
2016 KAIKŌURA/HURUNUI EARTHQUAKE CLAIMS SETTLEMENT RESEARCH:

Understanding the outcomes of managed
residential repair following the
Canterbury earthquakes

LITERATURE REVIEW REPORT

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2016 Kaikōura/Hurunui earthquake claims settlement research

Summary of research stages

Full references and weblinks to these reports can be found in Section 6.

REPORT TITLE	SUMMARY
Understanding the Outcomes of Managed Residential Repair Following the Canterbury Earthquakes (<i>Literature Review Report</i>)	This report summarises the outcomes, challenges, and benefits of the managed repair process following the Canterbury earthquakes of 2010/11, as a basis for informing broader considerations of appropriate insurance settlement models in future large-scale disasters and supporting research method design.
Evaluating the Impacts of Cash Settlements on the Long-Term Quality of the Housing Stock <i>(Housing Quality Report)</i>	<p>This report investigates the impacts of cash settlement of insurance claims following the 2016 Kaikōura/Hurunui earthquake. In particular, the report focuses on the impact on the long-term quality of housing.</p> <p>The research draws on insurance claims data, building consent data, real estate data, and results from a 2022 claimant survey carried out by the research team. The analysis in this report focuses on the most significantly impacted districts of Kaikōura, Hurunui and Marlborough.</p>
Claimant and Community Experiences and Impacts from the Kaikōura/Hurunui Earthquake Residential Repair Process <i>(Impacts Report)</i>	This report builds on this previous work by exploring the wider impacts of cash settlement. It looks at the process of cash settlement from multiple stakeholder perspectives (claimants, builders, professional services, building control authorities, insurers (including assessors), and real estate agents). The analysis is based on a series of interviews with key stakeholders and is complemented by results from a 2022 claimant survey carried out by the research team. The analysis explores issues such as timeliness of repair works, cost, claimant experience (including impacts on claimant wellbeing) and property transactions.
Key Principles and Considerations for Future Residential Recovery <i>(Discussion Paper)</i>	This discussion paper outlines key principles and considerations to inform decision-making for future residential recovery strategies. This draws on findings from previous reports and evaluates the advantages and disadvantages of cash settlement following a major disaster. The features and attributes that underpin an effective residential claim settlement approach are suggested, acknowledging the spectrum of approaches from claimant-led to third party-led. Key factors for early-stage decision-making as to the optimum claims settlement approach for a given event are also proposed.

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1.0 INTRODUCTION

1.1 Overview

This report contributes to a body of work on the impacts of cash settled insurance claims following the 2016 Kaikōura/Hurunui earthquake funded by Toka Tū Ake EQC (Earthquake Commission). The overall project aims to understand the impacts of applying a cash settlement model following the 2016 Kaikōura/Hurunui earthquake, with particular consideration to the long-term quality of housing stock; and provide lessons for residential recovery following future events in Aotearoa New Zealand. This report summarises the outcomes, challenges, and benefits of the managed repair process following the Canterbury earthquake sequence (CES) of 2010/11, as a basis for informing broader considerations of appropriate insurance settlement models in future large scale disasters.

An outline of insurance settlement models and the residential earthquake insurance landscape in Aotearoa New Zealand is provided first. This is preceded by an overview of the context and insurance process following the CES. Outcomes of the managed repair process is then explored. This involves discussion around claim duration, cost, and issues related to housing quality, including missed scopes and re-work on repairs, claimant satisfaction with repairs, cash settled claim repairs in Canterbury, and the nature of on-sold homes. Finally, outcomes of the managed repair process in relation to the wellbeing of individuals is also explored. This includes the prioritisation of vulnerable claimants, perceived mistrust of some claimants towards the insurance industry and government agencies, the impacts of insurance dealings and housing quality on mental and physical health, and the disproportionate impact of earthquake damage on tenants.

1.2 Aotearoa New Zealand residential earthquake insurance

In Aotearoa New Zealand, natural hazard damage to residential dwellings and land is covered by a combination of private insurance and the state insurance entity, Toka Tū Ake EQC. Toka Tū Ake EQC is established under the Earthquake Commission Act 1993 (the Act) and provides cover, up to a cap, for all homeowners who hold a private house insurance policy that includes cover for fire damage. The Act covers damage for a specific list of natural hazards: earthquakes, natural landslips, volcanic eruptions, hydrothermal activity, and tsunamis, as well as fire resulting directly from any of these hazards. Damage from storms and flooding is also covered, but this is strictly in relation to claims made for residential land, not dwellings.

Aotearoa New Zealand has a very high rate of residential earthquake insurance compared to much of the world, with more than 95% of properties covered by Toka Tū Ake EQC (Van Cuong & Noy, 2018). Toka Tū Ake EQC plays an important role in assuming risk, thereby affording the public greater financial and institutional assurance during the recovery phase of damaging events (Chang-Richards & Wilkinson, 2016). A mandatory levy, collected through private home insurance policies, is invested into the 'Natural Disaster Fund' and used to pay claimants for natural hazards damage. Prior to the September 2010 earthquake in Canterbury, a general absence of large-scale disaster events in modern Aotearoa New Zealand history had enabled the National Disaster Fund to accumulate to NZD\$5.9 billion (Chang-Richards & Wilkinson, 2016).

Homeowners who are covered by Toka Tū Ake EQC currently receive a claim settlement value of a 'cap' plus GST (15%) for house damage. Claims of up to this value are referred to as 'under-cap', while claims which exceed this value are referred to as 'over-cap'. If a claim is 'over-cap' the balance is assessed and paid for by private insurers. At the time of the CES, the Toka Tū Ake EQC cap was set at NZD\$100,000 plus GST (15%) for residential dwelling damage, as well as coverage of up to NZD\$20,000 plus GST for contents damage.¹ Changes made to the Act in 2019 saw contents coverage removed, and the maximum Toka Tū Ake EQC cap raised to NZD\$150,000 plus GST. Further changes, set to come into effect from 1 October 2022, will yet again raise the maximum cap for claims to NZD\$300,000 plus GST per residential dwelling.

In addition to the value of Toka Tū Ake EQC's cap, the way in which claims are managed has also changed since the CES. At the time of the Canterbury earthquakes, Toka Tū Ake EQC managed 'under-cap' claims, while 'over-cap' claims were transferred to private insurers to manage once Toka Tū Ake EQC had assessed and paid up to the cap. This resulted in claimants dealing with multiple parties and created a number of frustrations for claimants, Toka Tū Ake EQC, and insurers alike. Today, almost all claims are managed through private insurers, who act as agents on behalf of Toka Tū Ake EQC (Public Inquiry into the Earthquake Commission, 2020). Claimants may still lodge claims directly with Toka Tū Ake EQC, though these will be transferred accordingly to private insurers if their private insurer is a party to the Natural Disaster Response Agreement (NDRA). The NDRA is thought to cover approximately 99% of the Aotearoa New Zealand insurance market.

Section 29 of the Act mandates that Toka Tū Ake EQC may choose to settle claims either through payment, repair, replacement, or relocation. The default method for claim settlements is through cash payment directly to claimants (Earthquake Commission, 2019b). Although managed repair is exercised within certain contexts, such as with the residential rebuild following the CES, it nonetheless remains the exception for Toka Tū Ake EQC in comparison to cash settlements. A small-scale managed repair program was trialled by Toka Tū Ake EQC with some claimants following the M_w 7.1 Fiordland earthquake in 2003, in an attempt to manage the wide dispersion of damaged properties across the Southern region and the shortage of available tradespeople at the time (Earthquake Commission, 2019b).

Cash settlement is currently the preferred settlement option of both Toka Tū Ake EQC and private insurers. In response to the M_w 7.8 Kaikōura earthquake in 2016, insurance claims were settled through the transfer of cash payments and private insurers acted as agents to Toka Tū Ake EQC by settling all under-cap claims that would have otherwise been settled directly by Toka Tū Ake EQC. This arrangement arose from a memorandum of understanding between Toka Tū Ake EQC and eight private insurers to adopt an agency settlement model to prevent double-handling of claims agreed to shortly after the 2016 event, which was first trialled in response to claims made from the 14 February 2016 earthquake in Ōtautahi Christchurch. This cash settlement model – commonly referred to as the Kaikōura model – is the central focus of this research project.

1.3 Insurance settlement models and housing quality

Despite being the preferred method for claim settlements, there is some concern that cash settlement of insurance claims may lead to poor outcomes on housing quality, especially following large-scale events where there are a significant number of claims lodged. In March 2020, a Report of the Public Inquiry into

¹ Damage to residential land is also covered by Toka Tū Ake EQC, however the sum of this is calculated separately from the residential building damage cap, see Earthquake Commission Act 1993, Section 19.

the Earthquake Commission (referred to hereafter as the Public Inquiry) was published. In it contained recommendations related to the process for settling claims, including for research to be completed for understanding the impact of cash settlements on the quality of housing in Aotearoa New Zealand (Public Inquiry into the Earthquake Commission, 2020, p. 32). Two of these recommendations provide the underlying basis for this research:

- 5.1.3 *Conduct a detailed assessment of the impacts of cash settlement of claims in the example of the Kaikōura/Hurunui earthquake, including the longer-term impact on quality of the housing stock.*
- 5.1.4 *Incorporate the findings of the detailed assessment of cash settlement for the Kaikōura/Hurunui earthquake into a larger and ongoing study that tests the advantages and disadvantages of cash settlement, the results of which could be drawn on when deciding the best response to future natural disaster events.*

There are several perceived benefits of cash settling earthquake damage claims compared to using managed repair. The Insurance Council of New Zealand (ICNZ) has outlined some of these perceived benefits, as noted within the Public Inquiry (2020, p. 207):

Cash settlements can be adjusted if missing damage is found or costs are inaccurate; claimants are provided with a fully documented account of what is required of the builder; and settlements can be concluded faster than a managed repair, which is advantageous to the insurer (who can settle much more quickly). Cash settlements are also reassuring for the reinsurance industry. In addition, cash settlements inject funds into the community more quickly, allowing for a faster local recovery.

In short, cash settlements are considered advantageous for faster payments and access to funds, as well as providing homeowners with greater autonomy over the management of repairs. On the other hand, there are several concerns about using cash settlements to repair housing in events which cause extensive damage, as was the case with the CES. Given the significant damage to property from these earthquakes, the decision was made to establish a managed repair programme. Establishing a managed repair programme was primarily an attempt to mitigate four key risks that may have potentially resulted from the use of cash settlement for all claimants. These risks were:

- The inflation of home repair costs;
- The availability and supply (or lack of) building materials;
- Equitable access to qualified tradespeople and other necessary resources; and
- Ensuring damaged homes were, ultimately, repaired or rebuilt.

The first three of these risks are associated with access and financial concerns of claimants undertaking necessary work if everyone were competing against each other for a limited number of resources. The then-Minister for the Canterbury Earthquake Recovery remarked that the managed repair programme helped to prevent a “chaotic” situation from arising (Small, 2017). The Public Inquiry noted that, compared to managed repair, which places Toka Tū Ake EQC and private insurers in a role of greater responsibility and liability for repairing damaged homes (2020, p. 207):

cash settlements place the responsibility for repairs on the homeowner, who would also carry the risks associated with engaging a contractor to carry out the repair work correctly and within budget. The individual homeowner, not necessarily experienced in building, could find it difficult to access independent advice on repairs, giving rise to delayed challenges to the accuracy of the assessment or cynicism about the Government’s willingness to care for its people. Compared with a managed repair programme, there will be fewer liabilities and disputes with EQC, which will not be liable for substandard or defective repair work.

The fourth risk – that homes may not ultimately be repaired in the absence of a managed repair programme – refers to concerns that cash settlements from Toka Tū Ake EQC for large-scale disasters may, as a culmination of price and resource concerns, lead to an outcome where necessary repair work is neglected, and homes remain either fully or partially damaged. Such concerns were raised in the Public Inquiry, stating there is “vestigial evidence” that cash settlements failed to translate into repaired homes in the districts of Kaikōura and Hurunui following the November 2016 Kaikōura earthquake (Public Inquiry into the Earthquake Commission, 2020, p. 207). In fact, the same concerns were raised by Toka Tū Ake EQC, private insurers, and local authorities alike, following the M_w 6.7 Gisborne earthquake in 2007. In that event, it was reported that around 800 (largely chimney-related) claims of the more than 6,000 claims Toka Tū Ake EQC cash settled had not been used to repair the damage, leading to concerns that people were residing in unsafe living conditions (Earthquake Commission, 2019b).

There are convincing arguments for both a cash settlement and managed repair claim model. In fact, the two methods should not be understood from an either-or perspective; it may be that a combination of both is appropriate in certain circumstances.

2.0 CANTERBURY EARTHQUAKE SEQUENCE MANAGED REPAIR PROCESS

2.1 The Canterbury earthquake sequence

In the early hours of 4 September 2010, thousands across the Canterbury region were awakened suddenly by a M_w 7.1 earthquake; an event that has since generated more than 15,000 aftershocks (GNS Science, 2021). Though significant damage was caused to many homes, commercial buildings, and infrastructure in Ōtautahi Christchurch and surrounding communities, the early timing of the earthquake helped ensure no lives were lost in the event. Almost six months later, on 22 February 2011, a significant aftershock (M_w 6.3) violently ruptured near Ōtautahi Christchurch city just before one o'clock in the afternoon. This event – located just 5km south-east of Ōtautahi Christchurch city and at a depth of only 5km – caused significantly more damage than the September event and, sadly, the loss of 185 lives and more than 7,100 injuries (Potter et al., 2015). The February 22 event itself was the deadliest disaster in Aotearoa New Zealand since the M_w Hawke's Bay earthquake of 1931 took 256 lives. With subsequent aftershocks causing additional damage to buildings and infrastructure in the years following 2010, the CES was also one of the costliest disasters in modern world history at a total of more than NZ\$40 billion; \$16 billion each for the residential and commercial sectors, and approximately \$7 billion required for infrastructure (Wood et al., 2016).

Perhaps the single largest physical impact resulting from the earthquakes, with respect to numbers of people directly impacted, was the damage caused to housing. According to Potter et. al (2015), more than 150,000 homes in Canterbury were damaged (almost three quarters of the region's housing), and approximately 9,000 homes were left uninhabitable. This significant impact on the housing stock placed immediate and ongoing pressure on the city (Potter et. al, 2015). As residents relocated, and workers entered the region to support the rebuild, both rental costs and house prices spiked (Wood et al., 2016).

Fortunately, Aotearoa New Zealand boasts one of the highest rates of natural hazard insurance coverage in the world (Van Cuong & Noy, 2018). This high level of insurance penetration meant that around 80% of total damage costs from the CES were borne by the insurance sector. This is extremely high coverage when compared to that of other recent major seismic events around the world, including the M_w 8.8 Chile earthquake of February 2010 (27% coverage) and the M_w 9.1 Japan earthquake of March 2011 (17% coverage) (King et al., 2014).

The significant residential building damage in the CES prompted a managed repair programme to be established, with thousands of residential earthquake repairs and rebuilds completed on behalf of homeowners. Managed repair was opted for in conjunction with the standard approach of cash settlement for various reasons. This included to manage the costs of repairs and availability of building materials, access to tradespeople for homeowners, and to ultimately ensure damaged homes were in fact repaired (Earthquake Commission, 2019b).

2.2 Overview of residential claims

The CES was the single largest insurance event ever faced by Toka Tū Ake EQC, and remains one of the costliest disasters in modern world history. In the agency’s own words, “EQC had not prepared or planned for a large-scale managed repair programme” (Earthquake Commission, 2019b, p. 7). At the time of the first earthquake in September 2010 (M_w 7.1), Toka Tū Ake EQC had planned for a “maximum loss scenario” of 150,000 claims made from a single event (Earthquake Commission, 2019b). More than 460,000 claims (including for damage to land, contents, and residential buildings) were made to Toka Tū Ake EQC as a result of the CES, for damage affecting more than 160,000 homes – more than threefold Toka Tū Ake EQC’s worst case scenario planning (Earthquake Commission, 2019b). Table 1 shows that the majority (432,308) of the more than 460,000 claims lodged with Toka Tū Ake EQC were for damage arising from five individual seismic events (Earthquake Commission, 2019a).

Table 1: Number of claims lodged with Toka Tū Ake EQC per the top 5 damaging events of the CES (Earthquake Commission, 2019a)

SEISMIC EVENT	MAGNITUDE (M_w)	NUMBER OF CLAIMS LODGED WITH EQC
4 September 2010	7.1	156,623
22 February 2011	6.3	157,309
13 June 2011 ²	5.5	56,211
23 December 2011	6.0	48,795
14 February 2016	5.7	13,370

The total estimate of Toka Tū Ake EQC gross claims and associated costs (i.e., claim handling expenses) is just over NZD\$12 billion, with NZD\$11.6 billion of this paid out as at 31 December 2021 (A. Gluyas, personal communication, April 28, 2022). Overall, the scale of damage led Toka Tū Ake EQC (as well as private insurers) to deviate from their usual standard of cash settlement and each establish a managed repair approach to insurance settlement and property repair. Project Management Offices, or PMOs, were set up by insurers to help manage the large number of claims that were received. PMOs worked across a range of activities connected with residential insurance claims, from the initial assessment of damage through to repair and, in some cases, complete rebuild.

² Two damaging earthquakes on 13 June 2011, occurring within 1 hour of each other, are grouped by EQC into a single event.

Damage to residential buildings from the CES can be broken into three main categories according to the assessed cost of repairs and the general process for dealing with such claims (Khakurel et al., 2021):

- **Small:** claims with a repair cost of less than NZD\$15,000³ were cash settled by Toka Tū Ake EQC.
- **Medium:** claims between NZD\$15,001 and NZD\$100,000 were typically managed through the Canterbury Home Repair Programme (CHRP)⁴ (unless claimants opted out).
- **Large:** claims of more than the NZD\$100,000 Toka Tū Ake EQC 'cap' were transferred to private insurers to be managed through their own PMOs.

Table 2 provides a representation of Toka Tū Ake EQC residential building claims according to claim size and seismic event (excluding claims for land and contents damage). Figures included in the table are claims made within the three month Toka Tū Ake EQC claim lodgement band following four significant seismic events in the CES. Because the aftershock events of June and December 2011 were of similar intensities and produced similar claim lodgement trends, Khakurel et al (2021) group them as a single event. Approximately 51% of residential building claims (70,883) from these events in the CES were considered small (<NZD\$15,000 repair cost), and therefore cash settled. Another 31% of claims (43,285) were considered medium (NZD\$15,000-\$100,000), and fell within the scope of managed repair through the CHRP. The remaining 18% of claims (25,219) exceeded the Toka Tū Ake EQC cap of NZD\$100,000, and were transferred to private insurers for settlement.

Table 2: Canterbury Toka Tū Ake EQC claims by seismic event (Khakurel et al., 2021)

Event	September 2010		February 2011		June 2011		Total
	Number	%	Number	%	Number	%	Number
Small	31,896	59.5	10,007	20.0	28,980	81.2	70,883
Medium	17,743	33.1	19,421	38.8	6,121	17.1	43,285
Large	3,999	7.4	20,630	41.2	590	1.7	25,219
Total	53,638	100	50,058	100	35,691	100	139,387

2.3 Approach to residential claims management

While much criticism of the CES insurance response focused on homes repaired or rebuilt through managed repair, it is notable to highlight that more claims were cash settled than were repaired through PMOs (Beaven, 2017). Most (84%) of the first-time⁵ residential claims from the CES were under-cap (less than NZD\$100,000 + GST) and handled by Toka Tū Ake EQC, while the remainder of claims (16%) were over-cap (above NZD\$100,000 + GST) and passed to private insurers (Greater Christchurch Group Monitoring Team, 2017). As at January 2016, Toka Tū Ake EQC had cash settled 72,440 under-cap properties and completed repairs on a further 67,374 under-cap properties. For over-cap properties, private insurers had cash settled 8,953 claims and completed repairs or rebuilding for 6,765 properties (Greater Christchurch Group Monitoring Team, 2017).

³ This was originally set at NZD\$10,000 but was subsequently raised to NZD\$15,000.

⁴ The CHRP was the project management office for Toka Tū Ake EQC.

⁵ First-time claims are distinguished from claims which had been settled and subsequently re-opened, typically because of newly identified damage.

Claimants had the ability to opt out of the CHRP, or their private insurer PMO process, and have their claims cash settled instead. The opt-out process for the CHRP was initially criticised by external contractors and claimants as overly rigid and, in some instances, claimant reimbursements by Toka Tū Ake EQC for contractor expenses were reported to have taken several months to be paid out (Human Rights Commission, 2013). Toka Tū Ake EQC reports in total approximately 2,500 claimants chose to opt out of the CHRP (Earthquake Commission, 2019b). The number of claimants who chose to opt out of their private insurer PMO process is unclear.

The managed repair of insurance claims was initiated for a variety of reasons. One such reason was to provide greater visibility and clarity for customers of a single PMO to manage projects, from inception to handover. Additionally, inflationary pressures were more readily managed by PMOs, so that economies of scale could ensure steady labour market and material supply which might otherwise have been difficult to control. Such innovative and novel governance, and project management arrangements, promised a framework for effective performance of post-disaster reconstruction efforts (Chang-Richards & Wilkinson, 2016).

Despite the advantages afforded by the implementation of governance structures such as PMOs in the reconstruction sector, Chang-Richards & Wilkinson (2016) highlighted a number of challenges and concerns. One such concern related to the use of project/programme-based agencies, such as PMOs, which had limited timeframes, yet they were charged with managing a complex series of tasks associated with the rebuild of a major urban centre. Limited time frames also raised concerns regarding their capacity to attract and maintain the skilled workforce required. The temporary nature of some project-based work could not offer long-term commitments to staff, many of whom were from outside the region (Chang-Richards & Wilkinson, 2016).

Challenges also arose from homeowner's expectations. The significant funding provided by insurance and the direct access to PMO staff was seen as an opportunity by homeowners to capitalise on works to make modification or changes to dwellings. This caused ongoing tension between insurance companies and PMOs meant the final reconstruction effort grew in scope and size. Finally, discrepancies existed between assessments undertaken by Toka Tū Ake EQC inspectors (and agreed to by homeowners) and the estimates of requirements by appointed contractors. There was also issue in connection with inconsistency in work quality and workflow (Chang-Richards & Wilkinson, 2016).

In addition to the above challenges, the scale and complexity of the Canterbury earthquakes created some additional challenges in the management of insurance. The major challenges are briefly described below.

2.4 Reinstatement of cover

One aspect of insurance practice that presented challenges in the context of the activity of Canterbury's seismic events was the reinstatement of cover after a claimable event occurred. Toka Tū Ake EQC registered 17 separate earthquake events in succession that could have resulted in claims, many of which may not have been assessed or settled before a new event occurred. This was of particular relevance to Toka Tū Ake EQC because of their role as first insurer in the two-tier system; in the case of frequent aftershock, new events potentially occurred prior to settlement and repair of previous incidents raising questions over the reinstatement of insurance cover. A judicial review was required before the Toka Tū Ake EQC and private insurers understood whether the Toka Tū Ake EQC cap was reinstated after every new event, even if claims had not been settled. The judicial review found that Toka Tū Ake EQC cover should be reinstated on registration of a claim, and that the Toka Tū Ake EQC was ultimately

responsible for every significant seismic event (Toomey, 2015). Therefore, repeat assessments by both Toka Tū Ake EQC and private insurers were required to determine Toka Tū Ake EQC's liability, if any, for the potential increase in repair cost owing to additional damage caused by each event (King et al., 2014). In general, both policy entitlements and the lines between Toka Tū Ake EQC and insurance responsibilities were poorly understood (Egbelakin, 2016).

2.5 Loss apportionment

Because of the frequency of claimable events during the Canterbury earthquake sequence loss apportionment to each separate event caused significant challenges and delays in the insurance settlement process (Chang-Richards & Wilkinson, 2016). There were significant numbers of multiple claims on single households. Indeed, many claimants indicated having experienced up to five individual claimable events, leading to complexities in connection with apportioning losses to specific events, between insurers and resulting in delays in settlement (Potter et. al, 2015). This has had implication not only for the Toka Tū Ake EQC - private insurer relationships, but also for insurer-reinsurer arrangements and the number of excesses paid by the homeowner. For commercial properties this also had significant impact on business interruption payments (King et al., 2014).

2.6 Abandonment of land

As a consequence of the damage sustained to land by earthquakes, decisions were made to retreat from certain areas. The eastern part of the city was particularly badly affected with severe liquefaction, land settlement and damage to house foundations. Around 20,000 residential properties were affected by liquefaction and associated damage to potable drinking water supplies in the eastern suburbs (Cubrinovski et al., 2012). As a result, the government designated the most damaged areas of the city as 'residential red zone', which was not suitable for rebuilding. According to Statistics New Zealand, a total of 7,349 properties were 'red zoned' (Statistics New Zealand, 2014). Property owners were given settlement options and over the course of several years were required to vacate the area and their homes. The determination of red zone properties and the settlement process was time consuming (Chang-Richards & Wilkinson, 2016) and insurers and the Canterbury Earthquake Recovery Authority had to work together to manage this process including compensation.

2.7 Resource constraints

The post-earthquake period posed unforeseen capacity and capability challenges for the insurance industry (Chang-Richards & Wilkinson, 2016). Perhaps the single largest issue centred on staffing. Prior to September 2010, the Toka Tū Ake EQC office had a small staff of around 22 people. Despite having plans in place that drew on international assessors and call centres to handle claims, the volume and complexity of claims was almost overwhelming (King et al., 2014). Claims processing and other operational issues required many highly qualified professionals – particularly loss adjustors and engineers. At its height, the number of Toka Tū Ake EQC field staff alone who were employed in claims management and evaluation process peaked at 2200 (King et al., 2014). Loss adjustors brought in from other countries, would often stay for finite periods (e.g., 3 months), which led to duplication of efforts while continuity of claim management was not always achieved (Brown et al., 2017). In particular, members from the business community identified this lack of continuity of assessment staff (Stevenson

et al., 2011) with changes in assessors commonly occurring four to six times and in one case the respondent noted 15 changes in assessor (King et al., 2014).

The Toka Tū Ake EQC insurance not only covered damage to buildings but also had provision for land damage caused by liquefaction and landslide. Because of the extensive amount of such land damage experienced in Canterbury (Cubrinovski et al., 2012), geotechnical engineering expertise was in high demand (Chang-Richards et al., 2017). Coupled with the new changes to the building code, the need for technical expertise presented a resource constraint and added delays to progress as suitably qualified engineering staff (with earthquake experience) were essential in providing oversight to the numerous junior engineers hired to work on the rebuild (King et al., 2014). Contracting and subcontracting services also had challenges finding, developing, and retaining skilled labour (Chang-Richards et al., 2017; Chang-Richards & Wilkinson, 2016; Piri et al., 2015).

2.8 Information management

The management of more than 460,000 claims between Toka Tū Ake EQC and dozens of private insurers was challenged by the lack of integrated claims management systems (Brown et al., 2017). Toka Tū Ake EQC itself lacked processes for sharing information with external stakeholders at the time of the first earthquake in 2010, meaning it could not access information necessary to perform its duties without first obtaining consent from private insurers (Public Inquiry into the Earthquake Commission, 2020). It was noted that the number and complexity of sequential claimable events made tracking cases a major issue, exacerbated by the absence of a national building data repository and/or unique building identifiers (King et al., 2014). Poor information management systems and processes meant that some claimants had to engage with multiple loss adjustors, many of whom were not always able to obtain claim details (Brown et al., 2017). These factors each contributed to a landscape of poor data quality relevant to damaged houses.

2.9 Regulatory changes

Several post-earthquake regulatory changes had a substantial influence over the nature and cost of the rebuild (Brown et al., 2013). These changes increased exposure for insurers and posed challenges in terms of policy coverage and insurer liability (King et al., 2014). Adjustments to regulations included changes to the seismicity factor for the Greater Christchurch area, requiring higher design loadings than pre-earthquake. Effective from July 2017, the Building (Earthquake-prone Buildings) Amendment Act 2016 introduced new changes around the mandatory identification and management of potentially earthquake prone buildings (seismic performance rated at <34% of the new building standard) (Ministry of Business, Innovation and Employment, 2017). Territorial authorities must now submit details of buildings determined to be earthquake prone to MBIE's national ERPB register. The regulatory changes affect building users, councils, engineers, and other building professionals as well as building owners, and will also affect insurers. While this act focussed mainly on non-residential buildings, larger multi-unit residential buildings, such as apartment block (containing greater than three household units) were included in the classification (Ministry of Business, Innovation and Employment, 2017). In the post-earthquake context, changes to regulations raised questions for the insurance industry as to whether the remediation required to bring entire buildings up to the new standards was the responsibility of the insurer, or simply the repair of damaged portions only (Brown et al., 2017).

There were also changes to land use classification which mostly affected areas that were designated as high risk of liquefaction. In areas affected by liquefaction, new regulations mandated that dwellings required improved foundation design (Chang-Richards & Wilkinson, 2016). Owners of land at risk of boulder roll or landslide were required to undertake additional land remediation where risk-based assessments enabled residents to return (King et al., 2014) . In the case where land was deemed too unstable or risky for reoccupation, reclassification occurred. This resulted in the retreat from large tracts of land deemed unsuitable for residential purposes under the Land Use Recovery Plan, and these land areas were incorporated into the wider recovery strategy for Ōtautahi Christchurch and surrounds (Canterbury Earthquake Recovery Authority, 2013). In some parts of Canterbury, the earthquakes caused changes to residential land which meant some properties become more vulnerable to flooding than they had previously been. This resulted in the Christchurch City Council (CCC) needing to re-assess flood hazard and implement physical mitigation measures, as well as make changes to Flood Management Areas in the City Plan (Christchurch City Council, 2017; Earthquake Commission, n.d.-b).

As the above issues highlight the scale and demand of the Canterbury quakes was significant for the insurance sector. Not only were there challenges in direct relation to the application of policy to outcomes, (i.e., loss apportionment, reinstatement of cover) there were also complex issues around the management of the tasks required. These demands included ensuring that PMOs could attract and maintain sufficient and appropriate staff to meet the ongoing workload. There were also pressures connected with ensuring work was carried out in a timely manner, in accordance with changes in regulatory requirement, and was sensitive to the needs of homeowners and communities. Combined these issues presented significant challenges for insurers, PMOs and insurance policy holders alike.

3.0 OUTCOMES OF THE MANAGED REPAIR PROCESS

3.1 Overview

As noted, the residential repair process following the CES was an exceptionally large undertaking. ICNZ reported having paid out more than NZD\$19 billion in over-cap residential claims by the beginning of 2017, at which time 86% of all over-cap claims received to date had fully settled (Insurance Council of New Zealand, 2017). More than 67,000 damaged homes were repaired through Toka Tū Ake EQC's CHRP managed repair program (Earthquake Commission, 2019a). By February 2019, Toka Tū Ake EQC had spent approximately NZD\$2.96 billion on managing housing repairs through the CHRP alone (Earthquake Commission, 2019b). As noted, various outcomes of the managed repair process are important to understand when considering the effectiveness of managed repair compared to cash settlement. This research gives particular focus to the following areas: duration of claim settlements, cost of repairs, quality of housing repairs, and impact on the wellbeing of claimants.

3.2 Duration of claim settlement

The ongoing nature of the seismic sequence in Canterbury led to a reluctance by insurers to commence repairs until the risk of significant additional damage had reduced (King et al., 2014). The Toka Tū Ake EQC cover for land damage also caused delays with land damage assessments taking considerable time and private insurers wanting to delay any repair to auxiliary items (e.g., fences, retaining walls, driveways, pools) until land settlement was agreed.

Slow rates of assessment of work required (the initial Toka Tū Ake EQC function to determine whether claims were under or over-cap) caused issues between Toka Tū Ake EQC and private insurers (Egbelakin, 2016), particularly when work went over the NZD\$100,000 cap. Private insurers were reluctant to pay the escalating costs associated with repairs/rebuilds, citing Toka Tū Ake EQC slow claims process as responsible (Egbelakin, 2016). The insurance industry was also challenged by their own capacity to process claims. Access to sufficient qualified staff contributed further to time delays as did the high turnover of insurance staff due to fatigue and stress (Chang-Richards & Wilkinson, 2016).

Land zoning review and subsequent outcomes also added delays in repairs for affected residents. In June 2011, land was zoned into one of four categories; green (rebuilding allowed – subject to additional geotechnical assessments); red (no rebuilding allowed); orange and white zones (required additional assessments before being classified as red or green). It took until the middle of 2012 for the majority of the Orange zone housing to be designated, and many white zone properties remained under assessment (Taylor et al., 2012). Until such times as zoning decisions were made, residents were unable to progress with repair or replacement of property and land damaged by the quakes.

The average length of time for CES claims to be settled and repairs to be completed differed based on the size of the claim being made. Khakurel et al. (2021) provide a breakdown of the length of time for different stages in the claim settlement process for CES claimants, distinguished according to whether a claim was considered small, medium, or large (as above). This includes for the lodgement of claims (the duration between the damaging event and the date of claim lodgement), damage assessments (the duration between the date of claim lodgement and that of the most recent damage assessment undertaken), and property repairs (the duration between the date of the most recent damage assessment and the date repairs were officially completed).

Across the four most significant seismic events of the CES relative to the number of claims received by Toka Tū Ake EQC (September 2010, February 2011, June 2011, December 2011), the median length (in days) of the overall claim settlement process, from lodgement with Toka Tū Ake EQC to completion of repairs by either Toka Tū Ake EQC or private insurers, was as follows:

- Small claims (less than NZD\$15,000): 138-191 days
- Medium claims (NZD\$15,001-\$100,000): 712-890 days
- Large claims (more than NZD\$100,000): 1226-1392 days

On average, small claims took the longest for insurers to assess. Reasons for this include that many people with small claims first attempted to understand their ability to obtain minor settlements before proceeding to lodge a claim, and that prioritisation of life safety concerns was typically given to occupants' residing in properties with extensive damage, (Khakurel et al., 2021). For instance, following the February 2011 earthquake Toka Tū Ake EQC began a process of rapid assessments to categorise the scope of property damage and prioritise which homes required the most urgent attention (Earthquake Commission, 2019b).

Although large claims took the least amount of time on average to be lodged and for damage assessments to be completed, they nonetheless took the greatest duration for repairs to be completed; a median of 1133-1158 days, compared to a median of 489-742 days for medium claims. This is expected relative to the scope and complexity of damage and with already-stretched resources being used to complete repairs at the time of subsequent damaging aftershocks. Data on the average time for small claim repairs to be completed does not exist, as there are no official records of when and if cash settled claimants completed their repair process.

A total of 1,229 re-opened Toka Tū Ake EQC claims remained open as at 30 June 2021 (Earthquake Commission, 2021). For over-cap claims transferred from Toka Tū Ake EQC to private insurers, ICNZ reported that 27,754 out of 28,565 total claims (approximately 97%) had been settled as at 31 December 2019 (Insurance Council of New Zealand, 2019). Of those 811 remaining claims, 69 were the result of undecided claimants, 75 were in construction, 282 were being disputed, and 385 were in resolution (Insurance Council of New Zealand, 2019).

There were many disputes between Toka Tū Ake EQC and claimants as to what was and was not earthquake damage, which extended the duration to settlement. As time went on, it became increasingly difficult to differentiate between earthquake damage and unrelated issues (e.g., weathertightness and other pre-earthquake building defects) (Earthquake Commission, 2019b). Toka Tū Ake EQC reports that external pressures from the media and public to remediate repairs as quickly as possible "may have resulted in Toka Tū Ake EQC making pragmatic decisions to accept, in good faith, customer views on the causes of damage in their homes", thus making it "possible that some damage (for example, paint cracking) may have been accepted by Toka Tū Ake EQC as 'earthquake-damage' and attributed as missed scope, even though it was caused by other factors" (p. 58).

3.3 Cost of earthquake repairs

One of the main reasons for establishing a managed repair programme in Canterbury, instead of cash settling all claims, was over concerns that repair costs may inflate to unaffordable levels in the absence of managed repair. The managed repair approach taken included various measures aimed at keeping these repair costs under control, such as applying a standardised approach to repairs, installing a rates ceiling, and by subjecting contractor variances to approval processes (Earthquake Commission, 2014).

Overall, managed repair was generally considered to have been effective in preventing repair cost inflation concerns from eventuating (Controller and Auditor-General, 2015). In their 2015 audit of the CHRP, the Auditor General stated (p. 15):

As at 30 June 2014, EQC estimates that the cost of a repair is on average 14.2% higher than it was in February 2011. In comparison, the Canterbury inflation rate for purchasing a new house, which will have been affected by similar cost pressures and industry cost structures as home repair work, was 30.9% during roughly the same period.

This equates to a compounded average annual cost increase of 3.8% for repairs completed through the CHRP between February 2011 and June 2014 (Earthquake Commission, 2014). For comparison, data provided by Statistics New Zealand shows a compounded average annual cost increase of 7.6% for building new homes in Canterbury between February 2011 and March 2014, as well as a 4.5% increase in property maintenance costs over the same period. When the 3.8% figure for repairs completed through the CHRP is broken down further, 1.9% was attributed to regulatory compliance and 2.1% for increased costs for construction materials and labour (Earthquake Commission, 2014).

3.4 Housing quality

In the context of repairing earthquake-damaged residential properties, it is not only the repair process that is important but also the quality of these repairs. This is especially relevant in the context of managed repair, where homeowners depend upon contractors who are externally assigned to their property to complete repair work: a hands-off approach for homeowners compared to cash settlement.

Serious concerns about the substandard quality of earthquake repairs arose following the CES managed repair. As noted in the 2020 Public Inquiry, in relation to homeowners whose claims were settled through managed repair, “EQC has been unable to reassure [Canterbury] homeowners that the repairs, over which those homeowners had little control, were done to a satisfactory standard (and in some cases, whether they were done at all), which has caused considerable distress to homeowners” (2020, p. 14). The quality of earthquake-repaired housing through managed repair is an essential consideration when comparing with a cash settlement approach for insurance claims.

The Building Research Association of New Zealand (BRANZ) provides a definition of “quality” for residential building construction, which incorporates three key factors (Curtis & Gordon, 2018):

- **Functionality:** all functional requirements within the building contract are met.
- **Durability:** building materials, components, and construction methods ensure the building satisfies building code requirements for its expected life and does not require significant interventions to improve its condition.
- **Performance:** the building performs as necessary according to different design elements, including structural, seismic, and thermal requirements.

Toka Tū Ake EQC and private insurers were responsible, and liable, for ensuring that homes repaired were restored or reinstated to a condition of appropriate quality. Under the Earthquake Commission Act, the replacement value of a residential building covered by Toka Tū Ake EQC is defined as being the cost of:

Replacing or reinstating the building to a condition substantially the same as but not better or more extensive than its condition when new, modified as necessary to comply with any applicable laws.

As a result, Toka Tū Ake EQC is liable for repairing or rebuilding damaged homes to the condition they were "when new" and for any legal building requirements subsequently enacted which must be complied with, such as updated building codes or standards. This was reaffirmed in a joint statement between Toka Tū Ake EQC and the EQC Action Group in 2016 (Earthquake Commission, 2019b). Subject to the wording of the insurance policy, private insurers typically had similar obligations.

A consequence of establishing the CHRP was that liability for inadequate repair work (and associated impacts on housing quality) was borne by Toka Tū Ake EQC and not individual homeowners. Despite early efforts by Toka Tū Ake EQC to outsource primary liability for such work to the successful external project manager, no parties agreed to take on this accountability (Controller and Auditor-General, 2013).

3.4.1 Missed scope and re-work on repairs

The earthquake repair work on some Canterbury homes has drawn significant attention over the years, with a notable portion of homes requiring further repairs or remediation after initial works had been completed. For example, of the 67,000 homes repaired in the CHRP, several thousand required further work to be undertaken after initial repairs had been completed. The majority, however, required no further re-work. As noted by the Auditor-General in their 2015 follow-up audit of the CHRP, "on one hand, there are problems with the quality of some repairs [yet] on the other hand, many thousands of people are residing in repaired houses" (Controller and Auditor-General, 2015).

Five key reasons were identified for why re-work on repairs were necessary (Earthquake Commission, 2019b, p. 56):

- a. Missed scope (damage missed in initial repair scope)
- b. Incomplete scope (damage identified in initial repair scope but not repaired)
- c. New damage (damage arising from subsequent earthquakes after initial repairs completed)
- d. Failure of, or incorrect, repair strategies and/or building materials
- e. Repair quality (unacceptable standards of repair work quality)

Of these reasons, missed scope is distinct from issues related to repair quality and new damage occurring. A combination of factors led to damage being missed at the time properties were assessed, including health and safety concerns with ongoing aftershocks preventing some damage being assessed at the time, damage not being visible at the time of assessment, and that some damage was simply overlooked (Public Inquiry into the Earthquake Commission, 2020).

A Toka Tū Ake EQC briefing submitted to the Public Inquiry, which provides statistical data for earthquake repair re-work, refers to 'remedial repairs' as an all-encompassing term that includes all re-opened claims whether they were re-opened because of substandard repair work or otherwise (Earthquake Commission, 2019b). As a result, there is no distinguishment between remedial repairs (arising from substandard work) and additional repairs (arising from missed scope) in the data provided.

Toka Tū Ake EQC provides figures for the percentage of cost and proportion of properties associated to these five reasons, though it cautions the data is "not reliable" because of inconsistencies in recording methods and over/undercounting for individual properties (Table 3). The figures are therefore provided for illustrative purposes only.

Table 3: Illustrative Toka Tū Ake EQC figures of reasons for re-work (Earthquake Commission, 2019b)

REASON FOR RE-WORK	% OF RE-WORK COST BY EQC	% OF AFFECTED PROPERTIES
Missed scope	49	40
Incomplete scope	6	9
New damage	2	3
Incorrect and/or failed repair	10	13
Repair quality	4	4
Other	29	31

The figures in Table 3 imply missed scope was the leading reason for re-work, both as a percentage of cost and portion of affected properties. This is not unexpected given the context of a difficult assessment environment at the time, as noted above. Additionally, the figures imply one quarter of properties requiring re-work were the result of incomplete scope, incorrect or failed repairs, and inadequate repair quality.

Another factor that appears to have contributed to issues with inadequate repairs was the potentially liberal use of building consent exemptions. The Public Inquiry notes that discretion in allowing building consent exemptions and building compliance requirements under the Building Act 2004 meant many homes were repaired without the city council needing to sign off on the work (Public Inquiry into the Earthquake Commission, 2020). Because inspections associated with the building consent process serve as a form of quality control by local authorities, this layer of control was removed where exemptions were applied.

Decisions to provide exemptions, to the extent they were used for earthquake repairs, served as a trade-off against the extensive time and resources that would have been required from councils to approve and issue building consents to every home needing significant repair work, at a time when the CCC was struggling to process building consents (Cairns & Young, 2013; Crown Manager, 2015). On the other hand, many re-worked repairs may have possibly been avoided if greater monitoring and quality control had been implemented for damage assessments (Earthquake Commission, 2019b). It was noted in the Public Inquiry that given the considerable ongoing shaking and risks associated with underfloor assessments following the February 2011 earthquake, “assessments quickly became superficial and unreliable as a means of measuring the extent of earthquake-related damage, developing the repair plan or costing the repair [of homes]”, and that the scale of damaged homes and external pressure to assess these quickly made it “impossible” to sufficiently assess all homes in need (Public Inquiry into the Earthquake Commission, 2020, p. 124). In this context, the subsequent demand for additional repairs to be completed was almost inevitable.

The type of re-work needed ranged from minor work, such as cosmetic issues, to more significant work, such as issues with structures and foundations. A significant issue which arose was in relation to defective foundation repairs. In 2015, the Ministry of Business, Innovation and Employment (MBIE) assessed the quality of a select number of earthquake-damaged homes that had undergone managed structural repair work and had been exempt from requiring a building consent. From the sample of repaired homes assessed by MBIE, approximately one third (35%) were found to be non-compliant with the Building Code (MBIE, 2015). Most non-compliance arose from defective flooring and foundation repairs and were assessed to pose no serious risk to occupants’ life safety. Still, MBIE described this standard of repair quality as unacceptable and asserted that failure to remediate such work may lead to

premature material deterioration of the homes and therefore expose them to damage in future potential seismic events (p. 13).

Although the MBIE assessment itself was not considered to be statistically representative of all homes repaired by the CHRP and private insurer PMOs, it did nonetheless prompt Toka Tū Ake EQC to arrange the reassessment of repair files for several thousand repaired homes in August 2015 (Controller and Auditor-General, 2015). Of the 2,325 repaired properties reviewed by Toka Tū Ake EQC to assess underfloor repair quality, 1,005 homes were identified to have compliance issues with the building code (Public Inquiry into the Earthquake Commission, 2020). Approximately one third (33%) of these issues were considered “minor” and rectified by Fletcher Building, over half (58%) had “moderate” issues requiring between NZD\$25,000-\$50,000 worth of remedial work by Toka Tū Ake EQC, while the remaining homes (9%) had “complex issues” requiring more than NZD\$50,000 in remedial work.

As at February 2019, Toka Tū Ake EQC had re-worked repairs for a total of 6,047 properties (excluding those which had contractor rework completed within the 90-day repair defect liability period) (Earthquake Commission, 2019b). Fletcher Building assessed the overall rate of defective earthquake repairs as being 4% of the homes repaired by the CHRP, which Fletcher noted is consistent with what it would typically expect for defects from normal construction processes (Public Inquiry into the Earthquake Commission, 2020).

3.4.2 Satisfaction with repairs

The quality of earthquake repairs can also be partly understood based on the reported satisfaction of claimants. Between July 2013 and April 2015 Toka Tū Ake EQC conducted a total of 27 surveys to understand homeowners’ satisfaction of earthquake repair quality immediately after repairs had been completed (Earthquake Commission, 2019b). On average, more than four fifths (approximately 84%) of respondents indicated consistently they were either “satisfied” or “very satisfied” with the quality of repairs undertaken (Controller and Auditor-General, 2015, p. 23). Nevertheless, after this period there was a “substantial growth” of re-opened claims in relation to the quality of repairs, either from missed damage or inadequate repair work (Earthquake Commission, 2019, p. 53). A similar picture emerged from the 2015 MBIE survey noted above, where a small number of homeowners whose properties were structurally fixed through managed repair and were exempt from requiring a building consent (MBIE, 2015). Approximately 66% of those surveyed indicated they were satisfied with the repair quality of their homes, despite approximately 61% of surveyed homes either having compliance issues with the building code or suffering from a “minor defect” (MBIE, 2015).

Relying on homeowners’ subjective reports of satisfaction to understand the quality of earthquake repairs is, however, limited in its effect. The Auditor General noted in their follow up audit of the CHRP that Toka Tū Ake EQC customer satisfaction surveys measure “the perceived quality of repairs, not the actual quality of repairs”, and that the process of completing satisfaction surveys “within a week of repairs being completed means that repair quality issues could arise after this time” (Controller and Auditor-General, 2015, p. 24). This is exactly what happened for many claimants, driving the number of remedial repairs needing to be addressed largely from 2015 onward. Many non-cosmetic repair issues, especially those concerning structural and foundational defects, are much more difficult for homeowners to notice and more likely to become evident after some time has passed (Controller and Auditor-General, 2015).

To emphasise the limitations of drawing correlations between homeowner satisfaction and repair quality, the Auditor General drew attention to data gathered in a 2014 BRANZ housing quality survey for

new builds. The survey, in which more than 200 new homes were evaluated across Aotearoa New Zealand (including Ōtautahi Christchurch), found that four in five new homeowners (81%) had called back tradespeople for issues concerning quality (BRANZ, 2014). Yet, an even greater number of homeowners (88%) indicated they were “at least fairly satisfied” with the overall quality of their new homes (p. 16). As reported by BRANZ, high self-reported satisfaction should be approached with some caution given that most homeowners are “unable to check” potential defects beyond the cosmetic and so “rely on the industry to do its job” (BRANZ, 2014, p. 16).

3.4.3 Cash settled claim repairs

As noted, while tens of thousands of homes in Canterbury were repaired or rebuilt under the CERP, close to 100,000 claims for damaged dwellings were in fact cash settled as at March 2017 (most of which were small claims of up to NZD\$15,000) (Wilkinson et al., 2018). Unfortunately, because there is no data on the progress made with earthquake repairs by homeowners who received a cash settlement, it is difficult to comprehensively compare these instances with managed repairs. Nonetheless, the September 2015 Canterbury Wellbeing survey of residents provides some insight into the decision-making processes of homeowners who received a cash settlement in the CES.

The survey found that of those who had received or had been offered a cash settlement, 22% were intending to repair or rebuild but had not yet begun (Canterbury Earthquake Recovery Authority, 2015). This small sample group (consisting of only 76 respondents, including 56 owner-occupiers and 20 owners who did not usually reside in the property in question) were asked to provide reasons for not yet starting repairs or rebuild Figure 1. Dominant reasons provided included that the owners were still planning or deciding on the scope of repairs (58%), that repairs were not a priority for them at the time or they lacked the energy to complete the process (44%), and because of limited access to tradespeople for completing repair work (18%).

The Canterbury Earthquake Recovery Agency emphasises that this is indicative only, given the small sample size. Additionally, caution should be exercised when interpreting the decision-making considerations of cash settled claimants based on the size of the claim. For instance, key considerations for cash settled claimants with relatively minor damage may differ from those with more significant damage. Nonetheless, it does provide an insight into potential factors considered by claimants when deciding whether to use cash settlement funds to complete repairs.

3.4.4 House sales

Concerns remain over the quality of earthquake damaged homes in Canterbury which were on-sold after the earthquakes. In some instances, claimants legally assigned their insurance claim to the new homeowners when selling the property, enabling the new owners to use the claim to carry out repairs or to re-open a claim with Toka Tū Ake EQC where missed earthquake damage is identified or where previous Toka Tū Ake EQC repairs fall below statutory requirements.

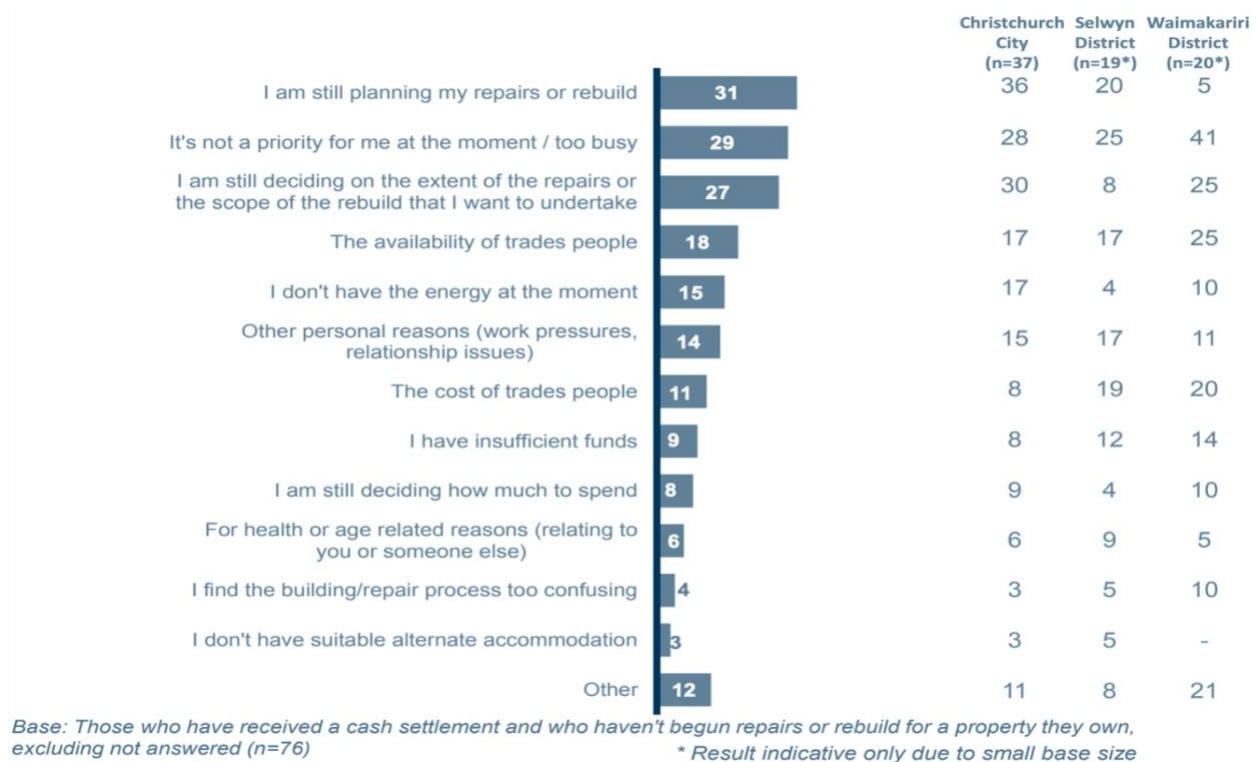


Figure 1: Reasons for cash-settled claimants not starting repairs or rebuilds (Canterbury Earthquake Recovery Authority, 2015)

However, issues arise where missed damage is discovered, and insurance claims have not been assigned to subsequent homeowners. Toka Tū Ake EQC states in instances “where the previous homeowner did not use those funds to complete repairs, the new homeowner has no further entitlement for that natural disaster damage” and cautions that it is “important to undertake due diligence to find out whether work associated with a claim that Toka Tū Ake EQC has previously settled has been completed” (Earthquake Commission, n.d.). The same issue exists where new owners subsequently discovered missed damage or inadequate repairs that exceeded the Toka Tū Ake EQC cap (NZD\$100,000 + 15%), leaving them with little or no ability to make a private insurance claim for the additional damage.

By the end of 2018, between 50,000-60,000 Toka Tū Ake EQC-assessed properties had been sold across Canterbury (The Treasury, 2019). Estimates from 2019 of the number of on-sold homes that had been subsequently assessed as having new over-cap damage was at least 1,000, with the potential for more to be identified (Robertson & Woods, 2019). The Government has since attempted to assist these homeowners. A policy was implemented in 2019 which allowed ex-gratia payments for eligible Canterbury homeowners who had unknowingly purchased on-sold over-cap damaged properties, and who had no financial mechanism to get appropriate repairs undertaken. An on-sold over-cap property is understood as a property which has been sold and missed or un-scoped earthquake damage has since been identified and valued above the Toka Tū Ake EQC cap, and the homeowner is unable to recover this from private insurance.

The policy was designed to provide “remedies to support a fair, timely, and enduring resolution of the social issues arising from uncompensated damage to on-sold properties from inadequate EQC commissioned repairs or damage missed from the EQC assessments” (The Treasury, 2019, p. 13). When released, it was estimated at least 1,000 homes would be affected by the policy and cost around NZD\$300 million in total. Toka Tū Ake EQC received close to 6,000 expressions of interest from Canterbury homeowners for the on-sold programme by the 14 October 2020 deadline for applications (Earthquake Commission, 2021). More than 1,300 of these applications had been processed by February

2021, of which 518 were deemed eligible and a settlement agreement had been reached (Murphy, 2021). As at October 2021, Toka Tū Ake EQC had paid out more than NZD\$40 million to qualifying homeowners on behalf of the Crown (Earthquake Commission, 2021).

Additionally, many homes in Ōtautahi Christchurch were sold ‘as is, where is’ (AIWI); in a damaged condition, typically at a lower cost (Public Inquiry into the Earthquake Commission, 2020). In contrast to homebuyers purchasing properties ignorant to any existing or remaining earthquake damage described above, purchasers of AIWI properties are aware of the damaged state of the property they are buying. Owing to their damage, AIWI properties are not insurable. At its peak, AIWI sales reached 7 percent of all house sales in Christchurch and were typically centred around areas which were flood-prone or of poor land quality. Today, more than a decade following the first earthquakes in the CES, the sale of AIWI properties in Ōtautahi Christchurch remains a lucrative industry for the likes of developers and others who specialise in repairing and renovating homes to sell on the market. To our knowledge, there is no data available documenting the repair of AIWI properties, so the impact on the housing stock, and the impacts on those living within AIWI properties, is unknown.

3.5 Impact on wellbeing

3.5.1 Prioritising vulnerable claimants

Through the managed repair process attempts were made to expedite the earthquake repairs of vulnerable claimants in Canterbury. Prioritisation of vulnerable claimants from the CES occurred in two distinct phases: initial emergency repairs, and full repairs.

Rapid assessments were completed by Toka Tū Ake EQC to categorise homes according to the extent of structural damage sustained (or lack thereof). These assessments were used to identify homes in most need of emergency repairs (Public Inquiry into the Earthquake Commission, 2020). Toka Tū Ake EQC, through CHRP, completed emergency repairs on 59,800 homes following the 22 February, 2011 earthquake (Public Inquiry into the Earthquake Commission, 2020). A winter heat programme was also carried out through CHRP to provide heat sources to damaged homes which had lost their sole source of heating, with priority given to homes occupied by sick or elderly, young children, or homes that had no alternative source of heating (Earthquake Commission, 2019b). The rapid assessments and emergency repair work completed were outside the usual scope of Toka Tū Ake EQC’s business operations, and were initiated under direction from the government (Public Inquiry into the Earthquake Commission, 2020). Notably, emergency repairs (including the winter heat programme) applied to all homes, regardless of whether the property was insured (Earthquake Commission, 2019b). The Public Inquiry notes that this is “an indication of the Government’s readiness to assist at a time of major natural disaster that may well be repeated in future major events” (p. 122). Prioritisation of this nature was wholly based on the life safety / urgent welfare needs of people impacted by the earthquake(s).

Prioritisation was also applied for completing residential earthquake repairs beyond emergency needs, for claimants who were considered vulnerable. Identifying vulnerable persons can be a challenging action to undertake. As reported in the Public Inquiry (2020, p. 178):

Obvious markers of vulnerability such as advanced age, number of young children or physical or mental illness are not necessarily definitive. By way of example, [Canterbury District Health Board] noted that some of those least able to manage after the Canterbury earthquakes were people who, in normal times, were in control of and made decisions about their lives and had infrequent

interactions with government agencies, but were disconcerted and discomfited by the shocks and stresses that a natural disaster brought to everyday living, including interaction with EQC and insurance processes.

Different methodologies were used by Toka Tū Ake EQC and private insurers to identify vulnerable claimants and home occupants. Prior to the beginning of the CES in September 2010, Toka Tū Ake EQC generally identified claimants as vulnerable where they were elderly and/or had health complications (Public Inquiry into the Earthquake Commission, 2020). By the end of 2012, Toka Tū Ake EQC had worked with the Ministry of Social Development to develop claimant vulnerability criteria. This included persons with a dependency on others for basic personal care; a diagnosed terminal illness; a health condition requiring continuous monitoring or regular medication; recent bereavement (with emphasis on those who experienced bereavement in the 22 February 2011 event); requirements for regular hospital or doctor visits; age; and where a comparatively minor repair would significantly improve living conditions (Earthquake Commission, 2019b, p. 49). Toka Tū Ake EQC notes that individual cases were also considered for persons who did not fit any of the aforementioned criteria. Private insurers had similar criteria. For example, Southern Response identified claimants as vulnerable according to guidelines developed by the Human Rights Commission, primarily including health or disability, living and family situation, and age (MacDonald & Carlton, 2016).

Prioritising repairs for vulnerable claimants was intended to ensure work was completed first for those who were most at risk. Toka Tū Ake EQC assigned a case manager and allocated “repair slots” for vulnerable claimants, with more than 27,000 vulnerable claimants having been identified as at 1 June 2014; at which time, 76% of repairs for these claimants had been completed (Earthquake Commission, 2019b, p. 49). According to ICNZ, private insurers had identified more than 4,000 claimants as vulnerable by June 2013 (Greenill, 2014).

Baird (2017) notes there were “numerous examples of home owners who appeared to come within the [vulnerability] criteria, but were not adequately prioritised” (p. 209). This is attributed in part to the lack of preparedness of Toka Tū Ake EQC and private insurers to complete a managed repair programme at the time of the CES, let alone dealing with the scale of claims generated from the disaster. For instance, it took considerable time for vulnerable claimants to be identified and prioritised in the first instance. The Public Inquiry (2020) emphasised that Toka Tū Ake EQC identified most of its vulnerable customers between August 2013 and May 2014; more than two and a half years after the 22 February 2011 earthquake. Formal action for identifying vulnerable claimants was not taken until November 2012 at the earliest, and different perspectives exist over the effectiveness of prioritisation of repair work for these homeowners (Public Inquiry into the Earthquake Commission, 2020). For instance, Toka Tū Ake EQC claimed in 2014 that repairs were completed on average 25 percent faster for vulnerable claimants than for other claimants (Public Inquiry into the Earthquake Commission, 2020), yet the Auditor-General reported in 2015 that Toka Tū Ake EQC had issued work orders for repairs quicker on average for vulnerable claimants than others but repair work had not been completed “significantly sooner” for vulnerable claimants (Controller and Auditor-General, 2015, p. 35). Toka Tū Ake EQC noted that this is because the timeline for actual repair work is highly contextual to the nature of earthquake damage in need of remediation and, therefore, something Toka Tū Ake EQC does not control (Controller and Auditor-General, 2015). From the perspective of Fletcher Building (the Toka Tū Ake EQC contractor for under-cap, CHRP managed repairs), a poorly coordinated customer relationship between itself and Toka Tū Ake EQC made prioritising repairs for vulnerable claimants difficult (Public Inquiry into the Earthquake Commission, 2020). It appears that a lack of preparation for identifying vulnerable claimants for a managed repair context drove challenges with expediting repair work for vulnerable claimants.

3.5.2 Mistrust

Early on, the CES claim settlement process was stymied in part by a climate of mistrust amongst claimants toward private insurers, Toka Tū Ake EQC, and government earthquake-response agencies. Beaven (2017) notes multiple reasons why many claimants held a lack of trust in these parties, including widespread negative public perceptions of insurers and Toka Tū Ake EQC, different and often conflicting advice provided to claimants by each party, and a lack of understanding of who to contact for accurate advice. This mistrust negatively impacted claimants' access to advice and information relevant for making decisions about insurers offers presented to them, including whether the settlement offers presented matched actual insurance policies.

For a myriad of reasons, the public reputation of Toka Tū Ake EQC plummeted in the years following the Canterbury earthquakes. This was noted in the Public Inquiry into the Earthquake Commission (2020, p. 9):

EQC is derided by many, predominantly in Canterbury. A similar reaction to private insurers is also apparent, although more muted. But a body such as EQC—seen as the face of government—that had always been helpful and supportive prior to the Canterbury earthquakes was seen to be uncaring, miserly and inefficient. This reputation gathered pace and EQC is now frequently mentioned with distaste and even expletives.

EQC did deal, albeit sometimes poorly, with the repair programme in Canterbury under very challenging conditions. While a proportion of the Canterbury population will not agree, for that EQC should be acknowledged.

It is within this environment of mistrust, in 2013, that the Residential Advisory Service (RAS) was established, to help claimants progress their claims and understand relevant advice that was not otherwise being obtained from insurers or government agencies. Reflecting the mistrust toward information provided by insurers and government agencies, requests made under the Official Information Act (OIA) to Toka Tū Ake EQC experienced an “unprecedented” increase from less than 50 in total prior to September 2010, to an average of 400 per month in mid-2013 (Human Rights Commission, 2013, p. 107).

3.5.3 Mental and physical health challenges

The CES had a significant impact on the mental and physical health of Canterbury residents. Chronic ailments, such as arthritis and mental health problems were identified by the Canterbury District Health Board (CDHB) as being exacerbated by substandard housing and living conditions that prevailed post-earthquakes (Canterbury District Health Board, 2012). Overcrowding in homes with substandard quality, due to a shortage of residential properties after the earthquakes, is also cited by the CDHB as likely to have contributed to a whooping cough epidemic that occurred in Ōtautahi Christchurch in 2012.

Increased experiences of stress among Canterbury residents were also widely reported as a consequence of the CES. Notably, stress and other impacts on wellbeing related to earthquake-damaged housing issues is not restricted to owners themselves. The Human Rights Commission notes “stress from parents dealing with housing issues [is] a significant factor in the increased level of distress among children reported to youth mental health services” (Human Rights Commission, 2013, p. 105).

Negative health impacts experienced by many residents was the result of various factors, including the need to engage in the insurance claims process for their damaged homes and to make decisions related to earthquake damage and repairs. For instance, the proportion of people who reported that dealing

with Toka Tū Ake EQC/insurance issues over personal property claims continued to have a moderate or major negative impact on their everyday lives steadily declined over time (Figure 2).⁶ While 26% of survey respondents reported this in April 2013, this number had dropped to just 8% by September 2016 (Canterbury District Health Board, 2016). This trend is not unsurprising given that almost all first-time claims had been settled by 2016. Dealing with Toka Tū Ake EQC/insurance issues and making decisions about property damage, repairs, and relocation were the 1st and 2nd most pertinent causes of continued negative impacts on everyday life for residents in April 2013. By September 2016, these issues ranked as the 6th and 9th most influential factors, respectively. The September 2016 survey asked residents who indicated they were still being negatively impacted by dealing with Toka Tū Ake EQC/insurance issues to provide reasoning. Among the most reported responses included issues with the quality and timeliness of repairs, financial loss or uncertainty, emotional wellbeing, slow claims progress with Toka Tū Ake EQC, and ongoing negotiations with private insurers (Canterbury District Health Board, 2016).

	Sept 2012	April 2013	Sept 2013	April 2014	Sept 2014	April 2015	Sept 2015	April 2016	Sept 2016
Dealing with EQC/insurance issues in relation to personal property and house	37	26✓	23✓	21	15✓	13✓	13	10✓	8✓

Base: All respondents, excluding not answered

Figure 2: Percentage of survey respondents who reported experiencing continued negative impacts (moderate or major) from dealing with insurance-related issues (Canterbury District Health Board, 2016)

Those who were more likely to indicate having experienced a moderate or major negative impact on their everyday life from insurance dealings also changed over time. In April 2013, people most likely to report such impacts included those living in temporary accommodation, had a physical health condition or disability, from a household with an income of greater than NZD\$100,000, or those aged between 50-64 years. By September 2016, this had shifted to owner-occupiers who had unresolved claims and people dealing with over-cap claims.

Residents were also asked about whether their everyday lives had continued to be negatively impacted because of decisions around damage, repairs, and relocation. Similar to those who reported experiencing negative impacts from dealing with Toka Tū Ake EQC/insurance issues, people who reported negative impacts from decisions around damage, repairs, and relocation also declined over time, from 22% in April 2013 to 7% in September 2016 (Figure 3). In April 2013, those more likely to indicate this was having a continued negative impact on their everyday lives were people living in temporary housing or those with a physical health condition or disability. By September 2016, this consisted of owner-occupiers with unresolved claims, those dealing with over-cap claims, and those living in temporary housing. For comparison, those *less likely* to indicate a continued moderate or major negative impact in September 2016 included those with a claim of less than NZD\$15,000, which were for minor damage and typically cash settled by Toka Tū Ake EQC.

	Sept 2012	April 2013	Sept 2013	April 2014	Sept 2014	April 2015	Sept 2015	April 2016	Sept 2016
Making decisions about house damage, repairs and relocation	29	22✓	21	19	14✓	12✓	11	9✓	7✓

Base: All respondents, excluding not answered

Figure 3: Percentage of survey respondents who reported experiencing continued negative impacts (moderate or major) from making housing-related decisions (Canterbury District Health Board, 2016)

⁶ Green figures presented in Figure 2 and 3 represent a decrease in the percentage of impacted persons on the year prior.

3.5.4 Housing quality impacts on renters

The CES also had a significant impact on the availability and quality of rental accommodation in Ōtautahi Christchurch and surrounding areas, which by extension, had a disproportionate impact on renters. The impact of the CES on renters' living situation is important to understand when considering the impact of the earthquakes and the managed repair process on renting in Canterbury. The number of people who rent instead of owning their own home has steadily increased across Aotearoa New Zealand over the last few decades. Almost one third (31.9%) of Aotearoa New Zealand households reported renting their home at the time of the 2018 Census, up from 22.9% of households in 1991 (Statistics New Zealand, 2020). More than four fifths of these households rent their properties from private landlords.

The CES exacerbated already-existing systemic issues of poor housing quality faced by many renters in Aotearoa New Zealand. Even without the impact of earthquakes or other natural hazards, renters in Aotearoa New Zealand are on average more likely to experience living in inadequate housing quality compared to owner-occupiers, including cold, dampness, and mould (Statistics New Zealand, 2020; Human Rights Commission, 2013). In 2013, a Tenants' Protection Association (TPA) survey of 365 tenants across Ōtautahi Christchurch and surrounding districts found 60% were living in properties with earthquake damage (Laura Gartner, 2013). Examples of reported damage included cracks, damaged foundations, leaks, dampness, and mould. In many instances it was reported that tenants had no choice but to live in housing of such substandard condition because of the significant shortage of available rental properties on the market, which did not begin to ease until well into 2015 (Baird, 2017).

The CES reduced the quality of available rental accommodation and caused average rent prices across Canterbury to increase significantly. Almost one sixth (17%) of respondents in the 2012 Canterbury Wellbeing survey indicated they rented their current place of residence from a private landlord, while this was approximately one seventh (15%) of respondents in the September 2015 survey conducted three years later, by which time almost all first-time CHRP repairs had been completed. It was noted that pressure on the remaining supply of rental accommodation in Ōtautahi Christchurch was aggravated by multiple reasons, including decisions by homeowners to sell their properties, landlords moving into their rental accommodation to live while their usual place of residence was having repairs undertaken, and tenants staying in their rental accommodation for longer (Human Rights Commission, 2013).

Approximately 67% of people less likely to rate their overall quality of life as positive in September 2015 were renters, and 24% of people who indicated their quality of life had decreased over the prior 12 months also renters (Canterbury Earthquake Recovery Authority, 2015). In addition, among the 13% of people who reported relocating after 4 September 2010 and indicated some form of dissatisfaction with their new location, 66% were renters. An emotional wellbeing score (the WHO-5) was also assessed amongst residents of Greater Christchurch (Canterbury Earthquake Recovery Authority, 2015). Amongst those more likely to have a score below the mean average across Greater Christchurch in September 2015, 57% were renters.

4.0 SUMMARY

It is inevitable that Aotearoa New Zealand will face the challenge of repairing and rebuilding damaged residential properties in the aftermath of future significant natural hazard events. Learning from past experiences for how to best deal with such occurrences is critical for preparing to deal with future large-scale events. The experiences of the CES are therefore highly useful when looking to the future.

The unprecedented scale of damage caused by the CES to residential properties led Toka Tū Ake EQC and private insurers to deviate from the typical cash settlement approach to insurance claims and instead opt for managed repair programmes. Such a move was deemed necessary due to the sheer scale of the disaster and Aotearoa New Zealand's national ability to repair the damage in an orderly and timely way. The approach was intended to avoid concerns raised in relation to a cash settlement approach, including potential pressures over repair costs and resources, as well as cash payments not ultimately resulting in homes being repaired (Public Inquiry into the Earthquake Commission, 2020). At the time of the first earthquake, Toka Tū Ake EQC was simply not prepared to take on a managed repair programme of such proportions (Earthquake Commission, 2019b). Given the challenging circumstances, Toka Tū Ake EQC's managed repair programme can be assessed by and large as having successfully managed repair costs to a sustainable level, sought to prioritise the most vulnerable, and ensured claimants with access to relevant tradespeople. At the same time, the quality of repairs completed through managed repair programmes drew criticism from many claimants, with thousands requiring additional repair work either to remedy defective repairs or fix originally missed damage.

Assessing the outcomes of the managed repair programmes in Canterbury provides a basis for informing broader considerations of appropriate insurance settlement models in future large scale disasters. As the most recent, and heavily researched insurance event in New Zealand it is useful to reflect on the experiences of homeowners, building professionals and insurers, and the impacts on housing quality and claimant wellbeing. The insurance response to the CES highlights factors and impacts that should be evaluated following other events to measure recovery efficacy. As such, a comprehensive review of the CES is an important input to the study of the 2016 Kaikōura/Hurunui earthquake residential recovery. The key findings from this review will inform project design to ensure relevant aspects of the insurance response and residential recovery are captured. This approach will also enable future comparison between event responses, if desired.

5.0 REFERENCES

- Baird, N. (2017). Housing in Post-Quake Canterbury: Human Rights Fault Lines. *New Zealand Journal of Public and International Law*, 15(2), 195–228.
- Beaven, S. (2017). *The Residential Advisory Service: Collaborative governance after a New Zealand disaster*. https://www.eqc.govt.nz/sites/public_files/1802-Collaborative-governance-after-NZ-disaster_0.pdf
- BRANZ. (2014). *Study Report SR 335 (2015): New House Construction Quality Survey 2014*. https://d39d3mj7qio96p.cloudfront.net/media/documents/SR335_New_house_construction_quality_survey_2014.pdf
- Brown, C., Seville, E., & Vargo, J. (2017). Efficacy of insurance for organisational disaster recovery: case study of the 2010 and 2011 Canterbury earthquakes. *Disasters*, 41(2). <https://doi.org/10.1111/disa.12201>
- Brown, C., Vargo, J., & Seville, E. (2013). *The role of insurance in organisational recovery following the 2010 and 2011 Canterbury earthquakes: Vol. 2013/04*. Resilient Organisations. http://www.resorgs.org.nz/images/stories/pdfs/Organisationsfacingcrisis/the_role_of_insurance.pdf
- Cairns, L., & Young, R. (2013, July 1). *Council set to lose consenting power*. Stuff.
- Canterbury District Health Board. (2012). *Housing, home heating and air quality: A public health perspective. A briefing paper for the Canterbury District Health Board*.
- Canterbury Wellbeing Survey, (September 2016).
- Canterbury District Health Board. (2016). *Canterbury Wellbeing Survey 2016*.
- Canterbury Earthquake Recovery Authority. (2013). *Land Use Recovery Plan*.
- Canterbury Earthquake Recovery Authority. (2015). *Canterbury Wellbeing Survey*. <https://www.cph.co.nz/wp-content/uploads/cerawellbeingsurveysept2015.pdf>
- Chang-Richards, Y., & Wilkinson, S. (2015). The roles of integrated project management frameworks and the insurance industry in post-disaster reconstruction: Recovery after the 2010 and 20100 Christchurch Earthquakes. In P. Daly & M. Feener (Eds.), *Rebuilding Asia: Approaches to Post-Disaster Reconstruction in the Asia-Pacific Region*. Cambridge University Press.
- Chang-Richards, Y., & Wilkinson, S. (2016). The insurance industry and integrated project management frameworks in post-disaster reconstruction: recovery after the 2010 and 2011 Christchurch earthquakes. In P. Daly & R. M. Feener (Eds.), *Rebuilding Asia Following Natural Disasters* (pp. 339–366). Cambridge University Press.
- Chang-Richards, Y., Wilkinson, S., Seville, E., & Brunson, D. (2017a). Effects of a major disaster on skills shortages in the construction industry: Lessons learned from New Zealand. *Engineering, Construction and Architectural Management*, 24(1), 2–20.

- Chang-Richards, Y., Wilkinson, S., Seville, E., & Brunson, D. (2017b). Effects of a major disaster on skills shortages in the construction industry: lessons learned from New Zealand. *Engineering, Construction and Architectural Management*, 24(1), 2–20.
- Christchurch City Council. (2017, November 23). *Flood Intervention Policy*.
- Controller and Auditor-General. (2013). *Earthquake Commission: Managing the Canterbury Home Repair Programme*. <https://oag.parliament.nz/2013/eqc/docs/oag-earthquake-commission.pdf>
- Controller and Auditor-General. (2015). *Earthquake Commission: Managing the Canterbury Home Repair Programme - follow-up audit*. <https://oag.parliament.nz/2015/eqc-follow-up/docs/eqc-follow-up.pdf>
- Crown Manager. (2015). *Final Report of the Crown Manager for Building Control at Christchurch City Council*.
- Cubrinovski, M., Henderson, D., & Bradley, B. A. (2012). Liquefaction impacts in residential areas in the 2010-2011 Christchurch earthquakes. *International Symposium on Engineering Lessons Learned from the Giant Earthquake*.
- Curtis, M., & Gordon, G. (2018). *Prioritising quality*.
- Earthquake Commission. (n.d.-a). *Assignment or transfer of EQC claims*.
- Earthquake Commission. (n.d.-b). *Increased Flooding Vulnerability (IFV) land damage*.
- Earthquake Commission. (2014). *Earthquake Commission Annual Report 2013-2014*.
- Earthquake Commission. (2019a). *Briefing to the Public Inquiry into the Earthquake Commission: Earthquake Commission Data*.
- Earthquake Commission. (2019b). *Briefing to the Public Inquiry into the Earthquake Commission: Canterbury Home Repair Programme*.
https://www.eqc.govt.nz/sites/public_files/documents/Inquiry/7.%20Canterbury%20Home%20Repair%20Programme%20Briefing%20rs.pdf
- Earthquake Commission. (2021). *Earthquake Commission Annual Report 2020-2021*.
- Egbelakin, T. (2016). Challenges in Managing Residential Earthquake Insurance: A Post-Disaster Review. *6th International Conference on Building Resilience*, 831–831.
- GNS Science. (2021, February 22). *Ten years on: Christchurch earthquake a watershed in so many ways*.
- Greater Christchurch Group Monitoring Team. (2017). *Monitoring Greater Christchurch Regeneration*.
- Greenill, M. (2014, March). Thousands wait for quake repairs. *The Press*.
- Human Rights Commission. (2013). *Monitoring Human Rights in the Canterbury Earthquake Recovery*.
<https://www.hrc.co.nz/files/2114/2427/8929/HRC-Earthquake-Report-2013-final-for-web.pdf>
- Insurance Council of New Zealand. (2017, February 7). *Insurers Settle \$2.7 Billion Canterbury Claims in 2016*.
- Insurance Council of New Zealand. (2019). *Canterbury Earthquake Progress: Q4 2019*.

- Khakurel, S., Dhakal, P., Yeow, T., & Saha, S. (2021, April). Residential building repair cost and claim settlement time from the Canterbury Earthquake Sequence. *NZSEE 2021 Annual Conference*.
- King, A., Middleton, D., Brown, C., Johnston, D., & Johal, S. (2014a). Insurance: Its Role in Recovery from the 2010-2011 Canterbury Earthquake Sequence. *Earthquake Spectra*, 30(1), 475–491.
- King, A., Middleton, D., Brown, C., Johnston, D., & Johal, S. (2014b). Insurance: Its Role in Recovery from the 2010–2011 Canterbury Earthquake Sequence. *Earthquake Spectra*, 30(1), 475–491.
- Laura Gartner. (2013). *Tenants' Protection Association (CHCH) Rental Survey 2013: A Study of Increasing Rents and Housing Standards in Canterbury*.
- MacDonald, M., & Carlton, S. (2016). *Best practice guidelines for the prioritisation of vulnerable customers*.
- MBIE. (2015). *Earthquake Repairs to Canterbury Homes: Home Inspection Survey Report*. <https://www.mbie.govt.nz/assets/9993cf73bd/home-inspection-survey-report.pdf>
- Ministry of Business, I. and E. (2017, December 8). *Managing earthquake-prone buildings*.
- Murphy, S. (2021, February 28). *Some houses in Earthquake Commission's on-sold programme not worth repairing*. Radio New Zealand. <https://www.rnz.co.nz/news/national/437332/some-houses-in-earthquake-commission-s-on-sold-programme-not-worth-repairing>
- Piri, I. S., Chang-Richards, Y., & Wilkinson, S. (2015). Skills Shoortages in the Christchurch Subcontracting Sector. *ANDROID Residential Doctroal School Proceedings, 5th International Conference on Building Resilience, 15-17 July 2015*.
- Potter, S. H., Becker, J. S., Johnston, D. M., & Rossiter, K. P. (2015). An overview of the impacts of the 2010-2011 Canterbury earthquakes. *International Journal of Disaster Risk Reduction*, 14, 6–14. <https://doi.org/10.1016/j.ijdr.2015.01.014>
- Public Inquiry into the Earthquake Commission. (2020). *Report of the Public Inquiry into the Earthquake Commission*.
- Robertson, G., & Woods, M. (2019, August 15). *Resolution for Canterbury owners of on-sold homes*. Beehive. <https://www.beehive.govt.nz/release/resolution-canterbury-owners-sold-homes>
- Small, J. (2017, May 19). Repair nightmares: Brownlee says it would have been chaos without home repair programme. *The Press*.
- Statistics New Zealand. (2014). *2013 Census QuickStats about greater Christchurch*.
- Statistics New Zealand. (2020). *Housing in Aotearoa: 2020*.
- Stevenson, J., Vargo, J., Seville, E., Kachali, H., McNaughton, A., & Powell, F. (2011). *The Recovery of Canterbury 's Organisations : a comparative analysis of the 4 September 2010, 22 February and 13 June 2011 earthquakes*.
- Taylor, J. E., Change, S. E., Elwood, K. J., Seville, E., & Brunsdon, D. (2012). *Learning from Christchurch: Technical Decisions and Societal Consequences in Post-Earthquake Recovery*.
- The Treasury. (2019). *On-Sold Canterbury Properties Information Release*.

- van Cuong, N., & Noy, I. (2018). *Measuring the Impact of Insurance on Urban Recovery with Light: The 2010-2011 New Zealand Earthquakes* (No. 7031).
- Wilkinson, B., Crampton, E., & Krupp, J. (2018). *Recipe for disaster: building policy on shaky ground*.
- Wood, A., Noy, I., & Parker, M. (2016). The Canterbury rebuild five years on from the Christchurch earthquake. *Reserve Bank of New Zealand Bulletin*, 79, 1–16.

6.0 PROJECT REPORT REFERENCES

Research reports

LITERATURE REVIEW REPORT

Eade, C., Brown, C., Bird, E., Brunson, D., and Brunson, N. 2023. 2016 Kaikōura/Hurunui earthquake claims settlement research: Understanding the outcomes of managed residential repair following the Canterbury earthquakes (*Literature Review Report*). Resilient Organisations.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-literature-review-report/>

HOUSING QUALITY REPORT

Eade, C., Bird, E., Horsfall, S., Brown, C., Brunson, D., and Brunson, N. 2023. 2016 Kaikōura/Hurunui earthquake claims settlement research: Evaluating the impacts of cash settlements on the long-term quality of the housing stock (*Housing Quality Report*). Resilient Organisations.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-housing-quality-report/>

IMPACTS REPORT

Eade, C., Brown, C., and Horsfall, S. 2023. 2016 Kaikōura/Hurunui earthquake claims settlement research: Claimant and community experiences and impacts from the Kaikōura/Hurunui earthquake residential repair process (*Impacts Report*). Resilient Organisations.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-residential-repair-process-impacts-report/>

DISCUSSION PAPER

Brunson, D., and Bird, E. 2023. 2016 Kaikōura/Hurunui earthquake claims settlement research: Key principles and considerations for residential claims settlement following future events (*Discussion Paper*). Resilient Organisations.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-discussion-paper/>

SUMMARY REPORT

Brown, C., Horsfall, S., Brunson, D., Bird, E., Eade, C., and Brunson, N. 2023. 2016 Kaikōura/Hurunui earthquake claims settlement research: Project summary report. Resilient Organisations.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-project-summary-report/>

Supplementary data reports

Bird, E. 2023. Claims and Consent Data Report for 2016 Kaikōura/Hurunui Earthquake Claims Settlement Research. Tonkin & Taylor Ltd.

<https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/claims-and-consent-data-report-for-2016-kaikoura-hurunui-earthquake-claims-settlement-research/>

Brunsdon, N. 2023. Kaikoura earthquake as-is-where-is listings analysis for EQC Kaikoura claims settlement project. Infometrics. <https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/kaikoura-earthquake-as-is-where-is-listings-analysis-for-EQC-Kaikoura-claims-settlement-project/>

Horsfall, S., and Brown, C. 2023. 2016 Kaikoura/Hurunui earthquake claims settlement research: Claimant survey analysis on housing quality. Resilient Organisations. <https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/2016-kaikoura-hurunui-earthquake-claims-settlement-research-claimant-survey-analysis-on-housing-quality/>