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Committee Secretariat
Transport and Infrastructure Committee
Parliament Buildings
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Tēnā koe

Submission on the Building (Earthquake-prone Buildings) Amendment Bill

Our Submission

We appreciate the opportunity to reflect on and provide a submission from the New Zealand Society for Earthquake Engineering (NZSEE) on the proposed Building (Earthquake-prone Buildings) Amendment Bill. We have collaborated with Engineering New Zealand and kindred technical societies, New Zealand Geotechnical Society, Structural Engineering Society of New Zealand, Timber Design Society, the Concrete New Zealand Learned Society and HERA to develop points of comment interest and consensus.

We applaud the Government's initiation of a review of Managing the risk to Existing Buildings in Earthquakes in 2024.

We provided a NZSEE Position Statement developed by our Society at the outset of the review led by the Ministry of Business Innovation and Employment (MBIE) and have continued to be engaged in the process.

As the technical society with a broad-based focus and expertise on earthquakes and its effects, we feel a responsibility to present to the Select Committee on the proposed legislation in the context of broader earthquake risks affecting buildings, so that parliament can make informed decisions on the bill currently before the house. Our submission has been prepared on this basis.

Presentation at the Select Committee

We would appreciate an opportunity for us to present at the Select Committee and answer any questions that the committee may have, given the importance of this Bill.

Summary

We applaud the Government's initiation of a review of Managing the risk to Existing Buildings, and in general the Bill presenting proposed changes to the Earthquake Prone Buildings regime.

NZSEE supports the following initiatives:

1) The bill providing an efficient and cost-effective pathway to reduce life-safety risk.
2) Inclusion of Dunedin and Southland as medium hazard zones, based on the latest science.
3) Simpler risk-based identification process for regulatory action.
4) Simplified Targeted Retrofit.

NZSEE raises consideration of the following issues to enhance the proposed regime:

1) The life safety risks from earthquake induced geotechnical hazards – landslides.
2) Managing significant life safety risks in low hazard areas, especially Auckland.
3) Enhancement of the anytime pathway, to allow inclusion of:
    a) Buildings with critical vulnerabilities, without being time bound.
    b) Larger high occupancy buildings critical vulnerabilities, through systematic screening.
    c) Previously incorrectly characterised (as non-earthquake prone) buildings.
4) Prioritise retrofit of buildings that serve a critical function in disasters, such as hospitals, emergency centres and schools which also serve as emergency shelters in disasters.
5) Limit the change of use easing to EPB s and smaller scale / low occupancy URM's, for particular use categories only.
6) Continue to require notices on buildings which have an identified earthquake risk.

NZSEE also suggests the following considerations in the implementation of the regime:

1) Limit extension of time to retrofit to 5 years, with extensions on a case-by-case basis.
2) Encourage and facilitate earthquake retrofit, such as through lower interest loans.
3) Form an expert panel to advise on the EPB regime and retrofit.
4) Support the development and roll-out of adequate guidance and training.
5) Recognising that buildings posing an earthquake risk remain outside the EPB regime:
    a) Clearly communicate that the EPB system only captures the worst buildings.
    b) Support the development of an alternative to the %NBS system, to classify buildings based on their risk associated with damage and resilience in earthquakes.

New Zealand Society for Earthquake Engineering Inc

Our Society is a broad-based technical society of over 1000 members bringing together all professionals engaged in the effects of earthquakes including structural | geotechnical | building services | central government | local authority | infrastructure engineers, researchers | academics, seismologists, social scientists, insurers among others. We have an interest across the full spectrum of the built environment and people, including buildings and infrastructure, and society. Our interest transcends life safety to consider the earthquake resilience of buildings, infrastructure and society.

Our Society was formed in 1973, and our current objectives include:

- Fostering the advancement of the science and practice of earthquake engineering and allied fields.
- Facilitating research and support initiatives to address seismic risk and enhance the resilience of the built environment and communities to earthquakes.
- Retaining a close liaison with Engineering New Zealand by being a Collaborating Technical Society of the Institution and
- Furthering the objectives of the International Association for Earthquake Engineering as applicable to New Zealand through international cooperation in earthquake engineering.

Pecuniary gain is not a purpose of our Society.

Our Society has advocated for the proactive management of the risk associated existing buildings from earthquakes from its inception. We actively have looked at the effects of earthquakes both in New Zealand and overseas through our Learning from Earthquakes programme, shared the learnings to the New Zealand government and the professionals engaged in the built environment. And developed or promoted initiatives from these learnings to work towards enhancing the earthquake resilience of New Zealand.

Over a number of decades, we have developed earthquake assessment guidelines and been engaged with the training of professionals and dissemination of information related to earthquakes and its effects, including on the assessment and strengthening of buildings. Recently we have been involved in the development of guidance in collaboration with government (MBIE) and other technical societies, through the Joint Committee for Seismic Assessment and Retrofit.

Overview

Overall, we support the Government's approach to refine the Earthquake Prone Buildings (EPB) regime, with a focus on highest seismic risk, and simplify the process to enable the buildings to be cost effectively retrofitted in a timely manner, to reduce the life safety risk to New Zealand society.

We recognise the deficiencies in the current system and the uncertainties and complexity associated with %NBS as the basis for the earthquake prone building classification.

We recognise the role of the Government to decide on the level of risk settings on behalf of society and decide on the level of risk beyond which regulatory requirements are imposed on building owners.

We present our rationale for supporting the initiatives, to inform the process. Our submission also includes areas where we consider that significant earthquake risks may be missed, and our recommendations for these to be considered.

Areas of Support

Initiatives in the bill provide for an efficient and cost-effective pathway for strengthening to reduce life-safety risk

NZSEE supports the transition to a more focused simpler scope and framework with a faster identification process, and a focus on the highest risk buildings. We consider that a simpler, practical framework and regulatory system that can be easily implemented and that would lead to a faster risk reduction from earthquakes.

Seismic Hazard

NZSEE supports the inclusion of Dunedin and Southland as medium hazard seismic zones, based on the latest science from geological and seismological studies.

We have some concern about exclusion of Auckland and Northland as low hazard zones, and this is discussed in a later section.

Simpler Risk-based Identification Process for Regulatory Action

NZSEE supports a simpler risk-based regulatory approach to identify buildings with the highest earthquake risk, this would be more beneficial than a complex assessment system with associated uncertainties. Focusing on typologies with a shift away from %NBS is appropriate to simplify the system. Such an approach has been more effective in other countries, such as has been observed recently in Taiwan by our NZSEE reconnaissance team after the 2024 Hualien earthquake. A simpler assessment process would facilitate the allocation of resources to the strengthening to reduce the risk rather than in the assessment using a complex assessment system and would benefit building owners.

The exclusion of 1-2 storey Unreinforced Masonry Buildings (URM) in small towns with a low population, where the risk of footpath pedestrian traffic being exposed to falls from damaged buildings is low, is a prudent step. We appreciate this will reduce the burden on building owners and territorial authorities in these areas.

Simplified Targeted Retrofit

A simplified targeted retrofit to address the greatest life safety risk is an effective way to reduce costs. It needs to be made clear that while this will reduce the risk to life safety, it may not reduce damage to the building or its functionality and any associated financial losses. However, it would be a minimum regulatory setting for compliance. NZSEE under its Learning from Earthquakes

programme sent a team to learn from the 2024 Hualian earthquake, and such targeted retrofit was observed to be one of the learning that significantly reduced the earthquake risk to life in that earthquake. A similar approach would help enable the reduction in life safety risk in a cost-effective manner in New Zealand.

Government funding to support development of targeted retrofit solutions would ensure consistency across New Zealand, create efficiencies in the specification and reduce the financial burden and provide greater certainty for building owners.

Separation of Seismic Strengthening from Fire Safety and Accessibility Requirements is a positive step to avoid seismic strengthening being impeded by the need to upgrade buildings for fire safety and accessibility. These requirements also pose a risk to life safety but need to be triggered by its own risk levels rather than being attached to seismic strengthening. This will help reduce the cost burden for buildings owners for seismic strengthening and enhance compliance.

Areas for Additional Consideration

Earthquake induced Geotechnical Hazards – Landslides

The proposed legislation focuses on assigning EPB classification based on building typology. While this has advantages of simplicity, it isolates the building from its geographical and geological environment. Earthquakes cause not only ground shaking that leads to building damage, but also geotechnical hazards such as fault rupture, landslides and liquefaction, which themselves pose a risk to buildings. While liquefaction poses a risk of building damage, it has a low probability of causing high life safety risk except in exceptional circumstances. Earthquake induced landslides, and to a lesser extent fault rupture, can lead to severe damage and destruction of buildings. This is a significant risk in New Zealand, particularly hilly areas such as Wellington, Queenstown, etc. NZSEE during its Learning from Earthquake programme has observed destruction of buildings and severe loss of life from earthquake induced landslides, such as in the 2008 Wenchuan earthquake in China and 2016 Kumamoto earthquake in Japan.

We appreciate that the building typology based EPB regime does not lend itself to incorporating damage from landslides. In addition, some earthquake induced landslide risk may arise from steep slopes within the property, whereas this could also originate from outside the property, where it may not be practical for the property owner to address. It would be prudent for this to be highlighted in the Bill, and for the Methodology being developed by MBIE to identify critical vulnerabilities also identify critical earthquake induced landslide | geotechnical risks, and whether this can be addressed by the property owner or referred to the local authority.

This is critical the risk that needs to be managed appropriately, if necessary, through other legislation or approaches.

Low Hazard Areas - Auckland and Northland

The proposed legislation removes Auckland and Northland from consideration under the EPB regime, based on these areas being identified as low seismic hazard.

Auckland is identified as having a low hazard based on the National Seismic Hazard Model. These are probabilistic models based on calibration with past earthquake records and geological sources such as active faults. Auckland has a small number of active faults located mainly in South Auckland. This includes the Wairoa Fault located in the Hunua Ranges, about 40 km southeast of the CBD. If any of these faults were to rupture, it could cause significant shaking especially in South Auckland. However, Auckland is also at risk from shaking caused by large earthquakes outside the region, including as far away as the Hikurangi Margin, off the east coast of the North Island, which might cause a lower level of shaking but of longer duration and with a longer frequency content. Recent overseas earthquakes have indicated that ground shaking sufficient to cause damage to high rise buildings can be experienced far from the earthquake source, particularly in areas with deeper soft ground basins where the effect is doubly compounded.

Additionally, Auckland's volcanic setting makes it especially vulnerable to earthquakes as well with seismic sources potentially underneath the city at shallow depths. Albeit small magnitude, these earthquakes can pose a risk to buildings in the city.

Given that the design codes estimate a low seismicity for Auckland, the buildings there are designed for a lower level of ground shaking from earthquakes. Poorly designed buildings with critical vulnerabilities could be vulnerable to damage in moderate levels of earthquake shaking.

Auckland is New Zealand's largest city and contains a much greater number of buildings than any other city, including vulnerable URM buildings and medium to high rise buildings with larger occupancy. This high exposure level means that the consequences of a moderate level of earthquake shaking could be more significant than in other regions of the country. Approximately 34% of the New Zealand population resides in Auckland and 38% of the GDP is generated there.

Earthquake risk is a combination of the earthquake hazard, building vulnerability and the consequences of building damage. Though Auckland has a lower hazard, the vulnerability and consequences could be greater as discussed above. Therefore, using a risk-based approach, there is still a significant risk to life safety in Auckland from earthquakes.

Our understanding of seismic risk has been evolving and will continue to evolve over time. NZSEE has historically been involved in the last 50 years in developing the codes and design provisions that protect buildings from these unknowns (acknowledged in the policy's line in the sand with post-1976 buildings). That's why eliminating entire areas from the identification process, can be riskier than anticipated. More importantly, The Economic Analysis of New Zealand's Earthquake Prone Building System prepared for this Bill acknowledges the step change in losses for rare events in Auckland. As knowledge evolves and uncertainty remains, it is important that the Bill focuses on reducing the risk to those vulnerable areas in a proportionate way.

Removing Auckland for any mandatory requirements to address EPB status also gives the wrong signal about reducing uncertainty to building owners. This may create renewed hesitation in some moderate hazard areas of the country such as Dunedin where building owners may wait for regulations to ease in the future, delaying any implementation of retrofits, thus compromising the spirit of the Bill.

Therefore, NZSEE considers that it would be prudent for the proposed EPB regime to allow for the higher consequence life safety risks to be identified and addressed in Auckland.

Targeted consideration where buildings pose a risk to significant life safety could be considered as a minimum to address the earthquake risk in Auckland. This could include:

a) Targeted strengthening of URM building components that pose significant life safety risk, such as along important pedestrian thoroughfares such as Queen Street. This could involve relatively low cost strengthening of parapets and facades, using standard retrofit techniques that cost effective and affordable for high value building owners (compared to say buildings in smaller provincial centres).

b) Allow for identification of larger buildings that accommodate larger number of people with critical vulnerabilities that could cause full or partial collapse (such as the CTV or PGC buildings that collapsed in the 2011 Canterbury earthquakes, and targeted retrofit to address these critical vulnerabilities.

Anytime Pathway

We appreciate the inclusion of the anytime pathway so that larger buildings with critical vulnerabilities could be brought into the system, including post-1976-2027 buildings.

However, the anytime pathway is not systematic, and will leave potentially unsafe, high fatality risk buildings to remain in place.

The proposed constraints of the "at any time" pathway by limiting the stock of buildings that existed before the implementation of the law may compromise the ability of territorial authorities to effectively manage buildings that are severely deficient and/or have a very high seismic risk. Without this pathway, territorial authorities seem to have no ability to require assessment or remediation outside prescribed triggers, leaving these buildings without a clear mechanism for intervention. In this sense, other means of identification that do and do-not rely on engineering assessments may still be needed in the Bill. Thus, NZSEE is also concerned that known or emerging (newly identified as knowledge evolves) risks remain unaddressed where a building does not meet the specific criteria or timeframes set out in the framework, despite presenting a disproportionate risk to occupants or the public.

NZSEE recommends that the anytime pathway:

- Allows for the identification of buildings, without being time bound. Buildings with critical vulnerabilities could arise from any period, pre- or post-1976 or even post-2027 as deficiencies in design may arise from either design standards of the time, or mistakes that do occur.
- Allows for systematic screening of larger high occupancy buildings, and identification of critical vulnerabilities, particularly in major towns or cities.

Moreover, buildings that suffer disproportionate damage during a minor earthquake or wind event could also be included in the EPB methodology so there is a compulsory way to address physically "tested" high risk buildings and improve existing risk stock in line with the spirit of the Bill.

An alternate approach could be to expand the dangerous building provisions to better address seismic risk. This could be a broadening of the dangerous building pathway to include clearly defined seismic life-safety triggers, where risks are demonstrably high but are not otherwise captured by the proposed earthquake-prone buildings framework. The current seismic assessment avenue can remain with minor adjustments.

Priority Buildings

The Bill proposes that the requirements associated with priority buildings will be limited to large buildings along important transport routes.

Priority buildings serve a critical function in disasters; this includes hospitals, emergency centres and schools which accommodate large numbers of people and often vulnerable people, and lifeline facilities which provide critical services. Often, these buildings also serve as emergency shelters in disasters.

NZSEE therefore recommend that the Bill keeps these priority buildings in the system and be subject to the requirements for strengthening. Many of these (but not all) are Government owned and provides an opportunity to lead by example by carrying out the strengthening in a timely manner. We also recommend that the trigger risk level on the current EPB categorisation may be too low for buildings with post-disaster essential functions. We suggest that the trigger for remedial work for these are more stringent than the currently proposed threshold by removing any storey height requirements at the least.

Change of Use

While we support the removal of mandatory requirements to address the fire safety and accessibility requirements when carrying out of earthquake strengthening of buildings, the change of use requirements needs to be considered differently. The easing of change of use requirements establishing a two-tier change of use profile with potentially adverse outcomes and unforeseen ramifications (i.e. transitions to increased occupancy/exposure categories (i.e. educational or medical facilities) for structures that may have received only very basic and minimal seismic improvements). Additionally, as this provision is not applicable to non-EPB structures and therefore will not currently operate in the low seismic area, the benefits linked to this easing will not be available in that zone (change of use in the low seismic area will continue requiring full ANARP compliance).

Change of use often is associated with longevity of the buildings that mean that the earthquake risk remains for a longer period of time beyond normal renewal.

NZSEE suggests that the change of use easing should exclusively apply to smaller scale / low occupancy URM's, for particular use categories only and be available countrywide.

Prior Incorrect Categorisation as not Earthquake prone

The Bill proposes that buildings already identified as not being earthquake prone can no longer be brought into the EPB regulatory system. While this has the benefit of providing certainty for building owners, we are aware of situations where early in the process letters were issued by territorial authorities based on an inadequate understanding of the regime and assessment at the time. This could lead to buildings with critical vulnerabilities remaining outside the EPB regulatory system.

NZSEE suggest that the Bill considers allowing an anytime pathway to allow these buildings to be brought into the EPB regulatory system. Alternatively, Government may consider allowing these to be brought in under the dangerous buildings provisions of the Building Act.

Notices on Buildings

The Bill proposes that notices on buildings be not required. These notices provide information for building users, who are ratepayers.

NZSEE recommends that notices of buildings which have an identified earthquake risk, even when not on the updated EPB register remain. This could be implemented as part of the existing Building Warrant of Fitness (BWOF) labelling without additional financial burden on implementation. This gives clarity to building users and allows them to take informed decisions on whether to occupy a building based on personal risk thresholds.

Implementation Considerations

Extension of Time for Strengthening

The Bill proposes a 15-year timeline extension for retrofit beyond the current 4-year extension granted. This could lead to building owners not taking the initiative to carry out even the relatively straightforward and modest seismic strengthening proposed under the new regime, and perhaps hoping for further relaxation of the system in another 10 years' time.

NZSEE suggests that the extension be limited to 5 years, and on condition that demonstrable steps have been taken by the building owner to arrange to carry out the retrofit, on a case-by-case basis. This was also recommended by the working group that provided advice to support the development of this Bill.

Encouragement of Retrofit

Even with more targeted strengthening proposed, a proportion of the owners could find that the retrofit is financially not affordable. This may perpetuate the existing lack of progress in strengthening for the most high-risk structures. In other countries where compulsory targeted retrofit schemes are present, government financial assistance through special lending, tax reliefs, and subsidies has greatly encouraged and increased risk mitigation and policy effectiveness.

We recommend that the Government considers providing targeted assistance. This may comprise providing lower interest loans, using the Government's ability to secure loans at a lower interest

rate compared to commercial rates, thereby limiting the impact on ratepayers. It should be noted that, in the context of natural hazards such as earthquakes, inadequate performance of the existing built environment inevitably imposes a significant financial burden on Government, and consequently on taxpayers. This was demonstrated unequivocally in the aftermath of the 2010–2011 Canterbury earthquakes. Moreover, to improve the effectiveness of the Bill in terms of reducing seismic risk, similar financial assistance could be also presented to building owners carrying out voluntary retrofits. These two financial aids should also be considered for Heritage Buildings.

Proposed Methodology

NZSEE has been able to comment only on the high-level issues associated with the proposed Bill. Much of the technical aspects of the implementation is critically dependent on the Methodology developed by MBIE, which has not been developed and made available to us as submitters.

We therefore recommend the Government allows for adequate consultation on the Methodology when developed with stakeholders, including technical societies such as NZSEE, who have been deeply involved in managing the earthquake risk to existing buildings as well as new buildings. We consider that such scrutiny by a broader range of professionals would be highly beneficial and important. We also suggest that Methodology is reviewed and updated regularly to reflect learnings from the implementation of the system, and developments in engineering science and knowledge.

Expert Panel

The implementation of the proposed system will require access to expertise in a range of disciplines to address issues that arise in the identification of critical vulnerabilities and review of buildings that come up as part of the anytime pathway (and hopefully systematic screening).

NZSEE therefore recommends that the Government, through MBIE, appoints an expert panel to provide advice and review, with adequate resources. It is important that some of the decisions from such reviews are also communicated to the wider community to facilitate ongoing improvement of the system and avoid repetition of common issues.

Guidance and Training of Engineers

The implementation of the system will essentially fall on the engineering profession to be involved in the assessment and development of retrofit. Adequate guidance and training should be developed and rolled out ahead of implementation to ensure that the application would be robust, consistent and meet the expectations of the government. This would be important to avoid pitfalls associated with implementation of the past EPB systems.

NZSEE can assist the Government in leading this, and request that the Government supports us with funding to allow this to be rolled out in earnest.

Beyond the EPB Regime

We note that much of the earthquake strengthening of buildings have occurred outside the existing EPB regime. The proposed changed to the EPB regime will significantly reduce the pool of EPB buildings.

This would mean that there will remain a large pool of buildings which still have a significant risk from earthquakes, outside the EPB regime. Only the worst pool of earthquake risk buildings will remain as "Earthquake Prone Buildings" under the proposed system. The risks involved with this will include:

a) Damage to buildings that pose a risk of injury and fatality to occupants

b) Losses to associated buildings that may still need to be demolished and rebuilt, or require extensive repairs after earthquakes, with a huge financial burden on society, and lack of action causing insurance withdrawals or premium hikes.

c) Poor resilience with loss of functionality, particularly for a large stock of buildings in a city or town becoming unavailable which may cripple the ability of continued functionality and providing accommodation and business continuity.

It is therefore critical to maintain and enhance the momentum of voluntary retrofit, to ensure that the building owners continue to invest in enhancing the life safety and resilience of the buildings.

NZSEE recommends two important measures:

1) The communications associated with the EPB regime changes from MBIE clearly communicate the fact that EPB regulatory system only captures the buildings with the worst life safety risk, and there still remains a pool of buildings where the risk from earthquakes remain, despite being outside the EPB system.

2) Government supports the industry to develop an alternative to the %NBS system, allowing buildings to be classified according to their risk associated with building damage and resilience.

   Despite the issues associated with the %NBS system, the system has encouraged the earthquake strengthening of many buildings that were vulnerable to severe damage in earthquakes. The current EPB proposed methodology will not eliminate the current problems associated with the %NBS system. In addition, any removal of the %NBS system would lead to a vacuum and confusion, with market forces creating a new baseline that may not align with the spirit of this Bill.

   Therefore, the replacement with an alternate system would be highly beneficial to society, and a Government-led initiative to replace this or support to facilitate this would be highly beneficial.

Conclusion

NZSEE supports the review of the Earthquake Prone Building legislation and the general risk-based approach to simplify and facilitate cost effective strengthening to reduce life safety risk.

We have raised some important issues that need to be considered to enhance the proposed regime to reduce the risk from earthquakes to existing buildings.

We look forward to engaging with the Select Committee and continue our engagement with the Government to help reduce the risk and enhance the resilience of Aotearoa New Zealand.

Ngā mihi nui,

Pathmanathan Brabhaharan
President
New Zealand Society for Earthquake Engineering