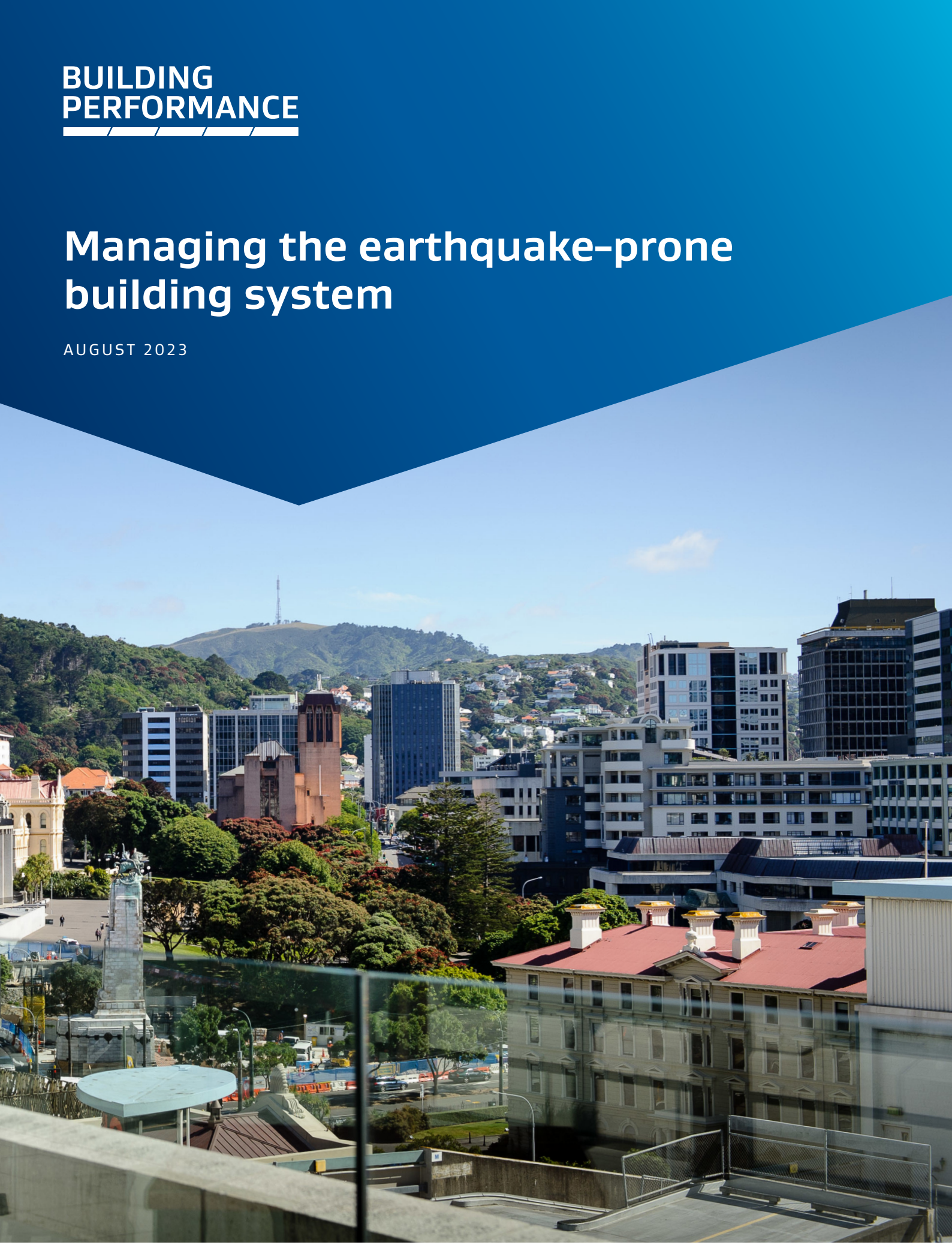
BUILDING PERFORMANCE

Managing the earthquake-prone building system

AUGUST 2023



MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

MINISTRY OF BUSINESS,
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Introduction

This document sets out a framework for how we will consider potential changes to the earthquake-prone building system in future as new knowledge comes to light. The framework establishes criteria that will allow us to carefully consider the value of changing earthquake-prone building system settings against the need to provide certainty and consistency for building owners.

The earthquake-prone building system addresses seismic risk for the most vulnerable buildings, or parts of buildings, across Aotearoa New Zealand. It imposes obligations on territorial authorities to identify, and building owners to then remediate, these buildings to help protect people from the life safety risk posed in a moderate earthquake.

The earthquake-prone building system prioritises action in areas of high seismic risk in the shorter term, while earthquake-prone buildings in lower seismic risk areas will have more time to be identified and remediated. This remediation work will ultimately take place over several decades. The current system has a range of settings that draw on the science and engineering knowledge of the time it was established[1]. As knowledge of seismic risk and building performance advances, the science and engineering knowledge supporting these settings will become increasingly out-of-date.

To date, we have not had a means of considering how we should incorporate new knowledge into the earthquake-prone building system in a transparent, robust, and predictable way.

As our knowledge advances, there will be a desire from engineers and others to incorporate the latest science into the way we both build new buildings and regulate our existing building stock. The earthquake-prone building system sets a minimum standard to protect life safety, but many building owners want resilient buildings that go beyond this standard.

While we want to support this progressive improvement of our building stock by ensuring the latest science is able to be used, we also want to assure owners of existing earthquake-prone buildings that the bar will not be raised without warning and that any changes will be carefully considered and justified.

This framework seeks to balance the need to keep the earthquake-prone building system up to date with the need to provide certainty for building owners.

[1] These settings include earthquake loadings, earthquake ratings (%NBS), the EPB Methodology and Seismic Assessment Guidelines. Annex One describes these settings in more detail.

Managing seismic risk in our buildings

Seismic activity particularly impacts Aotearoa New Zealand due to its location on the boundary of two major tectonic plates. This means all buildings, regardless of their age, are subject to some level of seismic risk.

DETERMINING SEISMIC RISK

Seismic risk is the potential for damage in an earthquake. Seismic risk is based on:

- the *likelihood* of an earthquake occurring, based on the National Seismic Hazard Model. This model is the key tool we use to calculate the likelihood and strength of earthquakes
- a building's *vulnerability* to damage, determined through the Seismic Assessment Guidelines
- the potential *consequences* to people if a part of a building was to fail, with the consequences being more significant for high-occupancy buildings.

This is demonstrated further in Figure 1 below.

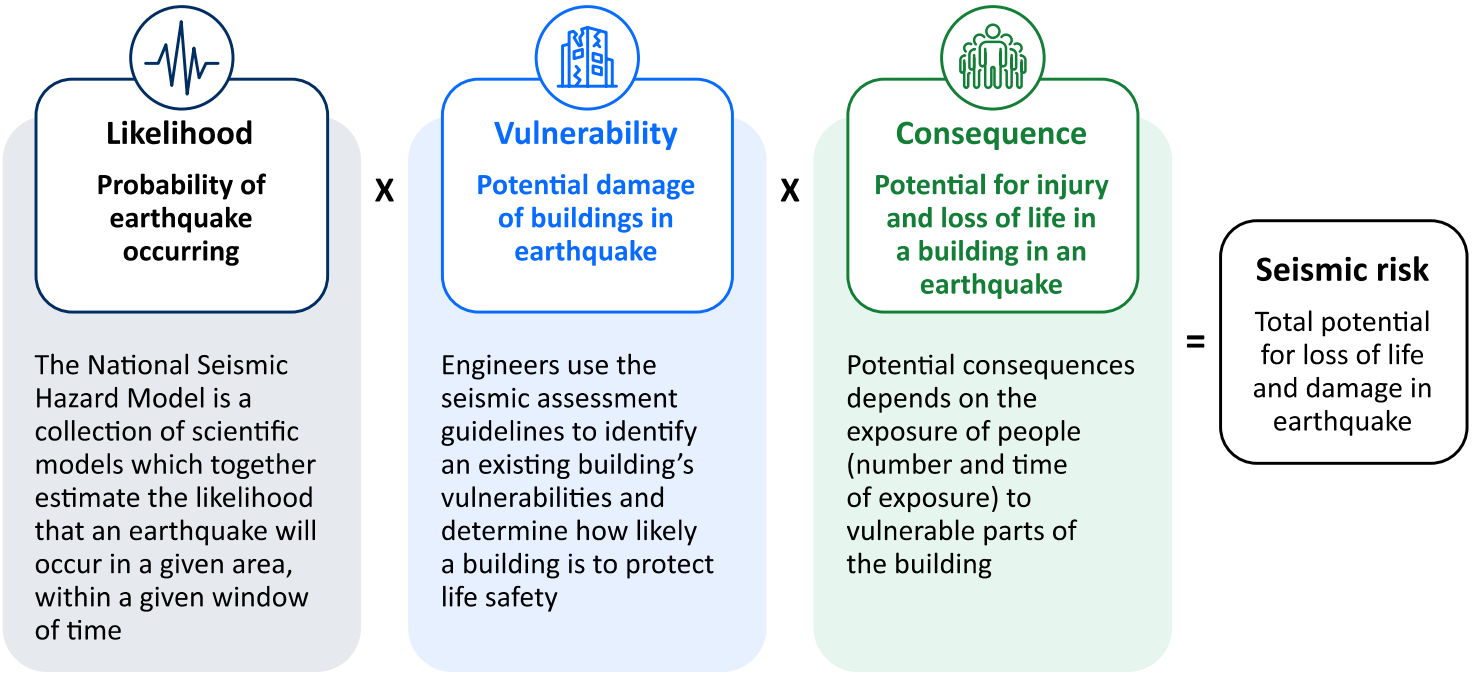

Figure 1: Determining seismic risk.

REGULATING SEISMIC RISK THROUGH THE BUILDING ACT

The *Building Act 2004* (the Building Act) is the primary legislation that governs the building regulatory system. The purpose of the Building Act is to ensure that Aotearoa New Zealand's buildings are safe, healthy, and durable.

The New Zealand Building Code sets minimum performance standards for all new building work. It ensures a high level of earthquake resilience in new buildings as they must be able to withstand the earthquake loadings likely to be experienced during their lifespan. However, most of New Zealand's building stock has been built to a range of earlier standards. Some building types from specific time

periods, or that used certain construction methods, have proven to be more vulnerable and to present a higher life safety risk – in terms of both fatalities and injuries – in a moderate earthquake.

THE EARTHQUAKE-PRONE BUILDING SYSTEM

The *Building (Earthquake-prone Buildings) Amendment Act 2016* (the Amendment Act) established the current earthquake-prone building system within the Building Act. The Amendment Act responded to the widespread loss of life and building damage that occurred in the 2011 Canterbury earthquakes and the subsequent findings of the Canterbury Earthquakes Royal Commission.[2]

The earthquake-prone building system aims to reduce the life safety risk posed by vulnerable buildings in a moderate earthquake. Territorial authorities must identify buildings (or parts of buildings) that are most vulnerable in a moderate earthquake, which are likely to include:

- unreinforced masonry buildings
- pre-1976 buildings that are either three or more storeys, or 12 metres or greater in height
- pre-1935 buildings that are one or two storeys in high and medium seismic risk areas.

Territorial authorities are required to use a specified methodology for identifying earthquake-prone buildings (the EPB Methodology) to determine whether a building is earthquake-prone. The EPB Methodology sets out how engineers will carry out seismic assessments of Aotearoa New Zealand's existing buildings.

Once a building has been identified as earthquake-prone, the building owner must undertake remediation work or demolition within a set timeframe that depends on the region's seismic risk profile. Areas with a high risk of a moderate earthquake (such as Wellington and Hawke's Bay) must identify and remediate buildings earlier than low risk zones (such as Auckland and Dunedin).

BUILDING REGULATORY FRAMEWORK

The government has a number of levers to regulate and influence how the seismic risk of new and existing buildings is managed. These tools range from legislation that prescribes a certain course of action to information and guidance that building owners, engineers and others may voluntarily use.

[2] Annex Two provides a history of key events from the 1931 Napier earthquake onwards, and the subsequent changes to how seismic risk is managed.

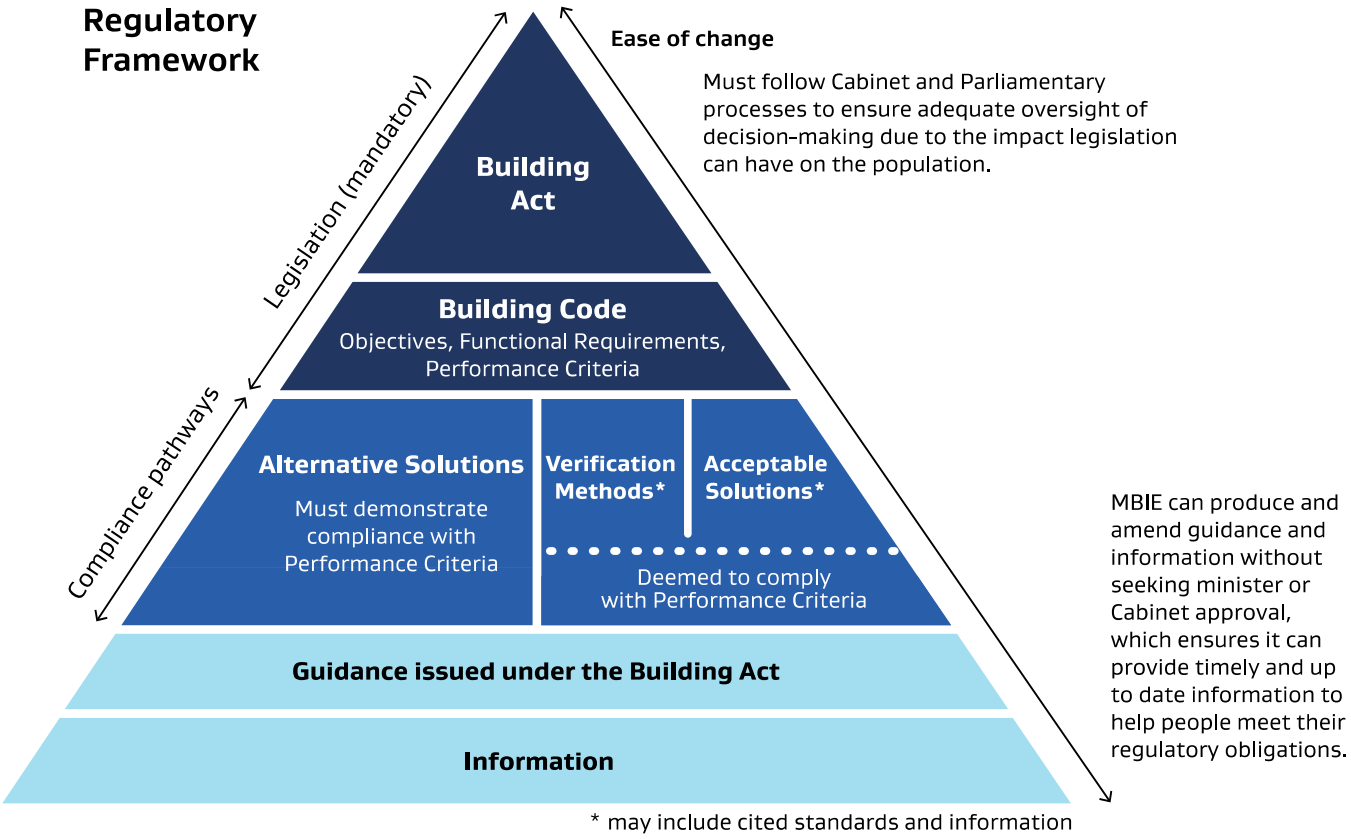

Figure 2: Building Regulatory Framework showing the legislative and regulatory tools used for the earthquake-prone building system.

Figure 2 above shows the hierarchy of levers within the building regulatory system. Further detail about these tools is available in Annex Three. The Building Act and any regulations made under it set a range of mandatory requirements, duties, or obligations on a number of parties. Due to the impact that change can have on these parties, proposed changes to legislation must first go through a robust Cabinet and/or parliamentary process.

At the lower levels of the hierarchy, information and guidance can be changed easily, often without the need for ministerial or parliamentary approval; however, such tools cannot impose requirements on anyone.

MANAGING SEISMIC RISK OUTSIDE OF BUILDING ACT OBLIGATIONS

New Zealand's recent seismic history has significantly raised the public's awareness of risk and shifted its expectations for safety. Several motivating factors outside of the building regulatory system are driving seismic risk reduction in Aotearoa New Zealand's existing building stock over time:

- **Market forces**: many building owners commission seismic assessments voluntarily as the market – through prospective tenants, banks or insurers – seeks to understand a building's relative safety.
- **Asset management**: proactively undertaking seismic assessments and subsequent remediation is good asset management practice, as improving the seismic performance of buildings can contribute to retaining the value and resilience of a property over time.
- **Health and safety obligations**: the *Health and Safety at Work Act 2015* requires all persons conducting a business or undertaking (PCBUs) to be aware of, and eliminate or reduce, health and safety risks in buildings they own or lease. When new risks are identified

regarding a building that operates as a workplace, the PCBU must decide how they will respond.

Many building owners and technical advisors use guidance or requirements intended for the earthquake-prone building system to determine the level of seismic risk in buildings that have not been deemed earthquake-prone and are also not targeted by the earthquake-prone building system.

Subpart 6A of the Building Act does not require non-earthquake-prone buildings to be remediated. However, building owners may choose to take actions to reduce the seismic risk of these buildings, particularly following an alternative seismic assessment (ie one that does not follow the EPB Methodology) that provides the building with a low earthquake rating. While these voluntary assessments and any subsequent actions are not the focus of this framework, MBIE will consider the impact of any future changes to earthquake-prone building system settings where these may be adopted or used elsewhere.

Framework for incorporating new information into the earthquake-prone building system

The earthquake-prone building system's expected lifespan is 50 years or longer. The system needs the ability to evolve with new information, such as the knowledge gained from a major seismic event.

HOW THE EARTHQUAKE-PRONE BUILDING SYSTEM WILL RESPOND TO NEW KNOWLEDGE

This framework sets out how MBIE will make decisions or develop advice to the government about updating the earthquake-prone building system settings (as set out in Annex Three)[3]. It establishes objectives for managing the earthquake-prone building system and criteria that will guide future assessment of options for change in a consistent and transparent way.

Frequent changes to regulatory systems can be unsettling for those affected, especially if changes have the potential to increase costs. Confusion or uncertainty about current or possible future obligations under the earthquake-prone building system may affect efforts by building owners to comply with legislative or regulatory requirements.

Having a framework in place will ensure that MBIE is transparent and accountable for its management of the earthquake-prone building system. It will ensure changes are considered in a coordinated and consistent manner, rather than applying an ad-hoc and reactive approach. This supports greater consistency and certainty for the system and for building owners.

OBJECTIVES FOR ENSURING THE EARTHQUAKE-PRONE BUILDING SYSTEM REMAINS EFFECTIVE

The primary purpose of the earthquake-prone building system is to protect people's life safety in the event of a moderate earthquake. However, the costs to strengthen or demolish earthquake-prone buildings can be substantial. This impact on building owners must be recognised and managed effectively to ensure that administrative and compliance costs are not unduly high.

This framework adopts the following objectives for managing the earthquake-prone building system:

- Mitigating the risk to life safety by **effectively targeting** the buildings that present the highest level of risk.
- Ensuring the impact on building owners (such as the cost of compliance) and communities (such as the impact on heritage values) is **proportionate** to the risk being managed.
- Ensuring there is **consistency** in how the earthquake-prone building system is managed.
- Providing **certainty** for all stakeholders in the system, including those outside of the earthquake-prone building system.

Any proposed changes to the system should promote these objectives.

[3] Certain settings, such as amendments to legislation, can only be changed by Parliament or Cabinet. In those situations, MBIE provides advice to those decision-makers rather than making a decision ourselves.

CRITERIA FOR ASSESSING OPTIONS FOR CHANGE

As new information about seismic risk and building performance comes to light, MBIE will identify the tools that are most appropriate to amend when incorporating new knowledge into the earthquake-prone building system.

To support the above objectives and ensure that proposed changes to the system are considered in a transparent, predictable and consistent way, MBIE will assess options for change against the criteria set out in Table 1 below. Using the criteria will enable robust assessment of the options and trade-offs to identify the preferred approach.

Table 1: Criteria for assessing proposed changes to earthquake-prone building system settings.

Criteria	What this means:
Effectiveness	• Regulatory settings allow engineers to identify a building's vulnerabilities and its likely performance in a moderate earthquake. • There is no confusion about when a building is considered vulnerable in a moderate earthquake.
Proportionality	• The impact of any change is proportionate to the level of seismic risk reduction that would result.
Consistency	• There is a consistent approach to seismic assessments across all buildings. • Changes made are consistent with the primary purpose of the earthquake-prone building system.
Certainty	• Building owners can plan for mandated remediation under the earthquake-prone building system with confidence. • There is equity for owners complying under previous settings and they have certainty about how any new knowledge will affect buildings.
Ease of implementation	• The change is clear and understandable, and building owners, regulators and the sector are able to implement the change easily. • Implementation costs are minimised.

The criteria are weighted equally. How well an option performs against each criterion is rated using a five-point scale, as set out in Table 2 below.

Table 2: Scale for measuring the impact of proposed changes against the framework's criteria.

+2	✓✓	Very aligned
+1	✓	Aligned
0	-	Neutral
-1	×	Not aligned
-2	××	Inconsistent

As an example, a change to the definition of 'moderate earthquake' would likely impose high costs on owners of earthquake-prone buildings and introduce uncertainty for those who have remediated their buildings or have remediation work underway. This would score poorly under the consistency, certainty, and ease of implementation criteria.

A change to the definition would more likely be recommended if it could be shown it would be effective and the impact of the change would be proportionate to the outcome, and that these benefits outweighed the costs to those affected and any risks to the overarching aim of the system.

HOW FREQUENTLY WE WOULD REVIEW THE SETTINGS

New seismic and engineering knowledge comes from several sources, such as the National Seismic Hazard Model or academic research. New information often emerges sporadically, rather than in a predictable cycle. This makes it difficult to plan when we might need to review settings within the earthquake-prone building system.

Frequent, ad-hoc or unpredictable reviews will lead to uncertainty, particularly given the long lead-in times for remediating buildings. We intend to comprehensively review the earthquake-prone building system every 10 years, unless directed to do so earlier by the Minister for Building and Construction. We anticipate that an out-of-cycle review would be triggered if, for example, new information indicates a significant change in risk.

Some components of the system can be reviewed more frequently, such as the Seismic Assessment Guidelines and other guidance and information. These settings can be more responsive to new information. MBIE will also consider any updates to the National Seismic Hazard Model and advice from the Joint Committee for Seismic Assessment of Existing Buildings[4] when deciding whether and how to review settings.

Reviews of any aspects of the system will take account of new information and knowledge and apply the framework's criteria to support decisions about whether settings should be updated or not.

[4] The Joint Committee for Seismic Assessment of Existing Buildings (JCSAEB) is responsible for producing the Seismic Assessment Guidelines. The Joint Committee has representatives from MBIE, the Earthquake Commission, New Zealand Society for Earthquake Engineering, New Zealand Geotechnical Society and Structural Engineering Society New Zealand.

Annexes

Annex One: Key terms.

Annex Two: History of earthquakes and subsequent regulatory reform in Aotearoa New Zealand.

Annex Three: Instruments available to regulate and support the earthquake-prone building system.

Annex One: Key terms

Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005

The Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005 set out the criteria for determining whether a building is earthquake-prone. Both 'moderate earthquake' and 'ultimate capacity' are defined under regulation 7:

- **Moderate earthquake** – means, in relation to a building, an earthquake that would generate shaking at the site of the building that is of the same duration as, but that is one-third as strong as, the earthquake shaking (determined by normal measures of acceleration, velocity, and displacement) that would be used to design a new building at that site if it were designed on 1 July 2017.
- **Ultimate capacity** – means the probable capacity to withstand earthquake actions and maintain gravity load support assessed by reference to the building as a whole and its individual elements or parts.

Earthquake-prone building system

The earthquake-prone building system is a national system introduced by the *Building (Earthquake-prone Buildings) Amendment Act 2016* that regulates how seismic risk is identified and remediated in the most vulnerable existing buildings.

To mitigate the risk to life safety in a moderate earthquake, the earthquake-prone building system mandates that:

- territorial authorities identify potentially earthquake-prone buildings
- owners who are notified that their building is potentially earthquake-prone obtain engineering assessments of the building carried out by suitably qualified engineers
- territorial authorities determine whether buildings are earthquake-prone, assign ratings, issue notices, and publish information about the buildings in a public register
- owners display notices on their building regarding its status as earthquake-prone and remediate the building within specified timeframes.

Earthquake-prone building

An earthquake-prone building is a building, or part of a building, that will have its ultimate capacity exceeded in a moderate earthquake and, if the building or part were to collapse, the collapse would be likely to cause injury or death to persons in or near the building or on any other property, or damage to any other property (refer to section 133AB of the Building Act).

The EPB Methodology

The EPB Methodology sets out the process that territorial authorities must follow when identifying, assessing, and making decisions on potentially earthquake-prone buildings.

The EPB Methodology must be set by MBIE's Chief Executive under section 133AV of the Building Act.

The EPB Methodology sets out the:

- types of buildings that present the highest life safety risk, which territorial authorities must take onto account when identifying potentially earthquake-prone buildings

- situations in which a territorial authority can identify a building as earthquake-prone outside of the initial time period set out in the Building Act
- approaches engineers must undertake when assessing potentially earthquake-prone buildings
- way territorial authorities make decisions about whether assessed buildings are earthquake prone.

Earthquake loading

The level of force, or capacity of shaking, that a building would be expected to withstand. Earthquake loadings consider variables such as seismic hazard, building height, soil types, building materials and if the building would be required to facilitate an emergency response.

Under clause B1 (Structure) of the Building Code, new buildings must be built to withstand likely loads, including wind, earthquake, and live (people) and dead (building contents) loads.

Earthquake rating – also known as New Building Standard (%NBS)

The degree to which a building or part of a building meets the requirements of the Building Code for a hypothetical new building, built on the same site, as at 1 July 2017.

Earthquake ratings are more commonly known as New Building Standard ratings (%NBS).

National Seismic Hazard Model

MBIE's understanding of seismic hazard is derived through the National Seismic Hazard Model. The National Seismic Hazard Model provides an estimate of the likelihood and capacity of earthquake ground shaking that might occur at any given site in New Zealand.

The model provides information about how different parts of the country might behave in the event of large magnitude earthquakes. This allows MBIE to set the earthquake loadings that new buildings must be designed to withstand.

Seismic Assessment Guidelines

The Seismic Assessment of Existing Buildings (the Seismic Assessment Guidelines) is a technical document that sets out how engineers should carry out seismic assessments of existing buildings within New Zealand.

The Seismic Assessment Guidelines support seismic assessments for a range of purposes. They must be used when undertaking a seismic assessment that is required under the earthquake-prone building system. The Seismic Assessment Guidelines are also used for property risk identification more generally, but do not have regulatory status and cannot be enforced outside of the earthquake-prone building system.

Annex Two: History of earthquakes and subsequent regulatory reform in Aotearoa New Zealand

Date	Event	Description
Pre-colonisation and 19th Century	1848/1855 Wellington earthquakes	Māori oral history and several major earthquakes in the early European settlement of New Zealand made it apparent that buildings must be designed with seismic considerations in mind. In 1848, a major earthquake in Wellington resulted in brick and masonry buildings collapsing. A rebuild using mainly wood products meant that the town suffered less damage during a larger magnitude 8.2 earthquake in 1855.
1931	Napier earthquake	Napier and Hastings were badly damaged, land uplifted, and 256 people killed. The first seismic performance building standards were subsequently introduced by the 1935 Model Building Bylaws.
1968	Introduction of powers to manage earthquake-prone buildings	Local councils were empowered to intervene if they deemed a building likely to be dangerous in an earthquake through the *Municipal Corporations Amendment Act 1968*. Councils could notify and require building owners to demolish or remediate the building (to the council's satisfaction) within a specific timeframe.
1991	Introduction of the national Building Code	Since 1991, the New Zealand Building Code has established and maintained standards required to ensure buildings can withstand likely forces from earthquakes. The current structural standards in the Building Code are informed by the 2002 National Seismic Hazard Model.
2004	*Building Act 2004*	The *Building Act 1991* was replaced with the *Building Act 2004*, which included earthquake-prone building clauses to: • increase the seismic standard for defining an earthquake-prone building from 13 per cent to 34 per cent of the New Building Standard (NBS) • require that territorial authorities develop and consult on a policy for the management of earthquake-prone buildings and undertake community consultation.
2011	Canterbury earthquakes	The 2011 Canterbury earthquakes caused widespread destruction of buildings and services, with hundreds of people injured and 185 people killed. Of these, 177 deaths were due to building failure, demonstrating the consequence that large earthquakes can have on life safety. Following the earthquakes, the Canterbury Earthquakes Royal Commission of Inquiry (the Royal Commission) was established and asked to report on the causes of building failure due to the earthquakes, as well as the legal and best practice requirements for buildings in New Zealand.

Date	Event	Description
2012	Royal Commission	The Royal Commission's report identified key issues with the way seismic risk in existing buildings was being managed, including: • poor understanding of the risks posed by earthquake-prone buildings • too much variability in approaches across territorial authorities to implementing policy requirements • decision-making being difficult for territorial authorities, building owners and building users as information on building earthquake capacity was not widely available or easy to use • poor quality information on New Zealand's building stock, the number and location of earthquake-prone buildings and the earthquake capacity of individual buildings • lack of central guidance and limited central monitoring and oversight of the sector.
2016	Kaikōura earthquake	The Kaikōura earthquake caused widespread damage to State Highway 1 along the north-east coast of the South Island and damage to mid- and high-rise buildings in Wellington, particularly those with precast concrete floors. Floor units collapsed in Statistics House, with no fatalities because the earthquake occurred in the middle of the night. MBIE commissioned an expert panel to investigate the factors that led to this partial floor collapse. In 2017, based on a recommendation from the Statistics House investigation[5], MBIE commissioned an update to Chapter C5 of the Seismic Assessment Guidelines to include critical content on how to assess buildings with precast concrete floors. This led to the development of the 'Yellow Chapter', which is widely used by engineers for the assessment of concrete buildings that are not considered earthquake prone.
2016 - present	Current regulatory settings	Wide-ranging legislative reforms were made following the Canterbury Earthquakes due to the risk to life safety posed by buildings in seismic events. The *Building (Earthquake-prone Buildings) Amendment Act 2016* established the current earthquake-prone building system, which seeks to reduce the life safety risk posed by the most vulnerable buildings in a moderate earthquake.

[5] The Statistics House investigation can be accessed on our website here: https://www.mbie.govt.nz/building-and-energy/building/investigations-and-reviews-for-safer-buildings/building-failure-investigations/statistics-house-investigation/

Annex Three: Instruments available to regulate and support the earthquake-prone building system

Seismic performance requirements for new buildings and existing buildings targeted by the earthquake-prone building system are contained in a hierarchy of instruments as outlined in Table 3 below.

Table 3: Instruments available to regulate and support the earthquake-prone building system.

Tool / lever			Key details	Ease of change
Primary legislation Set by Parliament	**New buildings**	The Building Act aims to ensure people can use buildings safely. It establishes the legal requirement that all building work must comply with the **Building Code**, whether a building consent is required in respect of that building work.		Changes must be made through Parliament. Requires multiple Cabinet decisions and needs to be of a sufficiently high priority to warrant Parliamentary time. Usually includes multiple opportunities for consultation.
	Existing buildings	The Building Act also establishes the earthquake-prone building system, which aims to mitigate the life safety risk in the event of a moderate earthquake. The Building Act: • defines earthquake-prone building. • sets high, medium, and low seismic risk areas by determining Z factors. • empowers MBIE to set an EPB Methodology • establishes the EPB Register and territorial authorities' responsibilities. • defines earthquake ratings. • sets timeframes for identification and remediation across different seismic risk areas.	The Building Act seeks to provide certainty to building owners by setting the minimum life safety standard in primary legislation. This ensures that, even as the relevant Building Code standards are progressively improved, the definition of 'earthquake-prone building' remains static and benchmarked to the EPB Methodology 2017, when the system came into force. MBIE completed the *Early insights – Initial Evaluation of the earthquake-prone building system*[6] report in 2021 that confirmed that, overall, the earthquake-prone building system is working well. The policy design is rated good overall and is working predominantly as intended. MBIE is establishing an ongoing evaluation and monitoring strategy to ensure the earthquake-prone building system continues to meet its objectives over the course of its 50+ year lifespan. This strategy would feed into the ongoing assessment of the seismic settings, alongside the framework set out in this document.	

[6] https://www.mbie.govt.nz/assets/early-insights-initial-evaluation-of-the-earthquake-prone-building-system-report.pdf

Tool / lever			Key details	Ease of change
Secondary legislation / Regulations Set by the Governor-General at Executive Council	New buildings	**Schedule 1 of the Building Regulations 1992 – the Building Code** Prescribes functional requirements for buildings and the performance criteria with which buildings must comply in their intended use.	Several Building Code clauses are relevant to managing seismic risk. Key among these is clause B1 – Structure. The objectives of this clause include safeguarding people from injury and protecting other property from physical damage caused by structural failure. The Building Code is updated frequently[7] and this can include updates to the Building Code, Acceptable Solutions, Verification Methods and published guidance information.	Changes made by the Government of the day. Requires multiple Cabinet decisions and consultation, and changes must be within the scope of the regulation-making powers in the Building Act.
	Existing buildings	**Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005** Defines 'moderate earthquake' and 'ultimate capacity.' Both are set to the Building Code as at July 2017.	Regulations are generally more flexible than primary legislation. However, this regulation requires careful management in order to preserve the integrity of the Building Act's objective to provide a nationally consistent framework to regulate life safety risk. For example, if the definitions of 'moderate earthquake' or 'ultimate capacity' are amended in the regulations, section 133AY of the Building Act requires territorial authorities to determine if they need to reassess any decisions they had made with respect to the earthquake-prone building system and enables them to remake those decisions. The regulations are also used in the determination of what is 'as nearly as is reasonably practicable' for the alterations of existing buildings (see section 112 of the Building Act).	
Secondary Legislation Delegated to MBIE	Existing buildings	**EPB Methodology** The document that territorial authorities and engineers must follow to identify, assess, and make decisions on potentially earthquake-prone buildings. The EPB Methodology is a disallowable instrument, meaning that the House of Representatives may disallow it by resolution (refer to Part 5, Subpart 2 of the *Legislation Act 2019*).	The EPB Methodology is a particularly important lever as it sets out what types of buildings must be identified (through risk profile categories), how potentially earthquake-prone buildings must be assessed by engineers, and the provisions for acknowledgement of assessments and remediation of buildings under previous settings. The Chief Executive of MBIE can amend or replace the EPB Methodology at any time. While consultation with stakeholders about such changes is best practice, the Chief Executive is not legislatively bound to do so. MBIE has not changed the EPB Methodology since it was first published in 2017. There is currently no established process for what might trigger an update.	Designed to evolve. Some changes can be made autonomously by MBIE, but there may be Cabinet or Minister involvement. depending on the scale of change.

[7] https://www.building.govt.nz/building-code-compliance/annual-building-code-updates/

Tool / lever			Key details	Ease of change
Supporting documents	New buildings and retrofits	**Acceptable Solutions and Verification Methods for New Zealand Building Code**	There are many Acceptable Solutions and Verification Methods covering different aspects of the Building Code, many of which reference various Standards. The most relevant to managing seismic risk is Verification Method B1/VM1, which demonstrates how Clause B1 (Structure) of the Building Code can be met, including ensuring that buildings will withstand likely loads, including wind, earthquake, 'live' (people) and 'dead' loads (building contents).	Designed to evolve. Some changes can be made autonomously by MBIE, but there may be Cabinet or Minister involvement. depending on the scale of change.
Referenced technical documents	Existing buildings	**NZS1170.5 Structural design actions - Part 5: Earthquake actions - New Zealand** Structural engineers use this standard to assess and calculate the forces and deformations from earthquakes acting on structures such as buildings and other structures. It helps engineers design structures that comply with the Building Code's earthquake resistance requirements.	This Standard is under review following the release of the 2022 National Seismic Hazard Model. It is currently referenced in Verification Method B1/VM1. NZS1170.5:2004 is referenced in the Building Code as of 1 July 2017 (when the earthquake-prone building system was introduced). This means that seismic assessments undertaken to identify earthquake-prone buildings also reference NZS1170.5:2004.	
	Existing buildings	**Seismic Assessment Guidelines, July 2017 (Red Book)** The Seismic Assessment Guidelines provide a technical basis for engineers to conduct seismic assessments of existing buildings within New Zealand. The Guidelines support seismic assessments for a range of purposes, including assessing potentially earthquake-prone buildings when required by the Building Act and for property risk identification more generally.	The Guidelines are funded by MBIE and Toka Tū Ake EQC because they are used for the earthquake-prone building system. They are developed by engineers through the Joint Committee for Seismic Assessment of Existing Buildings (JCSAEB). The Guidelines provide a standardised way for engineers to assess buildings to determine if they are under or over the minimum performance standard (34%NBS). The Red Book must be used for seismic assessments under the earthquake-prone building system. Parts of the current guidelines are considered as out of date. The chapter relating to how engineers should assess concrete buildings is no longer being used for voluntary (non-earthquake-prone building) seismic assessments as there is an updated version of this chapter (referred to as the 'Yellow Chapter') that incorporates new information based on how some concrete buildings performed in the 2016 Kaikōura Earthquake.	

Tool / lever			Key details	Ease of change
MBIE guidance	**All buildings**	**Information to assist compliance with the Building Act** Under Section 175 of the Building Act, the Chief Executive of the MBIE may publish information to assist people in complying with the Act.	Information produced under section 175 is only a guide. It is not enforceable, and "does not relieve any person of the obligation to consider any matter to which that information relates according to the circumstances of the particular case" (section 175(2) (a-b), Building Act). Examples include: • guidance available on the www.building.govt.nz website, such as *Securing parapets and facades on unreinforced masonry buildings*[8] • Seismic Risk Guidance for Buildings[9].	Can be readily updated. Guidance is frequently produced and amended by MBIE to ensure it is up to date. Ministers may be informed of the guidance but are unlikely to be asked to approve material.
Technical guidance developed by the sector	**All buildings**	**Guidance published by engineering technical societies.** For example, the BRANZ Good Practice Guides and Earthquake Design for Uncertainty Guidance[10].	No regulatory status.	May be updated at any time by the relevant technical society.
Underpinning science	**All buildings**	**National Seismic Hazard Model** The National Seismic Hazard Model calculates the likelihood and strength of earthquake shaking that may occur in various parts of Aotearoa New Zealand over specified time periods. The Model is very robust, and the science is trusted by many different decision makers that apply it in their risk assessments[11].	The National Seismic Hazard Model was substantially updated for the first time in 20 years in 2022. However, more frequent updates are anticipated in future (approximately every 10 years). Depending on the changes that result from these updates, they may trigger assessment and review of seismic settings within the building regulatory system.	GNS Science leads this research project and will identify when to next update the model.

[8] https://www.building.govt.nz/building-code-compliance/b-stability/b1-structure/securing-parapets-facades-unreinforced-masonry-buildings/
[9] https://www.building.govt.nz/assets/Uploads/getting-started/seismic-risk-guidance-for-buildings.pdf
[10] https://www.nzsee.org.nz/db/PUBS/Earthquake-Design-for-Uncertainty-Advisory_Rev1_August-2022-NZSEE-SESOC-NZGS.pdf
[11] https://www.GNS.cri.nz/research-projects/national-seismic-hazard-model/

Tool / lever			Key details	Ease of change
Underpinning science	All buildings	**Seismic engineering research** Research develops new technology in construction practices and evolves our understanding of how existing building methodologies may respond under different earthquake loadings. New knowledge emerges from several sources including building investigations following earthquakes and research from academic institutions.	Earthquakes are complex and our understanding is constantly evolving through research in both earth sciences and engineering. Seismic engineering science and research feeds into technical guidance, and the regulatory system. Seismic events also lead to better understanding, more sophisticated science and advancement in technical modelling and computing. In the last 10 years, there has been significant improvements in our understanding of seismic risk in New Zealand.	Research is released on an ongoing basis.

Te Kāwanatanga o Aotearoa
New Zealand Government

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