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## Brace for Impact – how the new understanding of seismic risk will affect your building

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Earthquakes aren't predictable as a rule, but a seismic shake-up for new and existing buildings is on the way with the current GNS-led review of the National Seismic Hazard Model.

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The Model is science's best estimate of the likelihood and strength of earthquakes across New Zealand and the review is a big deal – it has taken two-and-a-half years and will reflect the significant advances in knowledge since the last update in 2010, including from international best practice and the Canterbury and Kaikōura earthquakes. The impacts of change will be significant: end-users of the Model, including MBIE, EQC, local authorities, NZTA, land use planners and the insurance sector all rely on the Model to estimate the impact of earthquakes on land, buildings, and infrastructure. This in turn underpins government policy, public and private sector investment decisions and helps to increase resilience.

While many uses of the Model are forward-looking, the review will have immediate impacts on the property sector, particularly for building owners and tenants. One effect will be the update of structural design requirements under the Building Code, which the Model directly informs. The current structural design standard, NZS1170.5, was based on an earlier 2002 Model, so revision of the Model and design standards is overdue. The Seismic Risk Working Group is currently considering how new Model outputs will be incorporated into the building code, but, in general terms, an increase in assessed seismic risk can be expected to mean an increase in structural design requirements. Any changes there will have obvious implications for the design and cost of new buildings.

The most immediate and significant impact for the property sector, however, is likely to be on the seismic standard of existing buildings. In short, this is because an increase in Building Code requirements for new buildings will mean a decrease in the relative compliance of existing buildings. Existing buildings face being downgraded as new building standards move on.

How far existing buildings will be affected depends upon the degree of change to the Model and the Building Code, but the outlook isn't promising. A recent paper by Professor Brendon Bradley of the University of Canterbury in the NZSEE journal (*Probabilistic Seismic Hazard Analysis of Peak Ground Acceleration for Major Regional New Zealand Locations*) shows that major changes in some areas are likely.

Bradley's research showed that, for 24 locations across New Zealand, expected mean earthquakes magnitudes and peak ground accelerations were generally higher than current Building Code requirements under NZS1170.5. While some areas were unaffected, in others, such as Wellington, Gisborne and Napier, the differences were significant. Peak ground accelerations for Wellington, for example, were more than 50% higher than is currently assumed under NZS1170.5. As a result, changes to the Code and effective downgrades to buildings could be significant; some buildings may

effectively fall below the 67% or 80% NBS thresholds often seen by tenants as red lines.

While specific changes are yet to be confirmed, we can make some predictions:

- **What is the rating?** As the last few years have shown, seismic risk is a key concern for tenants in higher risk areas. The Wellington market, in particular, is affected on an almost weekly basis by assessments based on revised seismic assessment guidelines introduced in 2017-18. Tenants and owners will want to know where their buildings sit against revised standards, whether or not this is supported by seismic assessment guidelines.
- **Is vacating an option?** To date, tenants have been prepared to vacate when buildings have fallen short. However, with a rising standard, it may be different. If all existing buildings are effectively not as safe as we thought, tenants may be more likely to shrug their shoulders and stay. Downgrades across the market may also constrain relocation options.
- **Knowing the risk is key.** Due diligence on acquisitions and new leases will remain be critical and a “flight to quality” will continue. Expert advice is also key – having a lawyer (and often an engineer) who can navigate and explain the complexity is important.
- **Legal provisions will be in the spotlight.** Rights for tenants to abate rent, vacate and even terminate leases due to low NBS ratings have become the norm. Whether or not these rights are effective – if tenants want to exercise them – will be tested.
- **Experts and government have a role to play.** The market has adapted relatively quickly to seismic issues, but understanding of risk still has a way to go. Engineers have more work to do to educate the market on the appropriateness and limits of NBS as a proxy for safety. Equally, government needs to ensure that a transparent and effective measure, reflecting the public’s desire for reliable consistent ratings of buildings, is available.
- **Higher standards and more upgrades?** Some existing buildings have reached the economic and technical limits of upgrade capacity, but demand will mean that building strengthening projects continue. Anecdotally, some agencies have already begun insisting on increased design assumptions to take account of the anticipated building code changes.

The updated National Seismic Hazard Model is due to be released in August/September 2022. Brace for impact.

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