify and remediate earthquake-prone buildings, and provide improved information for territorial authorities, building owners, engineers and the public; and
  - be **proportionate**: targeting those districts, buildings, and parts of buildings that pose the greatest risk, and striking an appropriate balance between protecting people from harm and imposing seismic remediation costs onto the right building owners.
33. These high-level objectives were translated into assessment criteria. These were then used to consider options for each proposed regulation.
34. Table 1 shows the full detail of how objectives were drilled down into assessment criteria, and a description of ‘what good looks like’ next to each criteria.

**Table 1: Objectives, translated into assessment criteria against which to test options**

Aim	Criteria	Description of what good looks like
<b>Administrative efficiency</b>	<i>Promotes good decision making with best available information</i>	<ul style="list-style-type: none"> <li>• Supports good decision making</li> </ul>
	<i>An efficient and effective regulator</i>	<ul style="list-style-type: none"> <li>• Workability and ease of implementation</li> <li>• Administration and compliance costs are minimal</li> </ul>
	<i>Nationally consistent</i>	<ul style="list-style-type: none"> <li>• Supports consistency across territorial authorities</li> </ul>
	<i>Clear requirements and obligations</i>	<ul style="list-style-type: none"> <li>• Roles, responsibilities and obligations are clearly understood</li> <li>• Powers and requirements are clear and transparent</li> </ul>
	<i>Interfaces well with other legislation</i>	<ul style="list-style-type: none"> <li>• Relationships with other legislation are clear and appropriate</li> <li>• Any potential conflict between legislative frameworks is managed</li> </ul>
<b>Proportionate</b>	<i>Targets the right buildings</i>	<ul style="list-style-type: none"> <li>• Targets those districts, buildings, and parts of buildings that pose the greatest risk</li> </ul>
	<i>Recognises level of public concern about risk</i>	<ul style="list-style-type: none"> <li>• Recognises the risks that society is prepared to accept, the risks it finds intolerable</li> </ul>
	<i>Recognises public willingness to pay for life safety</i>	<ul style="list-style-type: none"> <li>• Recognises the price society is ‘willing to pay’ for mitigating risks to life safety</li> </ul>
	<i>Recognises impacts on personal and property rights</i>	<ul style="list-style-type: none"> <li>• Personal and property rights are impacted only to the degree necessary to achieve life safety objectives</li> </ul>
	<i>Recognises impacts on heritage</i>	<ul style="list-style-type: none"> <li>• Specifically recognises the value communities place on the contribution that heritage buildings make to social and cultural values and a community’s sense of place</li> </ul>
	<i>Promotes equity and fairness</i>	<ul style="list-style-type: none"> <li>• Roles, responsibilities and obligations are applied impartially and consistently across parties and across the regions</li> <li>• The costs and benefits are falling onto the right stakeholders</li> </ul>

35. A regulatory impact statement (RIS) presents a *summary* of the options analysis undertaken by officials. Therefore the analysis underlying each proposal, presented in the following sections of this RIS, is necessarily brief: *we present only an analysis of how a proposal, or options, perform against the key relevant assessment criteria.*

## Proposals and options considered

36. Sections 38 and 39 of the Amendment Act provide for regulations to be made by inserting a new section 401C into, and amending section 402 of, the Building Act. These may cover:
- the definition of ‘ultimate capacity’
  - categories of earthquake ratings, and the form of the earthquake-prone building notices, including transitional notices
  - exemptions (from the requirement to undertake seismic work)
  - criteria for ‘substantial alterations’ that will trigger early upgrade work
  - prescribing matters that a territorial authority must take into account when deciding whether or not to allow seismic work without the building complying with specified provisions of the Building Code, and
  - information required for the register of earthquake-prone buildings.

### These proposals

37. The regulations proposed prescribe details relevant to effective practical implementation of new requirements in the Amendment Act. The proposals cover:

Regulation	Purpose	Amendment Act reference
<b>The definition of ‘ultimate capacity’</b>	To clarify the level of building performance required to help determine whether or not a building is earthquake prone.	This term is used in the definition of an earthquake-prone building in section 133AB of the Amendment Act, but is currently not defined.
<b>Categories of earthquake ratings</b>	To provide a measure of the expected seismic performance of an existing building, relative to the minimum that would apply under the Building Code to a new building on the same site.	Section 133AC of the Amendment Act sets out a framework for earthquake-prone buildings or parts to be provided an earthquake rating. Categories of earthquake rating are referred to in section 133AL of the Amendment Act. However, no categories of earthquake rating are defined in the Act.
<b>The form of notices</b>	To provide the public with clear information about the earthquake risk of specific buildings.	Section 133AC of the Amendment Act specifies that the earthquake rating is specified on an earthquake-prone building notice. Section 133AL of the Amendment Act sets out requirements for the content of these notices, but the amount of notices is not prescribed.
<b>Criteria for ‘substantial alterations’</b>	To enable territorial authorities to identify when alterations to an earthquake-prone building will trigger a requirement for earlier completion of the necessary seismic work.	Under Section 133AT of the Amendment Act, if a building consent is sought for ‘substantial alterations’ to an earthquake-prone building, the consent may not be granted unless the seismic work necessary to ensure the building is no longer earthquake prone is also undertaken. The provisions relate to both a building as a whole and to part of a building (section 133AB). The term ‘substantial alteration’ is not defined.
<b>Characteristics that buildings must have to be considered for an exemption from the requirement to undertake seismic work</b>	To provide a mechanism for owners of earthquake-prone buildings to apply for an exemption from the requirement to strengthen their buildings where the consequence of failure is low.	Under section 133AN of the Amendment Act, owners of an earthquake-prone building may apply to their territorial authority for an exemption from the requirement to carry out the necessary seismic work. Territorial authorities may grant an exemption for either a building or a part of a building. The characteristics that a building or part must have to be eligible for an exemption are not prescribed.

38. This RIS covers the definition of ultimate capacity, categories of ratings, criteria for when substantial alterations trigger earlier compliance, and exemptions from the new requirements. Within each of these proposal areas, options for how to best achieve the objectives have been considered.

### Out of scope of this RIS

39. The following are out of the scope of this RIS:
- Notices: Currently, there is no set type of notice as each territorial authority designs their own, as and when needed. Meaning some territorial authorities have one, some have multiple. The Amendment Act allows earthquake-prone building notices to be created by regulation. The impact of creating nationally consistent notices is minimal, and judged to an efficiency saving. Thus consideration of options for the number of notices, and the graphic design of notices, is excluded from this RIS.
  - Methodology: this will be published by MBIE to describe how territorial authorities will identify potentially earthquake-prone buildings, how potentially earthquake-prone buildings will be assessed, and how decisions about earthquake-prone buildings, and their ratings, will be made. No regulatory change is involved.
  - Engineering Assessment Guidelines: the Methodology will be supported by Engineering Assessment Guidelines that set the requirements for engineering assessments and provide engineers with methods and tools for assessing existing buildings. This is a new document being prepared by the New Zealand Society for Earthquake Engineering (NZSEE), the Structural Engineering Society (SESOC) and New Zealand Geotechnical Society (NZGS), in conjunction with MBIE and the Earthquake Commission. It is the result of a full revision of the earlier (and current) guidance produced by NZSEE: *“Assessment and Improvement of the Structural Performance of Buildings in Earthquakes”*. No regulatory change is involved.

### Other legal obligations

40. The Building Act does not set out all of the legal obligations of an owner of an earthquake-prone building. For example, a building owner may have legal obligations under other legislation, such as, the Health and Safety at Work Act 2015, or common law or contract (for example conditions in their lease agreement). Resource Management Act 1991 requirements may also apply, particularly in regard to heritage buildings.

## Regulatory proposal: Ultimate capacity

### Context

41. Under the section 133AB of the Amendment Act, “a building or part of a building is earthquake prone if, having regard to the condition of the building or part and the ground on which the building is built, and because of the construction of the building or part, – the building or part will have its ultimate capacity exceeded in a moderate earthquake...”.
42. Once a building has been identified by a territorial authority as being potentially earthquake prone, an engineer will need to assess the building’s seismic capacity in order to identify whether or not the building or part of the building will have its ultimate capacity exceeded in a moderate earthquake.
43. In determining the building’s ultimate capacity, an engineer is also likely to identify the expected mode of failure of the building to see if the failure of the building or part would be

likely to lead to a significant life safety hazard. This will inform the territorial authority's decision as to whether or not the building is earthquake prone.

44. The term ultimate capacity is intended to refer to the probable load resisting capacity of an existing building, and is the point beyond which an engineer can no longer reliably establish the way the load-bearing capability of the structure will perform. A clear definition of ultimate capacity will provide certainty of what is to be considered when assessing earthquake-prone buildings and help engineers assess buildings in a consistent way.
45. The new section 402(1) of the Building Act enables a regulation to be made to define ultimate capacity for the purposes of section 133AB (meaning of earthquake-prone building).

## Problem

46. The current NZSEE publication "*Assessment and Improvement of the Structural Performance of Buildings in Earthquakes*" uses the term 'ultimate limit state capacity', which refers to the point at which design strength and deformation limits are reached, and is based on lower bound materials strengths. For new buildings, this provides a significant margin in the event of more extreme loadings.
47. However whilst the NZSEE publication's definition of 'ultimate limit state capacity' works for new buildings, it is less easily applied for the assessment of existing buildings. The current approach provides a process that is intended to reduce the probability of collapse of new buildings (and therefore the risk to human life) to an acceptably low level. However, this has sometimes been difficult to apply to older, existing buildings.
48. The Building Act refers to 'ultimate capacity' and not 'ultimate limit state capacity', and yet does not currently define 'ultimate capacity'. This means problems arise including:
  - **lack of clarity for engineers** as to the exact level of building performance required to determine whether an existing building is earthquake prone
  - **insufficient information** for decision making by territorial authorities potentially leading to inconsistent decision making within and across territorial authorities.

## Objectives

49. The objective of defining the meaning of ultimate capacity in regulations is to clarify the level of building performance required to help determine whether or not a building is earthquake prone. The high level objective of life safety was the aim of the Amendment Act. This current proposal aims to ensure administrative efficiency and proportionality.

## Options

50. Options considered were:
  - Option 1: a definition based on **specified load resistance**, which defines the probable level of a building's load-resisting capacity to withstand earthquake actions and maintain gravity load-bearing capacity
  - Option 2: a definition based on **likelihood of collapse**, which defines a building's load resisting capacity as being a 50 per cent probability of it collapsing
  - Option 3: **status quo**, the term is not defined in regulations.
51. Option 3 was not considered in detail and rejected as it is unlikely to meet policy objectives.
52. The following proposal to define the term 'ultimate capacity', a version of Option 1, was consulted on:

*‘Ultimate capacity means the building’s probable capacity to withstand earthquake actions and maintain gravity load support calculated by reference to the building as a whole and its individual elements or parts’.*

## Options analysis

### Option 1 – specified load resistance

- 53. This option establishes a definition that provides legal certainty regarding the threshold to be used when assessing whether a building is earthquake prone. The proposed definition will be common to all buildings, however, its application (ie the required performance level) differs depending upon the seismic hazard area in which the building is located.
- 54. The disadvantage of this option is that the proposed meaning differs to that used currently (‘ultimate limit state’) by the engineering profession.

### Option 2 – likelihood of collapse

- 55. This option was put forward by some submissions during public consultation on the Building (Earthquake-prone Buildings Amendment Bill).
- 56. The option acknowledges the desirability of formally defining ‘ultimate capacity’ and seeks to articulate a definition relating to the structural stability of buildings.
- 57. However, the frequency, severity and consequences of earthquake events are highly unpredictable. And, the point at which a specified building will collapse is acknowledged (in NZS 1170 (the structural design standards, and by the engineering profession) as being difficult or impossible to accurately assess because it depends on a number of variables.
- 58. Table 2 shows more detail of the options analysis carried out.

**Table 2: Analysis of options to define ‘ultimate capacity’**

Criteria	Option 1 – specified load resistance (preferred)	Option 2 – likelihood of collapse
<b>Administrative efficiency</b>	✓	✗
	A mandated minimum performance requirement will make it easier for territorial authorities to understand and administer the assessment of earthquake-prone buildings, reducing the likelihood of error or challenge.	In principle, a mandated minimum performance requirement will make it easier for territorial authorities to understand and administer the assessment of earthquake-prone buildings.  In practice, as collapse cannot be predicted, this could not be put into effect.
	✓	✗
	Should help to streamline systems and processes for territorial authorities by identifying one performance threshold that is consistently applied to all buildings.	In principle, this would help to streamline systems and processes for territorial authorities by identifying one performance threshold that is consistently applied to all buildings. In practice, as collapse cannot be predicted, this could not be put into effect.
	✓	
	Building owners can use existing relevant assessments of their buildings to demonstrate that they are not earthquake prone (because their building meets the mandatory threshold).	

<b>Proportionate</b>	✓	✗
	Provides certainty about the minimum level of performance that buildings must meet in order to not be classified as earthquake prone.	The point at which a specified building will collapse cannot be accurately assessed because it depends on a number of variables including features of the building itself, the land on which the building is built, previous seismic activity in the area, and features of the earthquake, such as the displacement levels.
	✓	
	The required performance level of each building is clear to all stakeholders. Where buildings are below this level, the 'gap' between actual and required performance will be identified by territorial authorities working with engineers.	
	✓	✗
	The threshold would be common to all buildings within the same seismic hazard area.	In principle, the '50% likelihood' threshold would be proportionately the same for all buildings in NZ. In practice however it cannot be identified.

## Conclusions and recommendations: ultimate capacity

59. MBIE recommends the following indicative definition of ultimate capacity be developed into regulation:

*Ultimate capacity means the building's probable capacity to withstand earthquake actions and maintain gravity load support calculated by reference to the building as a whole and its individual elements or parts.*

60. MBIE believes that setting regulations to define ultimate capacity will:

- give clarity to engineers about the requirements for undertaking assessments of potentially earthquake-prone buildings
- remove the need to rely on interpretation through sector definition, and other processes such as determinations made by MBIE's chief executive under the Building Act
- help to ensure that territorial authorities have the information they need when determining whether or not a building is earthquake prone, and
- promote consistent decision-making by territorial authorities.

## Regulatory proposal: Categories of earthquake ratings

### Context

61. Under section 401C(a)(i) of the Building Act (inserted by section 38 of the Amendment Act), regulations may prescribe categories of earthquake ratings. Ratings are determined by a territorial authority, and published on the EPB register and on earthquake-prone building notices. A presumption was made that these would be created, as categories of ratings are referred to in the Amendment Act.

62. The earthquake rating of a building is a critical indication of a building's status. Earthquake ratings provide a way to classify buildings according to the standard they achieve and therefore how well they might perform in an earthquake. The earthquake rating identifies the degree to which the building is expected to perform and is expressed as per cent of new building standard (per cent NBS), as set out in the Building Code.

## Problem

63. The Amendment Act does not prescribe categories of earthquake ratings, leading to lack of clarity for territorial authorities, engineers, and building owners and potentially inconsistent application across the country.
64. The Amendment Act anticipates multiple categories of earthquake ratings, and that ratings will be expressed in the form of a percentage or percentage range.

## Objectives

65. The aim of prescribing categories of earthquake ratings in regulations is to clarify and specify ratings as a measure of expected seismic performance. These will be relative to the minimum that would apply under the Building Code to a new building on the same site.
66. The high level objective of life safety was the aim of the Amendment Act. The ratings provisions in the Amendment Act are intended to incentivise owners of the worst-performing earthquake-prone buildings to prioritise remediation. This current proposal aims to ensure administrative efficiency and proportionality.

## Options

67. MBIE identified five options.
  - Option 1: **status quo** – categories of earthquake ratings are not prescribed
  - Option 2: **one category** of earthquake rating using per cent NBS (only buildings below 34 per cent NBS)
  - Option 3: **two categories** of earthquake ratings using per cent NBS
  - Option 4: **more than two categories** of earthquake ratings using per cent NBS
  - Option 5: **categories using per cent NBS plus other factors**, such as vulnerability and consequence of failure.
68. Option 3 was consulted on as follows. Two categories of earthquake ratings were proposed:
  - earthquake-prone buildings that meet 20 to 33 per cent NBS
  - earthquake-prone buildings that meet less than 20 per cent NBS (and buildings determined earthquake prone where no assessment is provided).
69. The ratings categories consulted on were based on the current engineering guidelines which identify a sector grading scheme to classify buildings according to their earthquake performance (A+ to E). The proposed earthquake ratings reflect the two lowest grades:

Seismic rating (%NBS)	Equivalent category in current sector grading scheme	Proposed earthquake ratings category	Relative risk (approx.) compared to buildings at 100%NBS	Risk classification
20-33%NBS	D	<b>20-33%NBS</b>	10 – 25 times	High risk
<20%NBS	E	<b>&lt;20%NBS</b>	>25 times	High risk

70. MBIE ruled out option 2 because it was not consistent with either the policy objective or the Amendment Act, which anticipates multiple categories of earthquake ratings. Following feedback on the discussion document, MBIE also considered option 5 in more detail.

71. Options analysis Table 3 outlines the options analysis.

**Table 3: Analysis of options for categories of earthquake ratings**

Criteria		Option 1 Status quo	Option 3 (Preferred) Two categories using per cent NBS	Option 4 More than two categories using per cent NBS	Option 5 Categories using per cent NBS plus additional factors
<b>Administrative efficiency</b>	<i>Workable and efficient</i>	- Each territorial authority would devise its own categories	- Difficult to sub-categorise earthquake ratings below 34%NBS	✗ Requires further sub-categorisation	- May be assessed inconsistently
	<i>Effective</i>	✗ Each territorial authority would devise its own categories	✓ Engineering Assessment Guidelines set out requirements for identifying %NBS	✓ Engineering Assessment Guidelines set out requirements for identifying %NBS	✗ May be assessed inconsistently
	<i>Consistent with the Amendment Act</i>	- Not inconsistent	✓ Amendment Act anticipates multiple categories of earthquake ratings, and ratings expressed in the form of a percentage	✓ Amendment Act anticipates multiple categories of earthquake ratings, and ratings expressed in the form of a percentage	✗ Additional factors cannot be expressed as percentage
<b>Proportionate</b>	<i>Promote equity and fairness</i>	✗ Potentially different ratings across the country	✓ Applied impartially and consistently	✓ Applied impartially and consistently	✓ Applied impartially and consistently
<b>Other</b>	<i>Clear information to the public</i>	✗ Potentially different ratings across the country	- Per cent NBS is not linear - public may not understand	✗ Potential confusion at number of categories	✗ Relevance of rating for risk to life safety unclear

72. Option 4 could confuse the public with too many categories. Option 3 would be clearer. However, because per cent NBS is not linear (all buildings below 34 per cent NBS are much more susceptible to failure in an earthquake than buildings above 34 per cent NBS) the public may not understand what the information means. To manage this risk and to aid understanding, MBIE will provide clear guidance on what ratings mean.

73. Option 5 may not provide clear information to the public. If the additional factors include occupancy of a building, a building with many occupants may receive a different earthquake rating to the exact same building with fewer occupants. It would not be clear to a member of the public why there was a difference in the two ratings or what impact it would have on their safety.

74. Option 5 expresses the earthquake rating in terms of life safety. Therefore, there would be additional incentives on owners to address those buildings in the lowest category of rating as people may have more reservations about entering a building with a lower life safety rating than a building with a low per cent NBS rating.

75. Options 1, 3 and 4 are consistent with the Amendment Act in that they use a percentage to express the earthquake rating. Option 5 would be more complicated and is not consistent with



the Amendment Act as it does not use a percentage or percentage range to express the earthquake rating.

76. Option 3 would be workable and efficient. The building is assessed by an engineer, a rating is provided, and then the territorial authority places the building into an earthquake rating category. Engineers have indicated that it is difficult to sub-categorise earthquake ratings below 34 per cent NBS. For this reason, more than two categories would not be efficient.
77. Option 5 would measure more factors and would likely be more variable. In its submission on the regulations, NZSEE wrote that it “does not consider any other risk parameters are likely to have a material effect on the assessment outcome, and would tend to add to the complexity of the rating categories.” Option 1 would provide more work for territorial authorities as they would each have to create their own category.
78. Option 1 would not be consistent as each territorial authority would devise its own categories. Options 3 and 4 could be inconsistent at times as ratings may differ between engineers. Option 5 would take into account even more factors than options 3 and 4, leading to the potential for further inconsistencies.
79. Other than Option 1, all options could be applied impartially and consistently across the regions, with buildings and building owners treated in the same circumstances in the same way.

### Conclusions and recommendations: ratings

80. Option 3 best meets the policy criteria. Two categories of earthquake ratings are proposed:
  - earthquake-prone buildings that meet 20 to 33 per cent NBS
  - earthquake-prone buildings that meet less than 20 per cent NBS (and buildings determined earthquake prone where no assessment is provided).
81. It is effective, workable and efficient, consistent with the Amendment Act, nationally consistent and promotes equity and fairness.
82. MBIE will provide guidance on what ratings mean to ensure the information is clear to the public.

## Regulatory proposal: Criteria for substantial alterations

### Context

83. Once identified as earthquake prone, a building must be remediated within the timeframe specified for its area of seismic risk. This will be 15 years (high risk area), 25 years (medium) or 35 years (low). For priority buildings (medium and high seismic risk only) the timeframes are half of those required for other earthquake-prone buildings in other areas of the same seismic risk.
84. Under section 133AT of the Amendment Act, a building consent must not be granted for a substantial alteration to an earthquake-prone building unless the alteration includes the necessary seismic work to ensure the building is no longer earthquake prone. Thus the act of carrying out a substantial alteration may trigger an earlier date at which remediation is required.
85. The relevant territorial authority will decide whether or not the proposed alterations meet the criteria defined in regulations for ‘substantial’ alterations.

86. Section 38 of the Amendment Act inserts a new Section 401C(c) into the Building Act, which specifies that a regulation may be made to “prescribe the criteria for determining whether a building alteration is a substantial alteration for the purposes of section 133AT” (alterations to buildings subject to EPB notice).

### Problem

87. Each territorial authority might interpret the term ‘substantial alteration’ differently leading to lack of clarity for building owners and potentially inconsistent application across the country.

### Objectives

88. The Amendment Act’s provision to bring forward strengthening timeframes for earthquake-prone buildings (ie where owners plan to do other alterations to their building) aims to protect life safety. Earlier upgrades of earthquake-prone buildings will improve building safety (so reduce risks to life safety).
89. The high level objective of life safety was the aim of the Amendment Act. This current proposal aims to ensure administrative efficiency and proportionality. Territorial authorities need a clear basis for deciding whether or not proposed building alterations will trigger the need for remediation to be carried out earlier than the statutory timeframes that would otherwise apply.

### Options

90. MBIE identified the following options:
- Option 1: based on **nature of building work** – a substantial alteration is one that affects the building’s primary structure ie those carrying the lateral seismic and gravity loads through to the ground
  - Option 2: based on **building features** – a substantial alteration is one that affects a specified minimum percentage (eg 25 per cent) of the building’s floor area
  - Option 3: based on **monetary value of the alteration**
    - Option 3A: a substantial alteration is one that has a value that is greater than 25 per cent of the rateable value (preferred of the 3 subsets considered)
    - Option 3B: a substantial alteration is one that has a value that is greater than \$200,000
    - Option 3C: a value that is greater the greater of 25 per cent of the rateable value or \$200,000, whichever is greater (this option was drawn from a territorial authority’s current policy). If the proposed alterations meet one of the tests then they trigger the requirement to do their seismic work earlier.
91. It is not intended that phased remediation work (under an EPB notice) will trigger the ‘substantial alterations’ requirement. This would penalise building owners who are proactively starting early remediation to improve the safety of their building (eg they could be securing or strengthening a parapet before considering remediation work more widely).

### Options analysis

92. Table 4 outlines the options analysis.

**Table 4: Analysis of options to set criteria for ‘substantial alteration’**

Option	Sub-option	Description	Consideration against criteria
<b>Option 1: criteria based</b>	Changes to the primary structure	A substantial alteration is building work that changes	<i>Pro:</i> readily identified. <i>Con:</i> the work may not be

**IN CONFIDENCE**

<b>on structural work</b>		the main building structural systems – ie those carrying the lateral seismic and gravity loads through to the ground.	'substantial' (as commonly defined).
<b>Option 2: criteria based on building features</b>	Changes to a specified building features within the scope of alterations.	A substantial alteration is building work that affects a specified minimum percentage of the building's floor area eg greater than 25%NBS.	<i>Pro</i> : readily identified. <i>Con</i> : the work may not be 'substantial' as commonly defined – eg if it related only to fit-out change.
<b>Option 3: Criteria based on monetary value</b>	<b>3A The cost of the alterations would be expressed as a ratio of a specified value of the building.</b>  <b>(Preferred)</b>	A substantial alteration is building work requiring a building consent with a value of more than 25% of the rateable value of the building (excluding the land value).	<i>Pro</i> : financial value can be assessed using information readily available to both territorial authorities and building owners. <i>Pro</i> : future-proof, reflecting changing values over time. <i>Con</i> : rateable values are market-based, and heavily influenced by demand and sale price. <i>Con</i> : there are significant differences in rateable values for similar buildings in metro/provincial/rural New Zealand.
	3B: A specified minimum value for the alterations.	A substantial alteration is building work requiring a building consent with a value of more \$200,000.	<i>Pro</i> : uses information already provided with the application for building consent. <i>Pro</i> : there is minimal variation in the cost of building alterations across New Zealand, thus this measure would have reasonable comparability nationally. <i>Con</i> : does not take account of the nature of the building – eg a low-cost alteration to a small, single storey building may have significant floor area implications whereas an expensive alteration to a large, multi-storey may not. <i>Con</i> : may not reflect future building costs.
	Option 3C: if the proposed alterations meet either of these tests, the requirement is triggered.	A substantial alteration is building work requiring a building consent with a value of more than 25% of the rateable value of the building (excluding the land value), or \$200,000, whichever is the greater (option based on a territorial authority's current policy).	<i>Pro</i> : mitigates significant differences in rateable values for similar buildings in metro/provincial/rural New Zealand <i>Con</i> : the inclusion of a fixed value sets a high threshold for substantial alterations in low value areas <i>Con</i> : may not reflect future building costs.

93. Impacts could be amplified for owners of earthquake-prone heritage buildings. The costs associated with building work on heritage building projects can be high, while the value of some heritage buildings may be low. This means the requirement may be more readily triggered. Substantial alterations, however, are a choice a building owner makes.
94. Options based on the nature of building work (eg any changes to the primary structure of a building, or changes to the building's external envelope), or based on a specified minimum percentage of the building's floor area, are not recommended. Provisions based on the nature of work would leave significant room for inconsistent interpretation by territorial authorities and building owners. Changes to the primary structure or a significant floor area will not necessarily be 'substantial'.
95. The inclusion of a fixed value of building work (eg \$200,000) does not necessarily produce more consistent outcomes, but rather sets a high threshold for substantial alterations in low value areas. A criterion based on a fixed financial value of building work may not reflect future building costs.

## CBA

96. Martin Jenkin's CBA estimate on the proposed regulation on substantial alterations projects forward over 50 years and results in a net (NPV) cost of: \$108million (in 2016 dollars). This estimate is based on substantial alterations forming 17 per cent of alterations consented. Further detail of the CBA is provided in the 'Impact of the proposals' section on page 27.

## Conclusions and recommendations: substantial alterations

97. Option 3A is preferred, as financial value can be assessed using information readily available to both territorial authorities and building owners. The proposed criterion of building alterations with a value of over 25 per cent of the building's rateable value ensures the threshold is future-proof, reflecting changing values over time.
98. MBIE recommends the following criteria for substantial alterations be prescribed in regulation:  
*A substantial alteration is building work requiring a building consent (excluding seismic work) with a value of more than 25 per cent of the rateable value of the building (excluding the land value).*

## Regulatory proposal: Exemptions

### Context

99. Under section 133AN of the Amendment Act, owners of an earthquake-prone building may apply to their territorial authority for an exemption from the requirement to carry out the necessary seismic work (an exemption). This provision recognises that there may be circumstances under which seismic strengthening costs are disproportionately high compared with the consequences of building failure, and the requirement to strengthen may produce unintended negative consequences for building owners.
100. Territorial authorities may grant an exemption for either a building or a part of a building. Territorial authorities must be satisfied that a building has "the prescribed characteristics" before granting an exemption.
101. The number of buildings likely to be granted an exemption is anticipated to be very small. Anecdotal evidence from some territorial authorities suggests two to five per cent of earthquake-prone building stock may be eligible for an exemption.
102. The characteristics that an earthquake-prone building (or part of a building) should have in order for a territorial authority to grant an exemption are to be prescribed in regulation, in

accordance with section 401C(b) of the Building Act, as inserted by section 38 of the Amendment Act.

103. A range of structures are already excluded from the definition of earthquake-prone building; for example, farm buildings and most residential buildings. As these buildings are already excluded, these are not considered in the design of a system for exemptions.

## Problem

104. The Amendment Act sets up an exemptions regime, without which application of the Amendment Act could be too far reaching. Earthquake-prone buildings that will have little or no consequence upon failure could be captured by earthquake-prone building remediation requirements, leading to costs for owners that outweigh any benefits in terms of expected lives saved or damage prevented.
105. However, without clarity on which buildings should be exempt, each territorial authority could interpret the exemptions regime differently, leading to lack of clarity for building owners and potentially inconsistent application across the country.

## Objectives

106. The high level objective of life safety was the aim of the Amendment Act. The objectives of the exemptions provisions are to:
- provide a mechanism for owners of earthquake-prone buildings not to be required to upgrade their buildings where the consequence of failure is low
  - minimise incentives for building owners to use the mechanism to deliberately avoid having to strengthen their buildings.
107. This current proposal aims to ensure administrative efficiency and proportionality.

## Options

108. Distinct options were not considered for this proposal. Instead the consideration focussed on which of a building's characteristics should be considered by a territorial authority when deciding on an application for exemption. The key characteristics are described and considered below.

## Options analysis

109. To be considered for an exemption, the consequence of failure of an earthquake-prone building or part (in terms of life safety and damage to property) must be low.

### *Occupancy and mode of failure*

110. Occupancy characteristics and expected mode of failure are key indicators of the likely consequences of an earthquake-prone building's failure. It is the size of the hazard – the likelihood of death or serious injury to people, and the likelihood of damage to other property – that should be weighed in assessing consequences for life safety or for other property.

### *Vulnerability of occupants*

111. MBIE does not recommend vulnerability be included as a factor because it adds a further level of complexity and potential ambiguity to the regulation, and a high degree of prescription would be required to achieve consistency. This is inconsistent with the objectives of achieving clarity and consistency. Further, earthquake-prone buildings containing vulnerable occupants in high and medium seismic risk areas are likely to also be priority buildings, and therefore not eligible for exemption.

### *Seismic risk areas*

112. The Amendment Act addresses the likelihood of an earthquake occurring through the application of seismic risk areas and corresponding timeframes for remediation. Seismic risk should not be reconsidered as part of the exemptions assessment.

*Building age and structural characteristics*

113. The age and structural characteristics of an earthquake-prone building are not appropriate factors for inclusion in the regulation. Reference to 'structural characteristics' is a proxy for considering the building's expected mode of failure. Building age is not recommended as a factor for consideration, as age is not necessarily a proxy for the structural performance of a building. MBIE proposes these factors be replaced with consideration of the building's expected mode of failure, as this is a more relevant consideration in the overarching 'severity of consequence test' for exemptions.

*Priority buildings*

114. MBIE recommends priority buildings are not eligible for exemptions. Because of their importance, priority buildings are required to be remediated within half the timeframe for other earthquake-prone buildings. To allow priority buildings to be exempted from remediation is not consistent with the intent of the Amendment Act.

**CBA**

115. Martin Jenkin's CBA estimate on the proposed regulation allowing exemptions projects forward over 50 years and results in a net (NPV) benefit of \$30 million (in 2016 dollars): mainly due to saving achieved as buildings are exempted from requiring an upgrade. This estimate is based on 3 per cent of buildings being exempt. Further detail of the CBA is provided in the 'Impact of the proposals' section on page 27.

**Conclusions and recommendations: exemptions**

116. To be considered for an exemption, the consequence of failure of an earthquake-prone building or part (in terms of life safety and damage to property) must be low.
117. It is proposed that that low consequence of building failure will be assessed by the territorial authority having regard to the following factors:
- the use and occupancy characteristics of the building or part, such as:
    - the likely number of people able to use the building at any one time
    - the likely number of occasions on which the building will be used in the calendar year following the date of application for an exemption
    - the likely duration of occupancy events
  - the expected mode of failure of the building or part, and its likely effect on people (in terms of serious injury or death) or any other property (in terms of physical damage).
118. It also proposed that priority buildings will not be eligible for exemptions.
119. The exemption regulations will not set numerical thresholds for the criteria required to be considered. Instead, MBIE is developing guidance with further detail and examples to help territorial authorities take a consistent approach when exercising their powers under the exemption provisions.

*Effective guidance and support for implementation is required*

120. MBIE proposes the regulations will not set numerical thresholds for the criteria required to be considered. Instead, the regulations will prescribe the necessary characteristics a building must have in order to be considered for an exemption, with guidance providing further detail and examples to support territorial authorities' decisions.

121. MBIE will encourage territorial authorities to regularly review exemptions decisions, to ensure earthquake-prone buildings with exemptions continue to have the necessary prescribed characteristics. This would involve checking that use and occupancy characteristics have not changed such that a building would no longer satisfy the exemption test.

## Consultation

122. Consultation has been extensive. Two discussion documents were released for public consultation in September 2016:
- Proposals for Regulations under the Building (Earthquake-prone Buildings) Amendment Act 2016 (the regulations proposals)
  - Proposals for a methodology to identify earthquake-prone buildings (the EPB methodology proposals).
123. Public consultation on proposals for regulations closed on 10 February 2017. Fifty submissions were received on proposals to prescribe a definition of ultimate capacity, categories of earthquake ratings, the form of earthquake-prone building notices, criteria for substantial alterations, and characteristics a building must have to be eligible for an exemption from remediation requirements.
124. Submissions were generally supportive of the new regime for managing earthquake-prone buildings, and the proposals for regulations and the EPB methodology. Proposals on exemptions have been revised following consultation to provide greater clarity and reduce the scope for inconsistent interpretation.

**Forty five submissions were received on the methodology proposals. A majority of submissions received were from local government agencies (23) and membership associations (14), as shown in**

125. Figure 2. A summary of submissions received and MBIE's response is set out in Table 5.

**Figure 2: Categories of submitters**

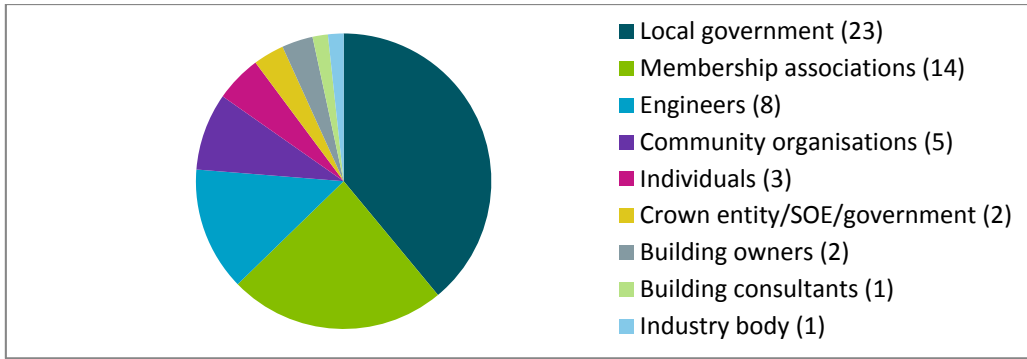


Table 5: Feedback from consultation (regulatory proposals only) and MBIE response

Themes from submissions on the proposed regulations			
Proposal consulted on	Overall theme	Comments from submitters	MBIE response and recommendation
<p><b>Ultimate capacity</b> Proposed definition: “ultimate capacity means the building’s probable capacity to withstand earthquake actions and maintain gravity load support calculated by reference to the building as a whole and its individual elements or parts”</p>	<i>Generally supported</i>	<ul style="list-style-type: none"> <li>30 submissions received</li> <li><b>28 expressed support</b> eg the definition is practical and workable</li> <li><b>10 suggested minor technical changes</b></li> <li>2 disagreed with the proposed definition eg stating the proposal was overly simplistic</li> </ul>	<ul style="list-style-type: none"> <li><b>Retain proposal consulted on</b></li> <li>Consider minor technical changes to achieve greater clarity</li> </ul>
<p><b>Earthquake ratings</b> Two earthquake ratings categories were proposed: 20-33%NBS and &lt;20%NBS (and buildings determined as being earthquake prone because no assessment is provided)</p>	<i>No clear majority view</i>	<ul style="list-style-type: none"> <li>37 submissions received</li> <li><b>19 supported</b> the proposal eg the two categories provided useful information and were useful to prioritise the remediation of lower rated buildings</li> <li><b>18 opposed</b>, most preferred <b>only one earthquake rating category</b> – under 34%NBS</li> <li>5 submitters suggested <b>alternative categories including vulnerability and consequence</b> rather than solely using the NBS</li> </ul>	<ul style="list-style-type: none"> <li><b>Retain proposal consulted on</b></li> <li>One category would not achieve the purpose of ratings</li> <li>Categories based on vulnerability and consequences are not viable options, as the Amendment Act requires ratings to be expressed as a percentage or percentage range</li> </ul>
<p><b>Substantial alterations</b> Proposed that substantial alteration will be building work requiring a building consent that has a value that is more than 25% of the rateable value of the building (excluding the land value)</p>	<i>No clear majority view on alternative</i>	<ul style="list-style-type: none"> <li>39 submissions received</li> <li><b>22 generally supported some aspects</b> of the proposal</li> <li>Almost all submissions suggested <b>different and/or additional criteria</b> to be considered eg a combination of a set percentage of rateable value and a fixed financial value of building work, or the floor area affected by the alteration</li> <li>Small alterations might trigger the strengthening threshold in <b>regions with low rateable values</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Retain proposal consulted on</b></li> <li>MBIE considers there is insufficient justification to include a criterion based on a fixed value of building work, and other options proposed by submitters are not fit for purpose</li> <li>The proposal is future-proof, as it responds to changing values over time</li> </ul>



<p><b>Exemptions</b> Proposed that use, occupancy, and structural characteristics be considered, as well as likely consequence of failure for nearby buildings</p>	<p><i>Generally supported, additional factors suggested</i></p>	<ul style="list-style-type: none"> <li>• 38 submissions received</li> <li>• The majority of submissions supported the proposal, but <b>recommended alternative or additional factors</b> be considered</li> <li>• Most commented that there was a need for any regulations made to be <b>clear and unambiguous</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Change proposal consulted on</b></li> <li>• MBIE has considered the factors recommended by submitters and revised the proposal for exemptions</li> <li>• MBIE proposes use and occupancy characteristics be considered alongside likely mode of failure</li> </ul>
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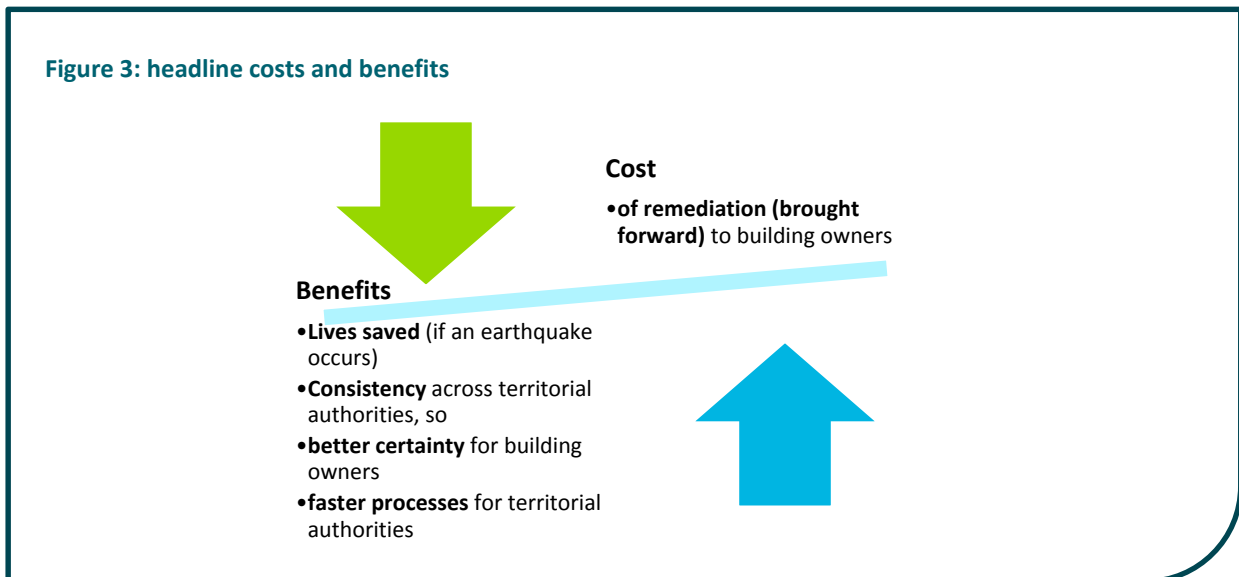
## Impact of the proposals

### These regulations focus on efficient and proportionate implementation of the Amendment Act

126. The currently proposed regulations are designed to facilitate effective implementation of the Amendment Act, and so aim to:

- support **administrative efficiency**: an effective nationally consistent framework to identify and remediate EPBs, and providing improved information for territorial authorities, building owners, engineers and the public, and
- be **proportionate**: targeting those districts, buildings, and parts of buildings that pose the greatest risk, and striking an appropriate balance between protecting people from harm and imposing seismic remediation costs onto the right building owners.

127. Headline costs and benefits are depicted in Figure 3.



### A negative CBA: strengthening buildings is costly, and earthquakes are rare

128. The Amendment Act allows for the creation of these regulations. This means the current proposal is therefore simply setting the design of regulations that have already been envisaged. Thus the additional cost of the proposed regulations is difficult to quantify.



**Table 2: Sensitivity analysis**

SENSITIVITY - AND RANGE	2012\$			2016\$		
	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million
	30 June 2012			31 Dec 2016		
<b>Marginal impact of regulations</b>						
Base case: 3% exemptions; 17.0% alterations	67	0	(67)	79	0	(79)
High cost case: 1% exemptions; 19.8% alterations	102	1	(101)	120	1	(119)
Low cost case: 6% exemptions; 14.0% alterations	24	(1)	(24)	28	(1)	(29)
<b>Other sensitivities</b>						
3% exemptions; 14.0% alterations	51	(0)	(51)	60	(0)	(60)
3% exemptions; 19.8% alterations	83	0	(82)	97	0	(97)
1% exemptions; 17.0% alterations	86	1	(86)	101	1	(100)
6% exemptions; 17.0% alterations	39	(1)	(40)	46	(1)	(47)
Base case - 4% discount rate	56	0	(56)	66	0	(66)

135. As noted above, these figures do not factor in the benefits of time saved due to improved administrative efficiency and proportionality in the implementation of the new system. Territorial authorities will be able to make decisions more quickly, and more consistently. Building owners will save time and have greater certainty when dealing with territorial authorities. These benefits remain unquantified. Thus the estimated net costs reported above should be read with care, as these figures do not include these substantial benefits.

**Conclusion on net impacts**

It is reasonable to presume that some regulations were anticipated by the Amendment Act. And so the \$79 million figure estimated must be interpreted as an upper limit to the overall impact, as the counterfactual used for the CBA is having no regulations enacted.

Martin Jenkin’s report on the CBA carried out is appended.

## Conclusions and recommendations

136. **The proposals are to develop the following in regulation:**

- define the meaning of **'ultimate capacity'**, reflecting the following: ultimate capacity means the building's probable capacity to withstand earthquake actions and maintain gravity load support calculated by reference to the building as a whole and its individual elements or parts
- define two distinct **categories of earthquake ratings**:
  - i. earthquake-prone buildings that are 20 to 33 per cent of New Building Standard (per cent NBS)
  - ii. earthquake-prone buildings that are less than 20 per cent NBS
- define criteria for **substantial alterations**, so that a substantial alteration will be building work (excluding seismic work) requiring a building consent and has a value over 25 per cent of the rateable value of the building (excluding the land value), and
- define characteristics that a building must have to be considered for an **exemption** as follows: the consequence of failure of an earthquake-prone building or part (in terms of life safety and damage to other property) must be low. Low consequence of failure will be assessed having regard to the use and occupancy characteristics of the building, and the expected mode of failure.

## Implementation plan

137. The August 2013 RIS on the Amendment Bill describes how a revised system for managing earthquake-prone buildings will be implemented. This implementation plan is still applicable.
138. The proposals in this RIS would be given effect by the development of a new set of regulations relating to earthquake-prone buildings. An Order in Council to bring the Amendment Act into force is also required.
139. The regulations will be supported by guidance provided by MBIE.

### Financial assistance provided

140. Central government, through Heritage EQUIP (for example), does make available some funding to owners of earthquake-prone heritage buildings that can be used to assist with the costs of seismic work. Some territorial authorities also provide assistance.
141. The joint government and council Unreinforced Masonry Buildings Securing Fund (approximately \$4.5 million) also will provide some of the cost of securing unreinforced masonry features in areas of heightened seismic risk over the next 12 months, up to a maximum of \$15,000 for a facade and/or \$10,000 for a parapet.

## Monitoring, evaluation and review

142. MBIE is developing a monitoring and evaluation strategy to assess the implementation and impacts of the Amendment Act and proposed regulations. The purpose of the monitoring and evaluation strategy would be to determine whether the policy is working as intended (outcomes), understand any constraints impacting on the implementation policy (processes), and describe any unintended consequences from the implementation of the policy, both positive and negative.
143. The evaluation will include both qualitative and quantitative data collected over time. The evaluation will occur in distinct phases: baseline data collection; iterative modelling of policy implementation; process and early impact evaluation; and a five year impact evaluation.
144. Data will be collected through:
- monitoring data provided by territorial authorities, including the number of buildings identified and assessed, the number of buildings repaired or demolished, and the types of repairs undertaken
  - cost data provided by territorial authorities related to both the direct costs of implementing the policy and the impact on other work activities
  - key stakeholder surveys and interviews related to the constraints and consequences of the policy implementation
  - analysis of a range of market data to determine the influence of the market.

# **Appendix 1: Cost benefit analysis of the proposed regulations on substantial alterations and exemptions**

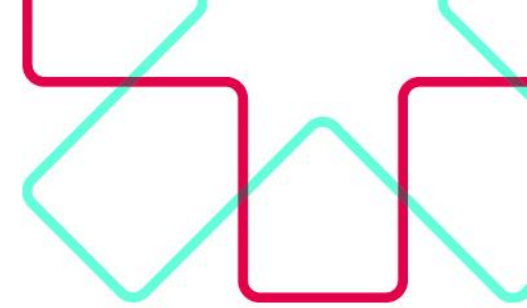
# EARTHQUAKE-PRONE BUILDINGS - REVISED COST BENEFIT ANALYSIS

## Final Report

Ministry of Business, Innovation  
and Employment

7 April 2017





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# PREFACE

This report has been prepared for the Ministry of Business Innovation and Employment by Nick Hunn from MartinJenkins (Martin, Jenkins & Associates Limited).

MartinJenkins advises clients in the public, private and not-for-profit sectors, providing services in these areas:

- Financial and economic analysis
- Public policy
- Evaluation and research
- Strategy and investment
- Performance improvement and monitoring
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MartinJenkins is a privately owned New Zealand limited liability company. We have offices in Wellington and Auckland. The company was established in 1993 and is governed by a Board made up of executive directors Kevin Jenkins, Michael Mills, Nick Davis and Nick Hill, plus independent directors Sir John Wells (Chair) and Hilary Poole.



# PURPOSE AND BACKGROUND

The purpose of this report is to provide the Ministry of Business Innovation and Employment (MBIE or the Ministry) with a cost benefit analysis (CBA) that measures the impact of two proposals for regulations under the Building (Earthquake-prone Buildings) Amendment Act 2016 (the Act). These proposals, which formed part of a suite of policy changes introduced via Supplementary Order Paper in mid-2015, are for:

- Substantial Alterations – where criteria are set for territorial authorities to identify when alterations to an earthquake-prone building will trigger a requirement for earlier completion of the necessary seismic work.
- Exemptions – where characteristics are prescribed to allow an earthquake-prone building to be considered for exemption from the requirement to undertake seismic work.

This report provides MBIE with the cost benefit analysis that will form part of the regulatory impact statement (RIS) to be provided with the Cabinet paper seeking Cabinet's agreement to the policy proposals for changes to regulations.

The Ministry has agreed with Treasury that the RIS will only include an analysis of the likely costs and benefits of proposals for Substantial Alterations and for proposals for Exemptions.

An indicative CBA model was prepared in 2012 to measure the potential impacts of changes to earthquake prone buildings policy, with subsequent updates in 2014 and 2015 to extend the timeframe for the model and to include allowance for a shorter strengthening timetable for priority buildings. This current work builds on these earlier models, adding functionality to measure the impact of Substantial Alterations and Exemptions.



# SCOPE AND APPROACH

The scope of work was agreed with MBIE prior to commencement. The focus was on developing high-level indicative costs and benefits of the proposed regulations, building on the modelling performed in 2012 to 2015. Results have been calculated in 2012 dollars, to retain consistency with the original work, and they have also been inflated to current dollars using an appropriate cost inflator.

## Exemptions

The objective of the proposed change in regulation is to allow owners of some earthquake-prone buildings to not be required to remediate their buildings where the likely impact of failure of the building (on life safety or on other property) is low. The determination of 'low consequence' is to take account of occupancy and/or structural characteristics.

Limited data was available to measure the impact of the proposed Exemptions regime. To address this, MBIE approached a small selection of Councils and requested a high-level estimate of the percentage of earthquake-prone buildings that they thought would qualify for an exemption. Responses were received from Hamilton City Council and Wellington City Council.

- Hamilton City Council estimated less than 20 buildings would qualify, which is approximately 2% of the total.
- Wellington City Council estimated less than 5% would qualify.

For the CBA calculations, the analysis used a range of estimates, including a low point of 1% (just below Hamilton), a high point of 6% (just above Wellington), and a point estimate of 3%. The point estimate was set slightly

lower than the average of the Hamilton and Wellington percentages to take some account of Wellington's "less than 5%" expression.

These percentages are applied directly to the Net Present Value (NPV) of the estimated costs and benefits, calculated using the building stock from the 2015 modelling, and the timing assumptions after allowing for accelerated strengthening timeframes for priority buildings. The Exemptions calculation is also performed before the Substantial Alterations calculation.

The analysis is performed using 2012 dollars and current dollars. Current dollars are calculated using the latest quarterly Statistics New Zealand cost inflation data (to 31 December 2016) using the Capital Goods Index for non-residential buildings.

## Substantial Alterations

The Substantial Alterations calculations are more complex. To determine the impact of the proposed regulation we needed to measure how many earthquake-prone buildings, in any given year, would undertake a substantial alteration, and therefore trigger the requirement to strengthen the building earlier than the standard timeframe.

Unlike the Exemptions regulation, where buildings no longer need to be strengthened, the Substantial Alterations regulation just changes the timetable for the strengthening – bringing it forward. The impact of this change manifests in the NPV calculations because, for example, one dollar paid today has a higher value (cost) than one dollar paid in 25 years

The proposal is that a substantial alteration would be declared when an application was made to carry out consented building work of more than



25% of the rateable value of the building (or if there is no rateable value, a reasonable value).

Again, limited data was available to assess how many earthquake-prone buildings might be subject to a substantial alteration before they would have been strengthened under the standard timetable. To deal with the data limitation, the following approach was adopted:

#### **Determine the percentage of consents that are expected to exceed 25% of rateable value**

- A request was made to a selection of Councils to provide details of building consents for alterations and additions for the last two years. The request asked for all non-residential building consents, details of the value of the alteration or addition, and details of the rateable value of the building.
- Responses were received from Hamilton City Council and Whakatāne District Council.
- Using this data it was possible to calculate for each Council the percentage of consents that were for more than 25% of the rateable value of the property. The data was adjusted to remove any impact of multiple consents for the same property.
- In Hamilton City Council there were 501 consents and 431 that had a rateable value. 71 consents were over 25% of the rateable value, being 16.5% of the useable population.
- In Whakatāne District Council there were 87 consents and 86 that had a rateable value. 17 consents were over 25% of the rateable value, being 19.8% of the useable population. Three consents that were over 25% of value were removed because they were for seismic strengthening work.
- The Whakatāne District Council data included a description of the work, so it was possible to identify consents for seismic strengthening. This

was not possible for the Hamilton City Council data, so there is a potential overstatement in that data, with the percentage possibly being nearer to 14% than 16.5%. In the absence of actual evidence, the CBA calculations have adopted a conservative approach and used 16% in the point estimates. The lower number has been used in estimating the lower end of the range.

- A weighted average of the two point estimates (19.8% and 16.5%) was calculated to be 17.0%. This represents the estimate of the percentage of total commercial and industrial consents (for alterations or additions) that are expected to be over 25% of the rateable value. This was calculated over two years, but can be applied to any time period.
- The percentages obtained from the data provided by Hamilton City Council and Whakatāne District Council represent the current level of Substantial Alterations. This costing exercise has not allowed for the impact of any changes in behaviour that might arise when building owners see the impact of the regulations in action. It is quite possible that in some parts of New Zealand, where commercial imperatives are not driving strengthening timeframes, the level of actual alterations will be lower than these percentages indicate. This would occur where owners did not undertake planned alterations because of the additional cost of earthquake strengthening.

#### **Determine the annual number (and area) of earthquake-prone buildings that are expected to qualify under the Substantial Alterations regulation**

The methodology uses the 17% estimate described above to derive the annual number of buildings that would be considered Substantial Alterations, as follows:

- For each territorial authority, the number of commercial and industrial consents for alterations was obtained from Statistics New Zealand, for the 12 months to 31 December 2016. In total, there were 3,463



consents under the two categories 'commercial buildings' and 'factories, industrial and storage buildings'.

- The number of these consents that were over 25% of value was derived, being 17% of 3,463. This gave 587 buildings across New Zealand, including both earthquake-prone and non-earthquake-prone buildings.
- To identify the earthquake-prone buildings, data from the 2012 CBA model was used. For each territorial authority, the 2012 model derived total numbers of buildings (193,672 across New Zealand) and total earthquake-prone buildings (16,901 after attrition<sup>1</sup>, and after removing Exemptions). For each territorial authority, the ratio of expected buildings with alterations over 25% of value divided by total building stock, was applied to the earthquake-prone building stock. This implicitly assumes that the mix and type of alterations is similar on average across earthquake-prone and non- earthquake-prone buildings.
- The calculations were carried out separately for each territorial authority and summed for New Zealand. This gave 48 earthquake-prone buildings that would be expected to be caught by the proposed Substantial Alterations regulations each year<sup>2</sup>.
- The number of buildings is converted to building area in order to calculate the annual impacts over time. Using the 2012 CBA model, the average area per earthquake-prone building is 688 m2, based on total area before attrition of 13,326,847 m2 and 19,360 buildings. For 48 buildings, the total area is 32,812 m2.

<sup>1</sup> Attrition takes account of buildings that are expected to be demolished, or that have already been strengthened. This was assumed to be 10% of buildings.

<sup>2</sup> When the calculation is performed at the whole-of New Zealand level, the result differs slightly. This is because the ratios of earthquake-prone buildings to total buildings differs significantly across territorial

### **Calculate the annual shifts in the timing of earthquake-prone building strengthening caused by the proposed Substantial Alterations regulation**

- As described above, it is expected that 32,812 m2 of building area will be caught by the proposed regulation every year. The 2012 CBA model covered a total strengthening timetable of 52 years<sup>3</sup>, by which time all works would be completed.
- The calculations recognise this impact by adding an additional 32,812 m2 of strengthening work in each year of the model. However, this represents a bringing forward of the work (not new work), so the methodology also needs to subtract this work from out-years.
- The timing of this is unknown, so the methodology uses the forecast annual strengthening timetable to provide a pro-rata estimate of when the works might have originally been expected to occur.
- This pro-rata estimate of the shift in timing of strengthening is calculated for each of the 52 years of the modelling period.

### **Calculate the cost impact of the shift in timing of strengthening**

- The 2012 CBA model used a cost of strengthening of \$300/m2. This was applied to the annual building areas before and after the estimated annual impacts of the proposed Substantial Alterations regulation.
- The NPV of the difference between the two states is the cost impact of the shift in timing of strengthening – which represents the impact of the proposed regulation.
- The cost impact was estimated in 2012 dollars and in current dollars.

authorities. At the New Zealand level, the equation is: 587 buildings with consents in excess of 25% of value / total building stock of 193,672 \* earthquake-prone building stock of 16,901 = 51 buildings.

<sup>3</sup> Based on a maximum strengthening timeframe of 35 years, plus 16 years for assessment, and 1 year implementation.



## Calculation of benefits

- Benefits relate to lives saved and property damage reduced as a result of carrying out the strengthening work, but they form a very small part of the cost benefit analysis – approximately 3.5% of the cost of strengthening.
- In measuring the impact of the proposed Exemptions regulation, the benefits from the 2012 CBA model have been reduced by 3%, consistent with the adjustment to costs.
- The impact on benefits of the proposed Substantial Alterations regulation needs to take account of the shift in timing of strengthening only. Because the benefits are immaterial to the overall impact of the proposed regulation, an estimate was made using modelling carried out in 2015 for the impact of priority buildings. The ratio of the change in benefits for the priority buildings impact (which was also a timing impact only) was applied to the current calculation.



# SUMMARY OF RESULTS

## Point estimate results

Table 1 sets out the results of the analysis, based on the point estimates for the key assumptions:

**Table 1: Impact of proposed Exemptions and Substantial Alterations regulations**

POINT ESTIMATE RESULTS	2012\$			2016\$			
	2012\$	2012\$	2012\$	2016\$	2016\$	2016\$	
	30 June 2012			31 Dec 2016			
	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million	
Impact of Exemptions	3.0%	(26)	(1)	25	(31)	(1)	30
Impact of Substantial Alterations	17.0%	93	1	(92)	109	1	(108)
<b>Marginal impact of regulations</b>		<b>67</b>	<b>0</b>	<b>(67)</b>	<b>79</b>	<b>0</b>	<b>(79)</b>

The 2016 dollars have been inflated using an index of 1.1731, which is a compound average growth rate of 3.6% p.a. As noted earlier, this is based on the Statistics New Zealand Capital Goods Index for non-residential buildings.

The NPV has been calculated using Treasury's default rate as at April 2017, which is 6%.

## Sensitivity and range

Table 2 sets out a high and low scenario, varying the key assumptions for the percent of exemptions and the percent of alterations expected to be over 25% of value. It also shows a range of other scenarios, including using a 4% discount rate, which is Treasury's current rate for general office and accommodation buildings.

**Table 2: Sensitivity analysis**

SENSITIVITY - AND RANGE	2012\$			2016\$		
	2012\$	2012\$	2012\$	2016\$	2016\$	2016\$
	30 June 2012			31 Dec 2016		
	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million	Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million
<b>Marginal impact of regulations</b>						
<b>Base case: 3% exemptions; 17.0% alterations</b>	<b>67</b>	<b>0</b>	<b>(67)</b>	<b>79</b>	<b>0</b>	<b>(79)</b>
High cost case: 1% exemptions; 19.8% alterations	102	1	(101)	120	1	(119)
Low cost case: 6% exemptions; 14.0% alterations	24	(1)	(24)	28	(1)	(29)
<b>Other sensitivities</b>						
3% exemptions; 14.0% alterations	51	(0)	(51)	60	(0)	(60)
3% exemptions; 19.8% alterations	83	0	(82)	97	0	(97)
1% exemptions; 17.0% alterations	86	1	(86)	101	1	(100)
6% exemptions; 17.0% alterations	39	(1)	(40)	46	(1)	(47)
Base case - 4% discount rate	56	0	(56)	66	0	(66)



## High and low scenarios

Table 3 sets out the individual components of the high and low scenarios.

**Table 3: High and low scenarios**

HIGH SCENARIO		2016\$	2016\$	2016\$
		<i>31 Dec 2016</i>		
		Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million
Impact of Exemptions	1.0%	(11)	(0)	10
Impact of Substantial Alterations	19.8%	130	1	(129)
<b>Marginal impact of regulations</b>		<b>120</b>	<b>1</b>	<b>(119)</b>

LOW SCENARIO		2016\$	2016\$	2016\$
		<i>31 Dec 2016</i>		
		Costs NPV \$ million	Benefits NPV \$ million	Net NPV \$ million
Impact of Exemptions	6.0%	(60)	(2)	58
Impact of Substantial Alterations	14.0%	87	1	(87)
<b>Marginal impact of regulations</b>		<b>28</b>	<b>(1)</b>	<b>(29)</b>

A financial model showing the detailed calculations has also been provided to MBIE.

