

OPEN

MINUTE ITEM

ATTACHMENTS

Ordinary meeting of the
Audit, Risk and Finance Subcommittee
Te Kōmiti Āpiti, Kaute / Tūraru / Pūtea

Tuesday 24 May 2022
Commencing at 9.00a.m.
via Zoom

TABLE OF CONTENTS

PAGE

12 Quarterly Risk Report - 31 March 2022

- A. Risk Assessment - Earthquake prone building elements Civic House -
June 2022

2

For Information

To: Seismic Response Management Team

From: Malcolm Hughes

Date: 3 June 2022

SUBJECT: EARTHQUAKE PRONE BUILDING ELEMENTS – CIVIC HOUSE – RISK ASSESSMENTS

1. Summary

- 1.1. Ceiling systems in Civic House and the roof structure on level 6 of the tower block have been identified as earthquake prone.
- 1.2. Level six has been vacated as a precautionary measure pending further investigation and remediation work. Risk to other areas from roof failure are considered low and is not considered further in this document.
- 1.3. After following recognised assessment processes specific for earthquake prone buildings, further closures of any areas of Civic House are not recommended.
- 1.4. Remediation of highest priority areas is underway.

2. Background

- 2.1. The hazard of heavy ceiling tiles in Civic House and the risk of them causing harm by falling on building occupants in the event of a moderate earthquake has been considered and addressed over a number of years.
- 2.2. Remediation work has been carried out at various times including the most recent activity on Tower Block ceiling systems during 2021 however a report on the effectiveness of this work at improving ceiling performance in September 2021 commissioned by Council's contractor (NELMAC) identified that significant issues remained.
- 2.3. This September 2021 report by Alexander Merino generally agrees with priorities previously identified but goes much further in regard to the work required to remediate the ceilings and concludes by recommending full replacement of ceiling systems for many areas.
- 2.4. Partitions fixed directly to ceiling grids is also identified as a hazard and is likely to contribute to failure of the ceiling systems in a moderate earthquake.
- 2.5. A recent detailed seismic assessment of key structural elements of Civic House by Beca identified that the roof of the tower block was inadequately braced and was prone to damage in a moderate earthquake.
- 2.6. The main structures of all three buildings that make up Civic House are not considered earthquake prone; tower block 100% New Build Standard (NBS), clocktower 95%NBS and the savings bank building has previously been assessed at 50% NBS.
- 2.7. Council was issued with an earthquake prone building notice for ceilings in the savings Bank Building on 3 March 2022 and another notice for the Tower Block roof structure and ceilings on 1 April 2022.

3. Discussion

- 3.1. **Building Act 2004** - The Building Act 2004 was amended under the Building (Earthquake-prone Buildings) Amendment Act 2016 and contains the requirement for territorial authorities to identify buildings or parts of buildings that are potentially earthquake-prone and to request engineering assessments for them from the owners. The Act includes statutory timelines for remediating earthquake-prone buildings and does not preclude continuing to use and occupy them.
- 3.2. **Health and Safety at Work Act 2015 – Primary duty of care**
The Health and Safety at Work Act 2015 (HSWA) does not have specific provisions that relate to seismically vulnerable buildings. Persons conducting a business or undertaking (PCBUs) must protect the health and safety of workers (and others) while providing a safe working environment as far as is reasonably practicable.

Risk Assessment - Earthquake prone building elements Civic House - June 2022 (vA4213008)

3.3. Reasonably Practicable

3.3.1. In considering what is reasonably practicable a PCBU must consider:

- the likelihood and severity of harm that might result from exposure to a hazard, and
- what is known or ought to be known about the hazard or risk and the ways of eliminating or minimising the risk, and
- the availability of the control measures and how suitable they are for the specific risk, and
- only after all other relevant matters are considered, can cost be considered and only used as a reason not to do something when the cost is grossly disproportionate to the risk.

3.3.2. Likelihood of harm - The likelihood of harm from ceiling tiles falling is considered very low (rare) as it would require an earthquake of at least moderate intensity to occur while the areas under earthquake prone ceilings were occupied. Ceilings in areas with office furniture or similar available cover are not considered earthquake prone in many cases.

3.3.3. Severity of harm - The severity of harm that could occur from the failure of the heaviest ceiling systems in a severe earthquake is high (extreme) however the likelihood of the more severe event occurring while the areas are occupied is considered even lower (<rare). A risk assessment (appendix A) using Council's risk criteria outlines the risk assessed for the different ceiling systems.

3.3.4. State of knowledge - Although a number of reports have assessed the ceiling systems the findings have not been consistent particularly in regard to assessed % of NBS. Council has not yet received a report for the ceilings that meets the criteria set out in the earthquake prone buildings methodology and the document it references (Technical guidelines for engineering assessments). The Alexander Merino report focuses heavily on compliance with current standards and indicates a very low % NBS in some areas. These very low scores are considered to be inconsistent with the actual performance of the ceilings in previous earthquakes. Council does however have good information that identifies priority ceiling areas for remediation.

In considering the state of knowledge, in addition to the consultants reports and advice Council also has a number of standards to refer to regarding earthquake prone buildings, these include:

- Defined standards; the Building Act 2004, the Building (Earthquake-prone Buildings) Amendment Act 2016 and
- Established standards; The Seismic Assessment of Existing Buildings - Technical Guidelines for Engineering assessments and Managing Earthquake prone Buildings - a decision framework for Councils (BRANZ).

3.3.5. Availability of control measures – Control measures are available to remediate the ceilings, both temporary and long term however complete remediation would take considerable time and areas of highest risk should be prioritised. The suitability of full remediation for all ceilings raises questions about being reasonably practicable when the future use of the building remains uncertain. The disruption while work is completed is another factor indicating that it is not reasonably practicable to fully remediate all ceilings in a short time frame.

3.3.6. Cost – After considering all matters including those in the summary above the cost may be considered disproportionate to the risk in regard to remediating all ceiling systems prior to building refurbishment. However for the higher risk areas (heavy tiles in areas without cover) the cost is less likely to be considered disproportionate to the risk and remediation as soon as reasonably practicable is recommended.

3.4. WorkSafe position

Enforcement of the HSWA largely falls to WorkSafe New Zealand. WorkSafe has developed non-binding policy guidelines regarding earthquake-related health and safety risks that state WorkSafe will not enforce building safety to a higher standard than the Building Act 2004. However, this does not mean that the owner of such a building is not liable under the HSWA. WorkSafe has no role interpreting the HSWA itself, and such decisions lie in the hands of a court.

3.5. HSWA – Duty of Due Diligence

HSWA creates a due diligence duty on an officer. This means an officer must take appropriate, proactive steps to ensure the person conducting a business or undertaking (PCBU) complies with HSWA. In the context of this duty at Council the Chief Executive and elected members are considered officers.

3.6. Local Government Act

Section 14 of the Local Government Act 2002 requires councils to take the interests of current and future communities into account when making decisions. This means decisions to close Council buildings should also account for the economic, social and cultural impacts on the local community. Under this Act, councils must also consider the views and perspectives of people likely to be affected by the decision.

3.7. Managing earthquake-prone council buildings - a decision framework (BRANZ Nov 2021)

This November 2021 guide published by BRANZ outlines a 5 step process to follow when considering if an earthquake prone building should be closed. Its purpose is to systematically balance the risk of harm to building occupants in the event of an earthquake (low likelihood) with the risk of disruption to services and impact on the community which are likely to be more immediate.

- Step 1- Building Assessment – A detailed seismic assessment to identify any structural vulnerability, mode of failure and areas of building affected.
- Step 2 – Building user exposure to risk – Evaluate number of people using the building and time spent there.
- Step 3 – Risk mitigation measures – Identify temporary measures to reduce safety risk to building users.
- Step 4 – Consequence of building closure – Determine likely immediate consequence of closing the building including impacts on staff, neighbouring businesses and the community.
- Step 5 – Overall assessment of building risk – use the tables in the tool to determine if closure is indicated.

4. Risk Assessments

4.1. Building occupation recommendation

Using the BRANZ decision framework ongoing occupation of Civic House is considered below for:

- Level 6 only, considering roof and ceiling related risk
- Entire Building considering Ceiling, glass partition and L6 roof risk

4.1.1.

| Assessment 1 - Decision framework for Level 6 only, considering roof and ceiling related risk | | | | |
|---|--------------------------------|---------------------------------------|--|-----------------------------------|
| 1 | Building Assessment | Is the building a dangerous building? | No | Yes (proceed to step 2) |
| | | Is the building earthquake prone? | Yes | |
| 2 | Building user exposure to risk | What is the level of safety exposure? | Life safety exposure category = Moderate Seismic hazard zone = Medium | Degree of exposure = I (Building) |

Risk Assessment - Earthquake prone building elements Civic House - June 2022 (vA4213008)

Item 12: Quarterly Risk Report - 31 March 2022: Attachment 1

| | | | | |
|--|--|---|---|--|
| | | | Period of exposure = Short (<2years*) <i>* 2 years is the shortest period until strengthening commences that can be considered using this tool for a building in a medium seismic hazard zone.</i> | <i>remains open)</i> |
| 3 | Risk mitigation Measures | Can the risk be temporarily mitigated? | Yes- access restricted to level 6 and roof top, other temporary structural mitigations being investigated. | <i>(Proceed with mitigation)</i> |
| 4 | Consequences of immediate building closure | What are the immediate impacts on staff, users and neighbouring businesses? | Service easily delivered through other means Limited or no vulnerable community use the earthquake prone parts of the building Neighbouring business affected by reduced foot traffic Significant numbers of staff affected by partial closure | Low Low Moderate Moderate |
| 5 | Overall Assessment of Building risk | What is the overall risk? | Not able to be assessed using the tool as building remains open after step 2. | Remain Open |
| Temporary closure of level 6 and roof top except for essential access is an extra step considered reasonably practicable to ensure safety while remediation is investigated further. | | | | |

4.1.2.

| Assessment 2 - Decision framework for entire building – ceilings, glass partitions and L6 roof risk | | | | |
|--|--|---|---|---|
| 1 | Building Assessment | Is the building a dangerous building? | No | Yes – <i>(proceed to step 2)</i> |
| | | Is the building earthquake prone? | Yes | |
| 2 | Building user exposure to risk | What is the level of safety exposure? | Life safety exposure category = High Seismic hazard zone = Medium Period of exposure = Short (<2years*) <i>* 2 years is the shortest period until strengthening commences that can be considered using this tool for a building in a medium seismic hazard zone.</i> | Degree of exposure = II <i>(proceed to step 3)</i> |
| 3 | Risk mitigation Measures | Can the risk be temporarily mitigated? | Possible in some areas immediately Other areas without adequate cover will take more time | <i>(Proceed to step 4)</i> |
| 4 | Consequences of immediate building closure | What are the immediate impacts on staff, users and neighbouring businesses? | Service can be partially delivered outside of the building Vulnerable community impacted but services/amenities can be found Neighbouring business significantly impacted by direct loss of customers Significant numbers of staff affected by closure | Moderate Moderate High High |
| 5 | Overall Assessment of Building risk | What is the overall risk? | Category A – Building remains open. | Remain open |

Risk Assessment - Earthquake prone building elements Civic House - June 2022 (vA4213008)

This assessment indicates the building should remain open and would have the same outcome even if impacts of closure were assessed as moderate rather than high. If considerable remediation is not complete within 2 years this assessment should be revised with period of exposure commencing from this assessment date. Current budget and planning is for risk mitigation to be completed in much less than 2 years.

4.2. Risk Assessment - Council's risk criteria

- 4.2.1.** The risk assessment included as appendix A has been completed using Council's risk criteria. The assessed highest risk of medium is consistent with the outcomes of the assessment for ongoing occupation of the building using the BRANZ tool.
- 4.2.2.** The risk assessment has been applied firstly to the whole of Civic House considering all earthquake prone elements and then to each potentially earthquake prone element separately.
- 4.2.3.** In the risk assessments potential consequence is often considered very high (major or extreme) however these outcomes are assessed as very unlikely (rare) resulting in the medium assessed risk.
- 4.2.4.** In considering the likelihood consideration has been given all known contributing factors:
 - Likelihood of a damage causing earthquake occurring in Nelson
 - Likelihood of building being occupied when such an earthquake does occur
 - Likelihood of occupants being exposed to earthquake prone elements and not having adequate cover available.

4.3. Review of Risk Assessments

A draft version of the risk assessments at appendix A, the assessment using the BRANZ tool and the background information was reviewed by David Whittaker. David's feedback has been included in this version of the risk assessment. David is a senior technical director at Beca and a leading specialist in earthquake engineering

5. Conclusion

- 5.1.** The earthquake-prone or potentially earthquake prone elements of Civic House do present a health and safety risk to building occupants and ongoing remediation prioritising the highest risk areas should occur within timeframes much shorter than those allowed under the earthquake prone building notices.
- 5.2.** This remediation work should extend to hazardous ceilings and glass partitions not currently included in earthquake-prone building notices.
- 5.3.** This risk assessment does not indicate a need to vacate further areas of Civic House however a range of other ongoing controls and treatments as indicated in the risk assessments are required to minimise the risk.

Appendix A

Health and Safety Risk Assessment

Potentially earthquake prone elements of Civic House

DATE COMPLETED: 17 May 2022
REVIEWED BY: David Whittaker

COMPLETED BY: Malcolm Hughes

Assumptions:

1. A moderate earthquake will affect Civic House within 5-10 years (possible)
2. Severe earthquake or earthquake series will affect Civic House less than once per 50 years
3. That average occupation time of Civic House is approx. 25% (42/168 hrs/week)
4. That current maximum occupancy of Civic House is approx. 150 persons

| HAZARD | EVENT | CONTROLS | Consequence | Likelihood | RISK RATING | RECOMMENDED TREATMENTS |
|--|--|--|-------------|------------|-------------|---|
| Earthquake prone elements of Civic House (All) | Roof structure, ceilings and/or glass partition walls experience catastrophic failure in a severe earthquake while the building is occupied resulting in multiple fatalities. | - Drop Cover and Hold - Level 6 is unoccupied pending remediation work - Remedial support installed in chamber lobby, stairwell and toilets | Extreme | Rare | Medium (5) | - Remediate areas of highest risk ASAP - Remediate all earthquake prone building elements within time frames required by the Building Act or sooner |
| This assessment considers an extreme consequence as a result of a severe earthquake and does not separate individual earthquake prone elements. Due to the very low (rare) likelihood of such an event occurring while the building is occupied the assessed risk is medium. | | | | | | |
| 20% NBS Tower Block roof structure | Roof is damaged in a moderate earthquake . Resulting in life threatening injuries to building occupants or others in the vicinity. | - Level 6 has been vacated pending remedial work - Contractors are minimising time spent doing essential work on level six, plant room or roof. | Major | Rare | Medium (4) | - Minimise time spent doing essential work on level six, plant room or roof - Complete remedial work to strengthen roof structure (progressing with urgency) |

| | | | | | |
|--|--|---|----------------|-------------|--|
| <p>The 20%NBS rating relates to the estimated capacity of the steel roof structure and connections to the main concrete structure. Vacating the building is not required by the Earthquake Prone Buildings legislation, or WorkSafe guidance. NCC has decided to vacate the Level 6 space until temporary or permanent strengthening is put in place – this is considered a reasonable approach by Beca who see no need to vacate additional levels as risk to occupants on those levels remains low. Further advice from David Whittaker of Beca on 27/05/2022 is that, <i>the roof structure may be damaged in a moderate earthquake but is very unlikely to collapse.</i></p> | | | | | |
| <p>Heavy weight ceiling tiles in one-way grids over areas without desks or similar cover (Egress routes and some other spaces primarily in the Savings Bank building)</p> | <p>Ceiling system fails in a moderate earthquake over occupied areas with inadequate cover resulting in life threatening injuries due to falling heavy weight tiles or other ceiling grid elements.</p> | <p>-Drop cover and hold -Only use meeting rooms only in configuration with adequate cover present</p> | <p>Extreme</p> | <p>Rare</p> | <p>Medium (5)</p> <p>- Limit access to key areas where highest risk is identified if temporary remediation cannot be completed quickly. - Complete remedial strengthening in priority egress areas. - Replace all heavy weight one-way grids, prioritise areas without adequate cover.</p> |
| <ul style="list-style-type: none"> These 600mm x 600mm tiles are approx. 7.2kg each or 22.6 kg per m² which is below the threshold that is expected to be a significant life safety hazard in furnished spaces where the furniture can reasonably be expected to provide shelter during an earthquake. Likelihood above has been assessed by considering time the building is occupied, likelihood of a moderate earthquake, likelihood of exposure to an area without adequate cover and likelihood of one-way grid failing Severity assessment is based on higher overall density of system than tiles in two-way grids | | | | | |
| <p>Rondo reinforced Heavy weight ceiling tiles in one-way grids (Chamber lobby, stairs, 2A toilets)</p> | <p>Ceiling system fails in a moderate earthquake over occupied areas with inadequate cover resulting in life threatening injuries due to falling heavy weight tiles or other ceiling grid elements.</p> | <p>-Drop cover and hold -Remedial strengthening expected to remove any life safety risk.</p> | <p>Minor</p> | <p>Rare</p> | <p>Very Low (2)</p> <p>-Replace all heavy weight one-way grids, prioritise areas without adequate cover.</p> |
| <ul style="list-style-type: none"> This is the same system as above with remedial strengthening completed May 2022 to specification provided by Beca. | | | | | |
| <p>Medium weight ceiling system in two-way grids over areas without adequate cover. (Egress routes of tower block offices)</p> | <p>Ceiling system fails in a moderate earthquake over occupied areas with inadequate cover resulting in life threatening injuries due to falling medium weight tiles or other ceiling grid elements.</p> | <p>-Drop cover and hold</p> | <p>Major</p> | <p>Rare</p> | <p>Medium (4)</p> <p>- Replace medium weight tiles with light in areas without adequate cover (primarily egress routes). - Include complete replacement of ceiling system in any building refurbishment.</p> |
| <ul style="list-style-type: none"> Two-way grid systems are approximately half the weight of the one-way grids at 12.1kg m², therefore potential consequence is considered less severe. The individual tiles in this system are approx. 7.8kg per tile slightly over the threshold of 7.5kg for an unrestrained tile to be expected to be a life safety hazard. | | | | | |

| | | | | | | |
|--|--|--|----------|----------|------------|---|
| Plaster board ceilings fixed directly to old ceiling grids. (Mayor's reception, some other small areas) | Ceiling system fails in a moderate earthquake over occupied areas with inadequate cover resulting in moderate injuries | -Drop cover and hold | Moderate | Unlikely | Medium (6) | - Obtain further information regarding likelihood of failure - Include complete replacement of system in any building refurbishment. |
| Risk is likely to be lower than indicated in Merino report but requires information following engineer assessment (assessed by Beca 2 June report expected 7 June). | | | | | | |
| Light weight ceiling tiles in two-way grid (Council chamber, Mayor's office, some other areas) | Ceiling system fails in a moderate earthquake resulting in minor injuries due to falling light weight tiles or other ceiling grid elements. | -Drop cover and hold | Moderate | Rare | Low (3) | - Include complete replacement of system in any building refurbishment - Consider restricting use of the Council chamber in configurations without desks |
| From the Merino report - <i>Based on the manufacturer's rated grid capacity and observed fixings and perimeter details, the 2-way ceiling in the council chamber has an estimated compliance of 30%NBS. The previous recommendation by WSP to brace this ceiling would need to be accompanied by releasing the existing perimeter fixings, and cutting the tees at all perimeters to allow seismic separation between the walls and ceiling.</i> These ceilings are not considered earthquake prone in the normal chamber configuration as light weight tiles do not generally present a significant life safety risk provided cover such as typical office furniture is available. | | | | | | |
| Heavy weight Glass partitions fixed directly to ceiling grid | Loading from partitions contributes to ceiling failure and vice versa resulting in heavy glass panels falling in occupied space resulting in life threatening injuries | - Drop cover and hold - Minimise exposure to egress routes adjacent to glass partitions | Major | Rare | Medium (4) | -Brace remaining partitions directly to structure |
| From Merino report: <i>Throughout the building all partial height steel stud and aluminium/glazed partitions have been fixed to the ceiling grid. This poses a critical risk of failure, especially partitions along egress routes, as lightweight suspended ceiling components are not capable of withstanding the ULS seismic or wind loads imparted by the partition head track. It is unclear at this point which partitions have had additional braces already installed.</i> | | | | | | |

| CONSEQUENCES | | | | | LIKELIHOOD of the given consequence occurring | | | |
|---|--|--|--------------------------------------|--|---|---|--------------------------------|------------------------------------|
| Minor injury requiring only first aid or less | Serious injury on one person requiring medical treatment | Notifiable injury of workers or public | Single fatality of workers or public | Multiple fatalities of workers or public | Descriptor | Qualitative guidance statement | Indicative Probability range % | Indicative frequency range (years) |
| Insignificant(1) | Minor (2) | Moderate (3) | Major (4) | Extreme (5) | | | | |
| Medium (5) | Medium (10) | High (15) | Very High (20) | Very High (25) | Almost certain (5) | The consequence can be expected in most circumstances OR <i>A very low level of confidence/information</i> | >90% | >1 occurrence per year |
| Medium (4) | Medium (8) | High (12) | High (16) | Very High (20) | Likely (4) | The consequence will quite commonly occur OR <i>A low level of confidence/information</i> | 20% - 90% | Once per 1-5 years |
| Low (3) | Medium (6) | Medium (9) | High (12) | High (15) | Possible (3) | The consequence may occur occasionally <i>A moderate level of confidence/information</i> | 10% - 20% | Once per 5-10 years |
| Very Low (2) | Low (4) | Medium (6) | Medium (8) | High (10) | Unlikely (2) | The consequence may occur only infrequently <i>A high level of confidence/information</i> | 2% - 10% | Once per 10 - 50 years |
| Very Low (1) | Very Low (2) | Low (3) | Medium (4) | Medium (5) | Rare (1) | The consequence may occur only in exceptional circumstances <i>A very high level of confidence/information</i> | <2% | Less than once per 50 years |