Earthquake Commission

20 August 2018

Insurance Liability Valuation as at 30 June 2018

Final Report

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1 Executive Summary

1.1 Valuation results

1.1.1 Canterbury earthquake claims

The gross estimated ultimate claims costs from the Canterbury earthquake events are $11,044 million. This is an increase of $272 million since 31 December 2017.

Canterbury earthquakes only
Estimated ultimate claims costs (undiscounted) - 30 June 2018 valuation

	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	Total $m
Claims costs paid to date *						
Land	57	392	50	4	1	504
Building	2,332	4,782	367	105	188	7,774
Contents	125	302	29	12	7	476
CHE	484	843	116	39	51	1,534
Total	2,999	6,320	561	160	247	10,287
Estimated future						
Land	12	94	7	0	0	114
Building	185	294	33	8	15	534
Contents	1	1	0	0	(0)	2
CHE	26	56	21	3	2	108
Total	224	445	61	11	17	757
Gross ultimate incurred claims cost - central estimate						
Land	69	487	57	4	1	618
Building	2,517	5,076	399	113	203	8,307
Contents	126	303	29	12	7	478
CHE	511	900	137	42	53	1,642
Total	3,222	6,765	622	171	264	11,044
31 December 2017 comparative						
Gross ult inc claims cost - cent est	3,165	6,584	602	166	256	10,772

*Includes Fletcher PMO direct costs of repair (excludes margin and infrastructure costs)

For a description of the EQ1 – EQ4 and AS events, please refer to Section 2.9.1.

The majority of Canterbury earthquake claims have been resolved. There is however, considerable uncertainty in regard to those which are yet to be resolved or are in dispute.

1.1.2 Kaikoura earthquake claims

The gross estimated ultimate claims costs from the Kaikoura earthquake event are $616 million. This has increased from our previous estimate ($610 million) partially due to pressure on building costs and CHE.

For the purposes of this valuation, the Kaikoura earthquake event does not include the storm damage that occurred on 15 November 2016. The 15 November 2016 storm is included in the BAU provision.

Kaikoura earthquakes only
Estimated ultimate claims costs (undiscounted) - 30 Jun 2018

	30 Jun 2018 $m	31 Dec 2017
Claims costs paid to date		
Land	9	9
Building	416	296
Contents	13	8
CHE	78	61
Total	516	374
Estimated future		
Land	0	15
Building	67	167
Contents	5	15
CHE	28	39
Total	100	236
Gross ultimate incurred claims cost - central estimate		
Land	9	24
Building	483	463
Contents	18	22
CHE	105	101
Total	616	610

1.1.3 All EQC claims

The table below shows the gross ultimate claims costs (Canterbury earthquakes and Kaikoura earthquake) and how the net outstanding claims liabilities (all EQC claims) are derived.

All EQC claims
Gross ultimate claims costs to net outstanding claims liabilities - 30 June 2018 valuation

	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	BAU $m	KEQ $m	Total $m
Gross ultimate claims excl CHE, undisc - central est	2,712	5,865	485	129	211		510	9,913
Claims handling expenses (CHE)	511	900	137	42	53		105	1,748
Gross ult claims incl CHE, undisc - central est	3,222	6,765	622	171	264	n.a.	616	11,660
Reinsurance recoveries, undiscounted - central estimate	(1,686)	(2,478)	0	0	0	-	0	(4,163)
Net ult inc claims incl CHE, undisc - central est	1,537	4,287	622	171	264	n.a.	616	7,497
Net claims costs paid to date	(1,049)	(2,999)	(446)	(121)	(196)		(438)	(5,249)
CHE paid to date	(484)	(843)	(116)	(39)	(51)		(78)	(1,612)
Discounting	(1)	(9)	(1)	(0)	(0)	(0)	(2)	(15)
Net OS including CHE, disc - central est	2	436	59	11	16	31	98	652
Net risk margin, diversified, 85% PoA	2	249	34	6	9	12	40	352
Net OS including CHE, disc - 85% PoA	4	684	93	17	26	43	137	1,004

The table above shows the Kaikoura event ('KEQ') with a gross ultimate claims costs of $616 million. Payments to date are $516 million (including $438 million claims costs).

The diversified risk margin (85% PoA) is $352 million. This has decreased since the previous valuation by $10 million. The risk margin includes a loading to allow for the challenges related to data quality, which have a great impact in the tail of events. Refer Section 8.2.2 for details.

1.2 Current insurance activities

1.2.1 Canterbury earthquake building claims

As at December 2016, a provision was created for future reopened claims of 9(2)(j) This was determined on the basis that there would be 12,400 further reopened non-nil claims with each claim incurring an average cost of just over 9(2)(j) We note that this equates to around 18,000 reopened claims if there is a 30% nil claim rate.

The provision was set to amortise evenly over two years to what was expected to be the end of the building programme at December 2018.

Since December 2016, the rate at which properties have been reopening their claims has continued at around 500 per month with around 10,000 claims reopened so far. There is no evidence that the rate of reopened claims will abate in the near future. Based on our December 2016 provision, we would expect a further 8,000 claims to reopen.

Over the period since December 2016, the average non-nil cost of the reopened claims has been around 9(2)(j) although we note that recent experience is higher. That is, the average claims costs that has been experienced has been higher than previously assumed.

As a consequence of this, it seems likely that the ultimate costs associated with reopened claims will exceed the provision that was established in December 2016 and we have re-estimated the provision for reopened dwelling claims for this valuation.

In order to carry this out it is useful to understand why properties are being reopened and the consequential payments that are being made. It is relatively trivial for claims managers to assess this at an individual claim level, as the detail is contained in both CMSv4 and CMSv8.

Looking at a small sample of properties, the reason why claims are being reopened is that the homeowner considers that the initial repair may not have satisfactorily resolved the earthquake damage. Through this sampling and a review of the external environment some of the factors that are believed to cause claims to come back to EQC for review in the first instance are:

- Internal Factors
  - Invoicing excess payments in respect of EQR work.
- External Factors
  - Change of ownership of property.
  - Publicity in media and government communications.
  - Claim advocates and litigation funders.
  - Local authorities' encouragement for residents to check drains.

Some of these factors will increase the numbers of properties that reopen while others will simply accelerate the notification from the homeowner. This is not to say that EQC could, or should, attempt to control these factors, it is merely a recognition that these factors may affect the ultimate cost of building claims.

Some of these issues are discussed in Section 1.5.

1.2.2 *Canterbury earthquake land claims*

EQC made a further settlement payment to LINZ for a number of Red Zone properties including those that exhibited known severe lateral spreading vulnerability ('SLS'). As part of the payment, LINZ reserved their right to challenge EQC on the settlement and also to benefit if appropriate from any private insurer litigation.

In CMSv8 there are 2,500 properties with open land exposures although we have been advised that most of these should be closed. Further detail is included in Section 5.4.

The land litigation cases from insurers are ongoing. It is expected that they will begin to be heard in 2019.

1.2.3 *Memorandum of Understanding with Southern Response*

A Memorandum of Understanding has been signed with Southern Response ('SRES'). EQC and Southern Response have agreed to share resources in an effort to more quickly settle customers' residential building claims arising out of the Canterbury Earthquake Sequence in applicable cases.

The two organisations apply agreed processes to assess which party is best placed to manage open EQC residential building claims made by SRES Customers. SRES may accordingly manage some EQC claims on EQC's behalf.

SRES would act as EQC's agent in these applicable cases, completing the assessment and settling the EQC claim in accordance with the EQC Act, along with any entitlements the customer may have under their insurance policy.

1.2.4 *Kaikoura earthquake event*

As at 16 May 2018, based on the 'Kaikoura Event - Programme Progress Report', EQC had assessed 99% of its building claims with 99% having been settled.

In respect of insurer managed building claims, insurers have informed EQC that 99% have been assessed and 96% have been settled. This information is not yet fully reflected in the claims management system, nor in the invoicing and is the reason why the outstanding claims and the associated liability are at the level they are.

As at 30 June 2018, total payments made by EQC sum to $516 million, which includes claims costs and CHE costs incurred by EQC and by the insurers.

1.2.5 *Other claims*

There have been several natural disaster events over the past year. These have primarily related to weather events. Section 7 details the breakdown of the notable events.

1.3 Canterbury earthquakes

1.3.1 *Developments since prior valuation*

Since the previous valuation, there have been developments in respect of Red Zone land settlements, land litigation, and reopened building provisions.

Below is a brief note on these developments and what has been implemented as a consequence.

Land: payments and legal challenge

EQC have materially completed all Green Zone properties with the exception of claims in the land litigation.

A further LINZ payment was made in February 2018 in respect of Red Zone properties including those with known severe lateral spreading vulnerability. This payment should conclude EQC's transaction with LINZ with the exceptions of:

- Some Port Hills properties that are being reviewed to ensure they received an appropriate claim payment.
- Any consequences arising from the land litigation with IAG and Tower.

In respect of estimating a provision, we have retained our approach from the previous valuation and have explicit provisions for:

- land costs assuming the remaining properties are settled according to EQC policy, and
- litigation risk.

These developments have resulted in a reduction of the estimated ultimate land claims costs of 9(2)(j) since December 2017. Section 1.3.4 has more detail on this.

Legal challenge - individual

Individual legal challenges form a relatively small sum within the overall EQC provision although there are a number of cases to be heard. They relate primarily to building claims. The number of cases reported to us by EQC has continued to grow, to the extent that we have had to revise our estimate of total litigation cases.

We would highlight the difficulties in estimating the number of legal cases which may arise in the future, especially given that EQC have limited ability to control external factors which may influence homeowners' behaviour.

We would note that the individual legal provision is dominated by costs that would be incurred by EQC even if the legal route was not pursued. That is, it is dominated by the insurance payments and technical adviser fees that EQC incurs for non-litigious claims.

9(2)(h) [redacted]

Building financial close - insurers

9(2)(j) [redacted]

Building reopened claims

The valuation as at 31 December 2017 included reopened provisions for a variety of outstanding claims issues. These reopened provisions fell into one of the following categories.

- Remedial work carried out as a result of the EQR programme. This can be further broken down into:
  - CEDAR. Properties that require remediation as a result of the CEDAR review.
  - General remediation. Other properties.
- Drainage claims.
- Reopened Opt-out /Cash settled claims. Challenges on previously cash settled amounts as to their adequacy.
- Individual legal challenges – mentioned above
- Financial close – insurers – mentioned above.
- Unreported remedial and secondary repair issues. In addition to the identified issues above, it is expected there will be further reported remedial and secondary repair work to undertake.

Within CMSv8, these categories are not reported on although the Canterbury Business Unit is maintaining a 'Claim Stage Gate' report which does allow classification into the following categories:

- CBU Workable – able to be progressed by the Canterbury Business Unit ('CBU'). These can be further split into:
  - CBU Settlement team
  - CBU Construction team
- CBU Unworkable – requiring resources from outside the CBU. This includes litigation claims and those being managed by Southern Response.

We have updated these provisions as experience has emerged. The table below summarises the provisions held in respect of the various categories as at 31 December 2017 and those held for this valuation.

	30 June 2018 $m	31 December 2017 $m
CBU Settlement	9(2)(j)	n.a
CBU Construction		n.a
SRES		n.a.
CEDAR	n.a	
Remedials	n.a	9(2)(j)
Drainage	n.a	
Complaints / Disputes	n.a	
Open claims Subtotal	9(2)(j)	
Individual litigation - Insurance payment		
Individual litigation - Customer reimbursement*		
Inidividual litigation Subtotal	9(2)(j)	9(2)(j)
Financial close - insurer		
Future reopened		
Total	534	322

*Customer legal and technical advice reimbursement
*Complaints / Disputes includes CBU Settlements

Further detail on these provisions is provided in Section 1.3.3.

Canterbury CHE

The estimated ultimate CHE has been increasing as the expected time to resolve all Canterbury claims has lengthened.

EQC Finance have forecast CHE through to 30 June 2019. We have projected EQC's Canterbury operations beyond this point, through to 2022, albeit with a diminishing presence. This has increased the estimated ultimate CHE by $62 million.

A key driver in the actual ultimate cost of CHE will be how the rate of reopened claims trends.

1.3.2 *Key areas of judgement*

In undertaking the valuation there are some areas of judgement required that materially affect the results. These are briefly discussed below.

Canterbury building claims

In respect of building claims, a key area of judgement in the provision is understanding how claims are being reopened, the expected quantum per claim and how systemic this might be.

9(2)(j)

Canterbury land claims

9(2)(h)

1.3.3 *Canterbury building claims – key assumptions*

The figures quoted below are based heavily on the Claim Stage Gate report. This report allows an analysis into many factors, including:

- The number of claims open.
- Average amount paid per claim (open or closed)
- Claims closed with no payment (nil-claim rate)

The report is relatively new and covers experience from April 2018. Despite its recent creation, it is considered usable for the purposes of informing the provisions below.

CBU settlement

There are 1,155 open CBU settlement claims that have not had a payment. We expect that from these, 883 will require a non-nil payment.

In addition to this, there are 1,474 open unassigned claims. We would expect that 70% of these would fall into the CBU Settlement stream. Of these, we expect that 604 would then require a non-nil payment.

The average non-nil payment recently experienced by these claims is 9(2)(j)

This gives an overall provision of 9(2)(j)

CBU construction

There are 566 open CBU settlement claims that have not had a payment. We expect that from these, 489 will require a non-nil payment.

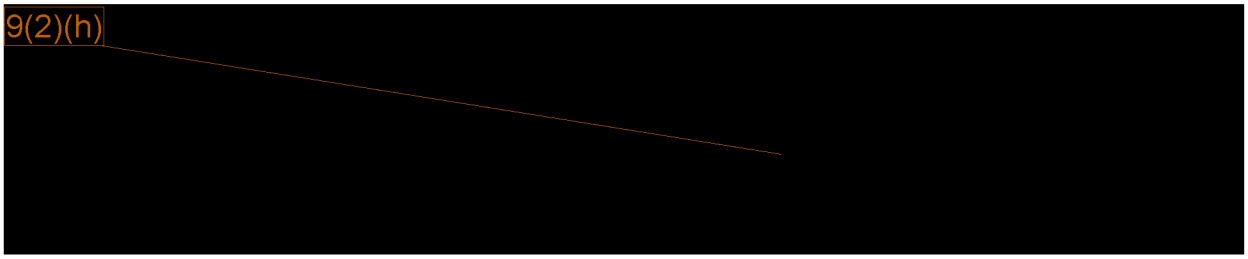
In addition to this, from the 1,474 open unassigned claims, we would expect that 30% of these would fall into the CBU Construction stream. Of these, we expect that 306 would then require a non-nil payment.

The average non-nil payment recently experienced by these claims is 9(2)(j)

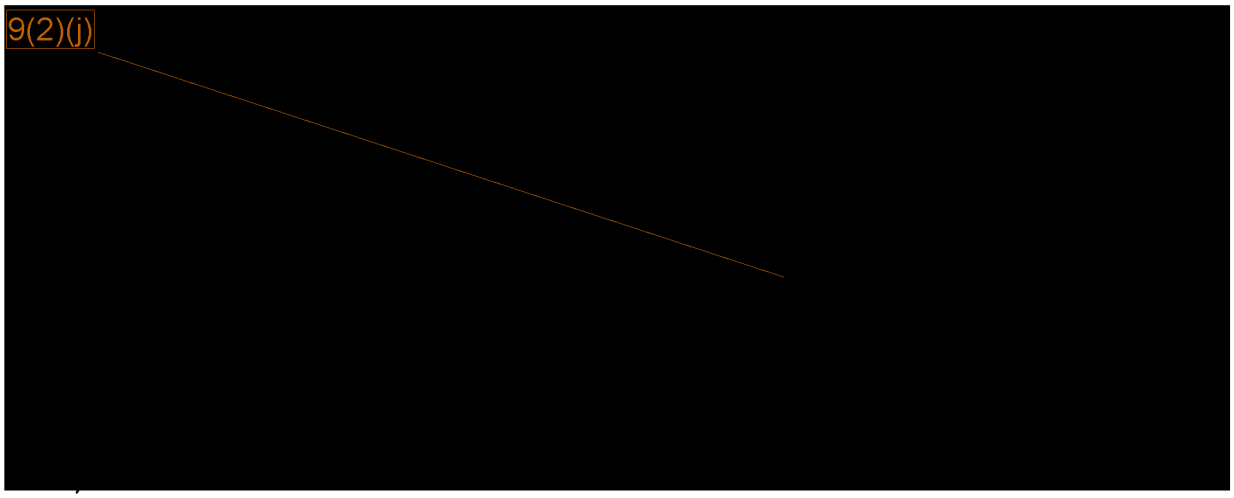
This gives an overall provision of 9(2)(j)

Individual legal challenges

9(2)(h)



Financial close – insurers



Unreported remedial and secondary repair issues

There has been a steady flow of reopened claims over the past 18 months, with a higher average no-nil claim payment than was previously assumed. We have attempted to estimate the ultimate cost of future reopened claims through a variety of means.

Normal modelling approach

The preferred approach that would be followed to estimate the future development of a claim issue would be:

- Identify the properties / claims that had exhibited the issue. In this case, claims that had reopened.
- For each property, record the characteristics of the property that may have contributed to the reopened claim.
- Determine the relevant weight of each characteristic to the claim being reopened and the ultimate cost implications.
- Use these risk factors to estimate which other properties in the population, with appropriate characteristics, are likely to reopen.

Modelling difficulties

There are two main difficulties to overcome with this approach.

Firstly, although we have a sample list of recently reopened properties, we don't have the complete list of all properties that have reopened. It is not feasible to produce the complete list as there is no reopened flag in CMSv4. There are notes and documents attached to each claim which will identify whether the claim was reopened but these are not readily available for reporting.

Similarly, risk characteristics are not obtainable for reporting. While the risk information is clearly recorded in CMSv4, it is difficult to extract this in bulk. Some information is available in bulk, such as evidence of liquefaction and peak ground acceleration but this has demonstrated limited predictive value.

We have therefore been obliged to use alternative techniques to address the issue. We have divided the population into those that may reopen and go overcap and those that may stay within EQC's cap.

Overcap claims

In respect of overcap properties, there is a set of properties that may be considered fully developed, that being the properties which have already gone overcap.

By using the modelling approach outlined above, we can estimate the total number of properties that will go overcap. This had led to the identification of *at-risk undercap* properties which have the potential to go overcap.

For properties that have previously been settled by EQC by cash or managed repair and information has been provided to EQC which confirms that the settlement does not meet the standard required under the EQC Act (either due to workmanship, change in repair strategy or missed earthquake damage), EQC will complete its Cap Cost Review process (see Glossary). Any further settlement paid by EQC to the customer up to the applicable statutory cap per event includes the results of the Cap Cost review.

The total of this provision is 9(2)(j)

We would stress that this is a model and the actual properties that will go overcap will be different to those that are predicted. Also, the model is highly dependent on the quality of the underlying data. Higher quality data will result in a more robust estimate.

Undercap claims

In respect of undercap properties, we do not have a complete set of fully developed properties. We have a list of properties that have recently reopened but cannot know, with enough certainty, that this group of undercap policies are now fully settled.

We cannot therefore use the modelling approach above. To estimate the undercap provision, we have projected the current rate of reopened claims for a period of time. We have allowed for a proportion of these claims to be closed without further payment and then applied the average building claim costs that has recently been observed.

The recent rate of claims reopening is around 9(2)(j) per month. Projecting this reopened rate over the next 24 months and allowing for a gradual reduction, suggest there may be a further 9(2)(j) claims that reopen.

Based on an analysis of recently reopened claims, approximately 9(2)(j) of these will result in no payment being made. This means that around 9(2)(j) claims will require a payment.

However, some of these claims will go overcap and some will fall into litigation. These are future claims are provisioned for elsewhere and we have therefore removed these other future claims from the total to result in 9(2)(j) further undercap claims that will require a payment.

We can split these undercap claims to the CBU Settlement and CBU Constructions streams in a similar manner to the unassigned claims noted earlier in this section. After applying the average claim amount, we have allowed for 9(2)(a) of undercap reopeneds.

Summary of Canterbury building claim provisions

	30 June 2018 $m	31 December 2017 $m
CBU Settlement	9(2)(j)	n.a
CBU Construction		n.a
SRES		n.a.
CEDAR	n.a	9(2)(j)
Remedials	n.a	
Drainage	n.a	
Complaints / Disputes	n.a	
Open claims Subtotal	9(2)(j)	9(2)(j)
Individual litigation - Insurance payment		
Individual litigation - Customer reimbursement*		
Inidividual litigation Subtotal	9(2)(j)	9(2)(j)
Financial close - insurer		
Future reopened		
Total	534	322

*Customer legal and technical advice reimbursement

1.3.4 *Canterbury land claims – key assumptions*

The estimated ultimate land claims costs as at 30 June 2018 are $618 million. This is a reduction of $78 million from the previous valuation ($696 million). The reduction can be broken down into the following components:

Canterbury land claims

Movement from 31 December 2017 to 30 June 2018

	Dec-2017	Jun-2018	Movement
Central estimate ultimate claims			
Green zone	9(2)(j)		
Red zone			
Port Hills & Other			
Litigation and challenge			
Total	$696m	$618m	($78m)

Land payments to date are $504 million, which means the outstanding land provision is $114 million. This can be broken down into:

- 9(2)(j) million outstanding. Open Green Zone and Port Hills properties.
- 9(2)(j) million outstanding. Litigation and challenge related to ILV DoV settlements.

Green Zone

The remaining Green Zone properties were modelled as receiving repair cost (if cleared site) or DoV (if in-situ).

Litigation risk

9(2)(h)

[redacted]

1.3.5 *Canterbury CHE – key assumptions*

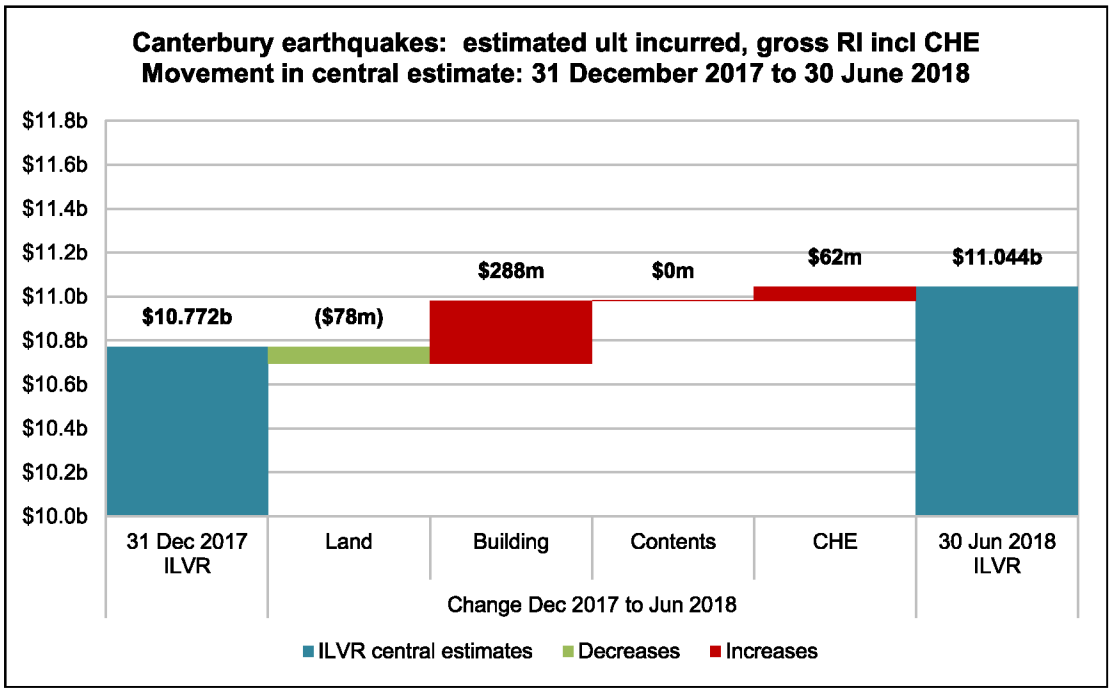
The Claims Handling Expenses ('CHE') related to settling Canterbury earthquake claims will continue for as long as there are outstanding claims.

The current EQC budget projects costs to 30 June 2019 although we expect costs to be incurred beyond this point, primarily due to individual and insurer litigation – which is constrained to a large extent by the court process. The issue of reopened claims is also highly uncertain and will affect the actual CHE costs.

We have projected the CHE budget beyond 2019 through to June 2022 and this has increased the expected ultimate CHE by $62 million.

1.3.6 *Estimated ultimate claims costs – movement since 31 December 2017 - Canterbury only*

The estimated ultimate gross claims cost for Canterbury earthquake events has moved from $10.772b as at 31 December 2017 to $11.044b as at 30 June 2018. Shown below is a graphical representation of the change in estimated ultimate incurred liabilities.



1.4 Kaikoura earthquake

Development

The 2016 Kaikoura earthquake was a magnitude 7.8 earthquake in the South Island of New Zealand that occurred two minutes after midnight on 14 November 2016.

Memorandum of Understanding

A Memorandum of Understanding (MoU) was signed between EQC and eight insurers to allow insurers to directly settle their customers' EQC claims on behalf of EQC. In summary, almost all building and contents claims are managed by the relevant insurer on behalf of EQC, who then invoices EQC for their share of claims costs and claims handling expenses.

Building and contents claims that are managed by EQC include:

- Claims relating to properties where there is still an open or otherwise unresolved prior EQC claim.
- Claims where the insurer is not party to the MoU.

EQC also manages all land claims.

Information developments

In respect of claims costs, over $400 million has been invoiced or communicated by insurers. Insurers have indicated that assessments are 99% complete and settlement progress is close to 96% complete. We note that these statistics are not yet reflected in EQC's claim systems.

In comparison, EQC has assessed 99% of the claims it manages and has paid out $34 million, equating to 99% settled.

The expected ultimate CHE costs are $105 million. This is an increase of $4 million over that for the 31 December 2017 valuation. More details are provided in Section 1.4.2.

Data challenges

As noted in Section 1.5, not all Kaikoura earthquake claims are fully recorded in CMSv8; claims are now being managed in a separate database specific to the Kaikoura events. There are around 17,000 building exposures that are still flagged as being open. Whilst we are confident that most of these claims will have already been settled by the insurers (and a large subset of which will have been reimbursed by EQC), the lack of clarity over exposure statuses does present some challenges for this valuation.

In part to alleviate this issue, we have reworked the valuation model for Kaikoura to simulate exposure status changes from open to closed and estimated future payments as exposures track through these statuses.

1.4.1 Kaikoura claims costs - judgement

The claim model is split into five parts, four of which cover the less material categories of:

- Land
- Contents
- Building - Wellington MuBs
- Building - EQC managed non-MuBs

The categories have been modelled using a relatively simple stochastic average cost per open claim model.

The remaining category, *Building – insurer managed non MuBs* contains the majority of the claims costs. For this category, we have developed a multi-state model with transition probabilities and payment assumptions between the various states. Details on this are shown in Appendix C.3.

1.4.2 *Kaikoura claims – key assumption*

The claim-based model uses a number of assumptions. For the four minor categories of exposure, the average claims applied range from $2,750 for open contents exposures, through to $40,000 for EQC managed non-MuBs. Further details are provided in Appendix C.2

Claims handling expenses

The CHE for Kaikoura was increased as at 31 December 2017 following discussions with insurers as to the costs they were incurring in settling claims. Some of those discussions were not complete at that valuation and subsequent information has been provided which suggests a further increase may be possible.

This increase has been quantified as $4 million, which has pushed the expected ultimate CHE for Kaikoura to $105 million.

Reopened allowance

The most likely source of reopened claims is from the largest component of costs to date i.e. the insurer-managed non-MUBs. The multi-state model explicitly allows for claims to transition to a reopened status. Experience of reopened claims for Kaikoura to date is limited, so the assumptions in regard to reopened claims have been estimated with consideration given to the Canterbury experience.

Some sensitivity/scenario analysis around the reopened allowance is provided in Section 6.5.

1.5 Data and data migration

EQC holds a tremendous volume of data and information over a variety of claims management and project management systems. These systems have evolved over time as required to facilitate the management of the claims as they arise.

Whilst they allow EQC to manage claims, they do not easily report claims information for other purposes. This includes management reporting and also as an input into actuarial valuations. The recent transfer from CMSv4 to CMSv8 has highlighted this issue.

CMSv4 held claims information as follows:

- BAU claims were recorded and managed on CMSv4.
- Canterbury earthquake claims were recorded on CMSv4 although it did not contain payment or resolution information in respect of claims that were managed through EQC's PMO, EQR.
- Kaikoura earthquake claims were recorded on CMSv4 although there was a lag in recording all claim payments as most claims were managed by the relevant insurer.

In respect of CMSv8:

- New BAU claims have been managed on CMSv8 since May 2017.

- Canterbury earthquake claims were migrated to CMSv8 on 20 April 2018 only if they were believed to be open. Approximately 5,000 claims were migrated covering building, contents and land.
- Kaikoura earthquake claims were migrated to CMSv8 in May 2018 only if they were open and were managed by EQC. Insurer managed claims are being recorded in a separate system.

We understand that from 31 May 2018 CMSv4 has been in a read-only state.

The introduction of CMSv8 has provided some initial benefits in that it has illuminated the actual number of building claims yet to be resolved. However, it has some limitations, relative to CMSv4 such as:

- Not allowing a payment to be recorded without creating a cheque. This retards the ability to load insurer managed Kaikoura claims.
- Not being able to report the reason why a claim is open. This means that open building claims cannot be classified into sub-classifications within CMSv8.

We emphasise that, while these systems may fulfil EQC's core function of managing claims, it has made management reporting challenging. This has a flow on effect to any party that relies on this data.

Some examples of these challenges include:

- Obtaining an accurate assessment of open exposures in CMSv4. This was due to the lack of a robust open / close indicator for each exposure.
- Obtaining an accurate assessment of open Canterbury exposures in CMSv8. When claims were migrated from CMSv4 to CMSv8, only those claims where EQC believed an exposure was open would be migrated to CMSv8. Unfortunately, the migration opened all exposures that existed on the original CMSv4 claim. It is intended that these claims will be reviewed, and the exposures closed.
- Un-validated Kaikoura claims. Under the MoU, there was a process to validate claims lodged with the relevant insurer. This has struck issues as some insurers have yet to provide the required information for EQC to validate each claim. This means we remain uncertain of how many claims were lodged.
- Obtaining an accurate breakdown of building issues in CMSv8. CMSv8 does not allow for the identification of why the building exposure is open. This has been partly mitigated by a Claim Stage Gate report, managed by the Canterbury Business Unit which does allow claims to be categorised – although using different classifications than previously.

Despite these challenges, it is still possible to produce a valuation estimate, albeit with more uncertainty than would be desirable. This uncertainty will be evident with a higher risk margin attached to the outstanding claims provision.

1.6 Implications of above

In respect of Canterbury earthquake claims only, the implications of the above are that the estimated ultimate claims costs have been increased. The estimated ultimate CHE costs have been strengthened. There is considerable uncertainty in how the remaining claims experience will evolve.

In respect of the Kaikoura earthquake claims, the estimated ultimate building costs have been strengthened slightly, partly due to timing of the claims data migration with the valuation process.

1.7 Limitations

In this report, we provide the results of our investigations together with an outline of the matters considered and the methods and assumptions applied to obtain these results. Opinions and estimates contained in this report constitute our judgement as at the date of the report.

There is some residual uncertainty regarding the estimate for the Kaikoura earthquake, primarily due to the lag in reporting assessment and settlement information from private insurers. Care should be taken in relying on this estimate at this stage. Refer to Section 9.3.3 for more detail.

This report must be read in its entirety. Individual sections of the report, including the Executive Summary, could be misleading if considered in isolation from each other.

1.8 Key Challenges

There are a number of key challenges facing EQC in respect of settling and reporting its Canterbury and Kaikoura earthquake claims. These are discussed briefly below.

1.8.1 Land litigation

9(2)(h) [redacted]

1.8.2 Insurer close

9(2)(h) [redacted]

1.8.3 Reopened claims

EQC has faced a constant stream of reopened building claims which is putting pressure on the ultimate claims costs. There is limited detail on why these claims are reopened and therefore little to indicate how long it may continue.

1.8.4 Data

EQC has amassed a considerable body of data in settling Canterbury and Kaikoura earthquake claims. This has not always been recorded in a single format which has allowed robust analysis. This has impacted negatively on the organisation's ability to report, measure, track and communicate effectively.

In respect of this valuation, many sources of data are used to produce the expected ultimate claims costs and while we are comfortable that the overall figures produced are adequate, there are limitations on our ability to analyse and justify some of the components.

1.8.5 Kaikoura claims management

The Kaikoura earthquake event has unique characteristics with challenges.

It is being almost wholly managed by third parties who will handle claims according to their own procedures and policies, within the terms of the MoU. EQC has less visibility over the status of the claims and the nature of the settlements than would be the case for internally managed claims.

This has been highlighted with the recent migration of data from CMSv4 to a database system. Over this transition period, the quality of claims reporting has dropped.

In addition, the claims are typically being settled by way of cash payment. It will be up to the claimant to manage their repair. Some of the claimants live in smaller communities with limited resources available to remediate damage. With limited alternative accommodation and limited labour resource, it may take some time for the repairs to be carried out. There is therefore the risk of economic inflationary impacts resulting in the original cash settlement being ultimately insufficient.

The estimated outstanding claims includes an allowance for reopened insurer-managed non-MUBs which amounts to around 7-8% of costs paid to date.

1.9 Key recommendations

1.9.1 Progress against previous recommendations

Several recommendations were set out in the previous ILVR. The progress against these recommendations is as follows:

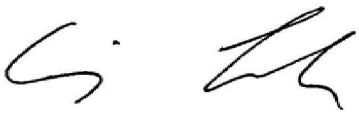
- In respect of settling the remaining land claims
  - Improve the quality of the link between properties in the land model and properties in the ADE. *Stage 1 complete*
  - Continue engaging with insurers in respect of Insurer Close. *Ongoing*
- Collect timely and accurate information in respect of the Kaikoura earthquake claims managed under the MoU. *Ongoing*
- In respect of Data. Undertake a review of the data capture process to ensure that as much data as possible may be effectively utilised. Ongoing
- In respect of Kaikoura management. Continue communicating with insurers to be able to manage risks as they emerge. Ongoing

1.9.2 Current Recommendations

The key recommendations, from an actuarial estimate perspective, arising from this investigation is:

- In respect of settling the remaining Canterbury earthquake claims
  - Improve the quality of the link between properties in the land model and properties in the ADE.
  - Continue engaging with insurers in respect of Insurer Close.
  - Review reopened claims to better understand the causes
- Collect timely and accurate information in respect of the Kaikoura earthquake claims managed under the MoU.
- In respect of Data. Undertake a review of the data capture process to ensure that as much data as possible may be effectively utilised.
- In respect of Kaikoura management. Continue communicating with insurers to be able to manage risks as they emerge.

1.10 Authors



Craig Lough

Fellow of the NZ Society of Actuaries

Jeremy Holmes

Fellow of the NZ Society of Actuaries

2 Report description

2.1 Addressee

This report is addressed to Sid Miller, Chief Executive of the Earthquake Commission ('EQC').

2.2 Report commissioned by

This report was commissioned by Hugh Cowan, EQC's General Manager Resilience.

2.3 Purpose

This report was commissioned to provide information with regards to:

- EQC's insurance liabilities and reinsurance recoveries for use in the financial statements as at 30 June 2018.
- The development of EQC's Canterbury earthquakes claims costs since 31 December 2017.
- The development of EQC's Kaikoura earthquakes claims costs since 31 December 2017.

2.4 Scope

2.4.1 Insurance liabilities components

The insurance liabilities include:

- Outstanding (OS) claims liabilities – which relate to the future direct and indirect claims costs and reinsurance recoveries for claims incurred up to 30 June 2018.
- Premium liabilities – which relate to the future net claims costs and administration and reinsurance expenses for future claims arising from unexpired risks as at 30 June 2018.

The liabilities calculated include a risk margin and are discounted for the time value of money.

Premium liabilities are not included directly on the balance sheet but are used for the Liability Adequacy Test of the unearned premium liability provision.

A more detailed description of the nature and components of the insurance liabilities is set out in Section 8.

2.4.2 EQC Act 1993

The scope of this report includes all claims costs and associated expenses required to be paid to settle legitimate insurance claims as defined in the EQC Act 1993 or as required through Ministerial Direction. These include costs and potential liabilities arising in connection with claims brought by IAG and Tower in connection with the settlement of land insurance claims.

Liabilities and Costs which may arise from outside the Act, such as damages for tortious negligence, are excluded from this report.

2.5 Effective valuation date

The effective date of the valuation is 30 June 2018.

2.6 This report

Although this report includes considerable detail on all aspects of the actuarial investigations, in order to keep it to a manageable size a lot of the information has been summarised. Further details regarding the data, methods, assumptions, calculations and results underlying this report are available from the authors on request.

Unless otherwise indicated, all amounts in this report are stated in New Zealand dollars and are net of GST (i.e. they exclude GST).

2.7 Previous valuations

Melville Jessup Weaver ('MJW') has prepared valuations for EQC at six monthly intervals since 2010, when the Canterbury Earthquake Sequence began.

The most recent valuation for EQC, which is referenced in this report, is the Insurance Liability Valuation Report ('ILVR') as at 31 December 2017 (dated 20 February 2018).

2.8 Definitions of technical terms

Whilst we have tried to avoid unnecessary insurance jargon where possible, to help understand the technical terms which were used in this report we have included a glossary in Appendix I.

2.9 Event groups

2.9.1 Canterbury earthquake claim events

A series of damaging earthquakes has affected the Canterbury region in general, and the city of Christchurch in particular, since the first event on 4 September 2010. These earthquakes have resulted in injury, loss of life, and billions of dollars of damage to infrastructure, commercial property and residential buildings.

For the purposes of valuing the outstanding claims, the Canterbury earthquake claims have been split into the following event groups:

- EQ1 – 4 September 2010 event – Darfield event
- EQ2 – 22 February 2011 event – Lyttelton event
- EQ3 – 13 June 2011 event (including 21 June 2011 event)* - Sumner event
- EQ4 – 23 December 2011 event
- Aftershocks ('AS') – the ten other events shown on the Business Information Unit ('BIU') Daily Report as well as 'Other Canterbury claims' included in the Daily Report totals. The logic used to identify these claims is based on the claim's Territorial Local Authority and loss cause and is consistent with the BIU's definition It does not include claims from the 14 February 2016 event.

*EQC's reinsurance programme covers all incurred losses arising within 720 hours from an event. Consequently, losses arising from the 21 June 2011 aftershock are included in the EQ3 event definition.

2.9.2 *Kaikoura earthquake claim events*

At 12:02am on 14 November 2016, an earthquake occurred near Culverden (approximately 100km north of Christchurch). This caused other faults to rupture in a domino effect, and other earthquakes occurred in a North-East direction towards Seddon. This earthquake event group has been named the Kaikoura earthquake. For the purposes of this report, it has the three-letter code KEQ.

2.9.3 *Other claim events*

Other outstanding EQC claims, including those arising from landslips, hydrothermal events, and from earthquakes outside Canterbury are categorised as 'BAU' (Business As Usual) claims. This includes the 14 February 2016 earthquake event.

2.9.4 *Components of premium liabilities*

For the purposes of valuing the premium liabilities, the following event categories were used:

- Business as Usual ('BAU') claims.
- Minerva claims - catastrophe event claims arising from earthquakes in NZ outside Canterbury.
- Enhanced seismicity in respect of Canterbury earthquake claims and Kaikoura earthquake claims.

2.10 Professional standards

This report has been written to comply with Professional Standard No. 30 (Valuations of General Insurance Claims) of the New Zealand Society of Actuaries.

2.11 MJW staff involved in the investigation

The following MJW staff members were involved in some capacity during the course of the investigation:

- Craig Lough Principal
- Jeremy Holmes Principal
- 9(2)(a)
- [redacted]

3 Canterbury Event Key Assumptions

	BUILDING CLAIMS as at 30 June 2018			
Assumption	**Explanation**	**30 Jun 2018 provision**	**31 Dec 2017 provision**	**Informed by**
Resolution	• Resolution of properties is now materially completed so key assumptions now relate to reopened claims, litigation and Financial Close with Insurers (see below)			• EQC data on resolved claims
CBU Settlements	• 1,155 open properties in this stream plus further 1,027 expected from the unassigned queue. Expect 1,487 to require a non-nil payment. • Average payment recently experienced is 9(2)(j)	9(2)(j)	n.a.	• Claim stage gate report. Provides information on average cost, non-nil %, numbers of open claim etc
CBU Construction	• 566 open properties in this stream plus further 447 expected from the unassigned queue. Expect 795 to require a non-nil payment. • Average payment recently experienced is 9(2)(j)	9(2)(j)	n.a.	• Claim stage gate report. Provides information on average cost, non-nil %, numbers of open claim etc
Previous re-opened claims	• Previous provisions • Remedial 9(2)(j) • Drainage claims 9(2)(j) • Complaints / opt out, 9(2)(j)	n.a	9(2)(j)	• Prior valuation result
Individual legal challenges – increased insurance payment and technical adviser fees	• 9(2)(h)			
Individual legal challenges –	• 9(2)(h)			

	BUILDING CLAIMS as at 30 June 2018			
Assumption	**Explanation**	**30 Jun 2018 provision**	**31 Dec 2017 provision**	**Informed by**
reimbursement of customer legal and technical adviser fees	• 9(2)(h) [redacted] •			
Financial Close-Insurers	9(2)(j) [redacted]			
Future unreported claims	• Carried out analysis of future reopened overcap properties and reopened undercap properties. • Dataset for current overcaps provide better statistical method for determining future overcaps. Have analysed the predicted overcaps and allowed for extra payment to cap. • Undercap analysis hampered by lack of fully developed dataset or triage of	$213m	$67m	• Listing of overcap claims • ADE • Analysis of Claim Stage Gate Report. • Cap Cost Review analysis.

	BUILDING CLAIMS as at 30 June 2018			
Assumption	**Explanation**	**30 Jun 2018 provision**	**31 Dec 2017 provision**	**Informed by**
	recently reopened claims. • For undercaps have projected recent flow for 24 months, with gradual reduction and allowed for nil-claim rate and recently experienced average cost. • We have also subtracted from projected undercap claims, those that are expected to be overcap and those that may become litigation			

	LAND CLAIMS as at 30 June 2018			
Assumption	**Explanation**	**30 Jun 2018 provision**	**31 Dec 2017 provision**	**Informed by**
Land model outcome as per policy	Green Zone: estimated future settlements based on estimates of: • Cat 1-7 damage for all properties • ILV DoV payments for in situ properties, ILV repair cost for cleared sites. NB that this is modelled approach and may differ from actual settlement. • IFV DoV payments for all affected properties Red Zone: • Non-SLS & SLS properties settled according to T+T settlement calculation.	Outstanding 9(2)(j) million for Green Zone & Port Hills. Red Zone complete	Outstanding 9(2)(j) for Green Zone & Port Hills and 9(2)(j) for Red Zone (Figures exclude Port Hills)	• CMS extract showing which claims are open/closed T+T advice on: • lists of properties in Green/Red Zones qualifying for ILV and/or IFV damage • DoV rates as per EQC policy and calculated by T+T (where known) • IFV DoV rates where not already known are based on information supplied by T+T • Repair cost estimate based on ground improvement land trials • LINZ payment and accompanying documentation
9(2)(h) [redacted]				

4 Kaikoura Event Key Assumptions

	KAIKOURA CLAIMS as at 30 June 2018			
Assumption	**Explanation**	**30 Jun 2018 provision**	**31 Dec 2017 provision**	**Informed by**
• Average cost per open claim model	• The smaller categories of Kaikoura claims costs are determined using this model. • Average claims costs taken form analysis of claims that are believed to be closed. • Range from 9(2)(j) for Contents exposures to 9(2)(j) for EQC managed non_MuBs	9(2)(j)	n.a.	Claims lodged in CMSv4 and v8 plus listing of claim payments paid to insurers. Cross referenced with KaikouraApp.
• Multi-state model	• Insurer managed non-MuBs were modelled using a multi-state model. • Transition probabilities and payment amounts allowed open claims, and reopened claims to 'generate' future costs.	9(2)(j)	n.a.	Claims lodged in CMSv4 and v8 plus listing of claim payments paid to insurers. Cross referenced with KaikouraApp. Reopened probabilities with consideration of Canterbury experience.
• CHE	• Based on revised figure as at 31 December 2017. • One insurer has suggested higher CHE cost. This has been reflected in this valuation.	$105m (ultimate)	$101m (ultimate)	EQC Budget EQC discussions with insurers

5 Canterbury earthquake claim liabilities

There have been a number of developments that have occurred over the six months from 31 December 2017 that have affected the estimation of EQC's Canterbury claims costs. These relate to:

- Land model
  - Actual settlements – Red Zone
- Building model
  - Resolved and reopened claims
- Claims Handling Expenses (CHE)

These have been discussed earlier in Section 1.3.

5.1 Valuation results – Canterbury earthquakes

5.1.1 Estimated ultimate claims costs – Canterbury earthquakes only

The table below summarises the main components involved in estimating the ultimate cost of claims to EQC arising from the Canterbury earthquakes only as at 30 June 2018.

Canterbury earthquakes only
Ultimate claims costs, central estimate, undiscounted, including CHE - 30 June 2018 valuation

	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	Total $m
Claims paid to date (excl. CHE)*	2,514	5,476	446	121	196	8,753
Estimated future (excl. CHE)	197	389	40	8	15	649
Gross estimated ultimate incurred claims	2,712	5,865	485	129	211	9,402
Claims handling expenses (CHE)						
Paid to date	484	843	116	39	51	1,534
Estimated future	26	56	21	3	2	108
Total	511	900	137	42	53	1,642
Gross ultimate incurred claims including CHE	3,222	6,765	622	171	264	11,044
Reinsurance recoveries	(1,686)	(2,478)	-	0	0	(4,163)
Net ultimate incurred claims including CHE	1,537	4,287	622	171	264	6,881
31 December 2017 comparatives						
Gross ult incurred claims including CHE	3,165	6,584	602	166	256	10,772

*Includes Fletcher PMO direct costs of repair (excludes margin and infrastructure costs - included in CHE)

The table below shows the components split by exposure.

Canterbury earthquakes only
Estimated ultimate claims costs (undiscounted) - 30 June 2018 valuation

	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	Total $m
Claims costs paid to date *						
Land	57	392	50	4	1	504
Building	2,332	4,782	367	105	188	7,774
Contents	125	302	29	12	7	476
CHE	484	843	116	39	51	1,534
Total	2,999	6,320	561	160	247	10,287
Estimated future						
Land	12	94	7	0	0	114
Building	185	294	33	8	15	534
Contents	1	1	0	0	(0)	2
CHE	26	56	21	3	2	108
Total	224	445	61	11	17	757
Gross ultimate incurred claims cost - central estimate						
Land	69	487	57	4	1	618
Building	2,517	5,076	399	113	203	8,307
Contents	126	303	29	12	7	478
CHE	511	900	137	42	53	1,642
Total	3,222	6,765	622	171	264	11,044
31 December 2017 comparative						
Gross ult inc claims cost - cent est	3,165	6,584	602	166	256	10,772

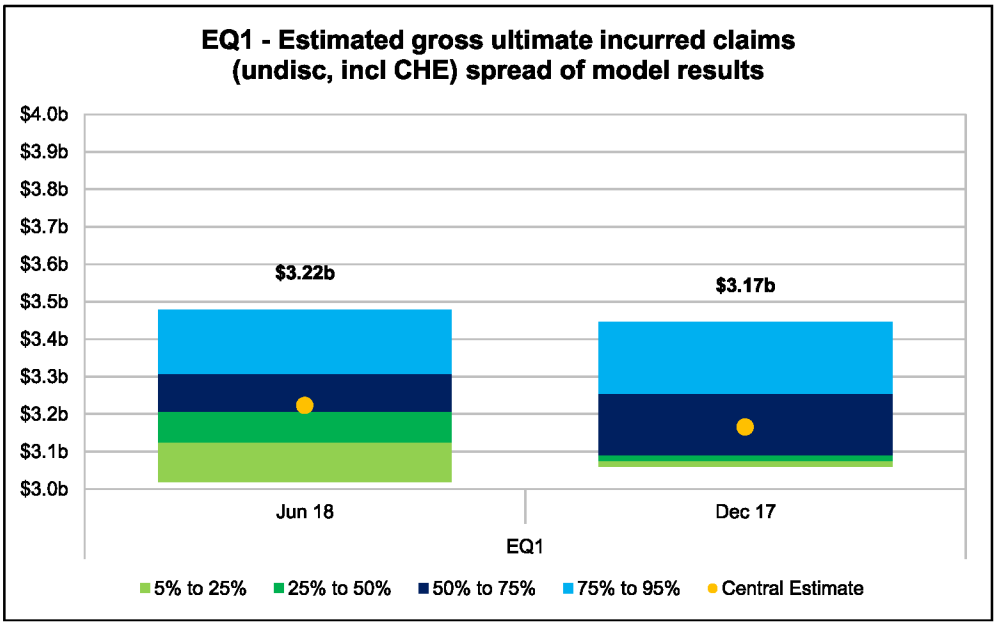
*Includes Fletcher PMO direct costs of repair (excludes margin and infrastructure costs)

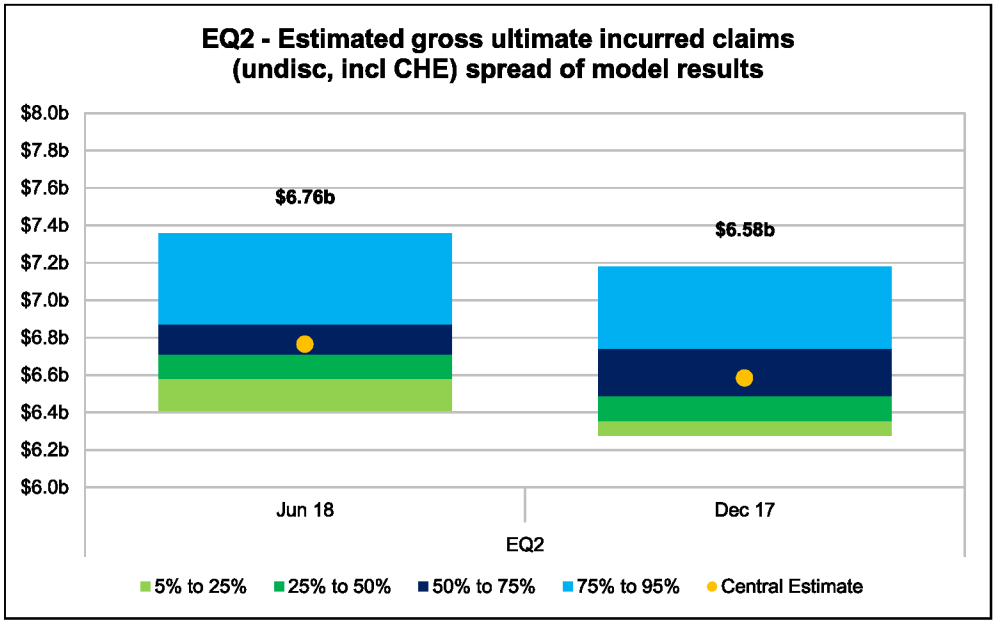
5.1.2 *Estimated ultimate claims costs – variability in modelled results*

The actual ultimate incurred claim costs arising from the Canterbury earthquake events will not be known until the last claim is settled. The figures shown in Section 5.1.1 are the central estimate (mean) of a distribution of modelled outcomes.

The charts below illustrate the variability in the ultimate claims liabilities for EQ1 and EQ2 according to our valuation model, split by Canterbury earthquake event. The numbers shown correspond to the central estimates.

Canterbury Earthquakes only



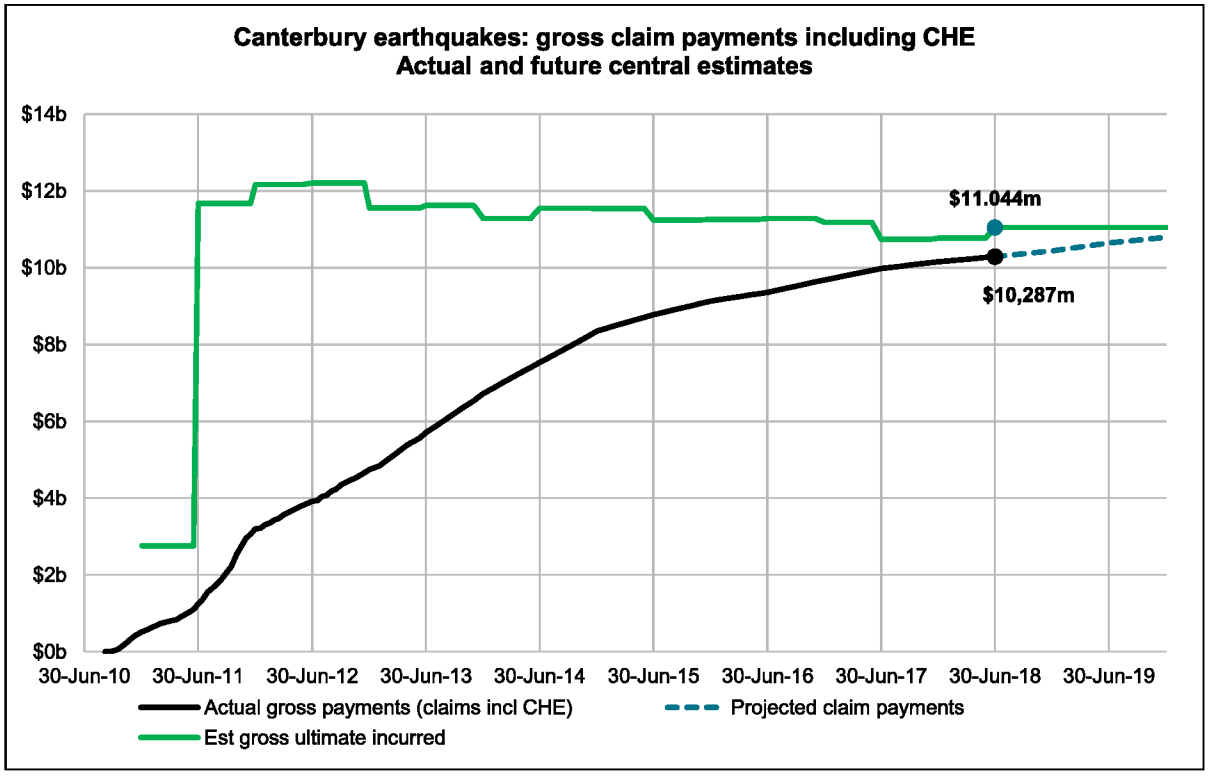


Estimated gross ultimate incurred cost incl CHE

	EQ1	EQ2	EQ3	EQ4	AS
30 June 2018 ILVR					
5%	$3.019b	$6.409b	$0.581b	$0.161b	$0.247b
25%	$3.124b	$6.580b	$0.601b	$0.167b	$0.257b
50%	$3.207b	$6.710b	$0.618b	$0.171b	$0.264b
75%	$3.307b	$6.869b	$0.641b	$0.175b	$0.271b
95%	$3.480b	$7.356b	$0.674b	$0.181b	$0.281b
Central Est	$3.222b	$6.765b	$0.622b	$0.171b	$0.264b
31 December 2017 ILVR					
5%	$3.060b	$6.275b	$0.568b	$0.162b	$0.249b
25%	$3.075b	$6.353b	$0.589b	$0.164b	$0.253b
50%	$3.090b	$6.486b	$0.604b	$0.166b	$0.256b
75%	$3.254b	$6.739b	$0.615b	$0.168b	$0.259b
95%	$3.446b	$7.182b	$0.629b	$0.170b	$0.263b
Central Est	$3.165b	$6.584b	$0.602b	$0.166b	$0.256b

5.1.3 Gross claim payments – comparison to previous estimates

The following chart shows actual gross claim payments for Canterbury earthquakes to 30 June 2018 (including EQR payments and CHE) as the solid black line. Projected payments are shown as the blue broken line.



The valuation reflects our understanding of anticipated future cashflows. CHE payments are assumed to continue until 30 June 2022. The final two years of CHE payments are assumed to be relatively smaller and will be required for a variety of tail issues including managing reopened claims and litigation.

5.1.4 *Movement in Canterbury earthquake claims costs*

Movement in ultimate incurred claims costs

	Building $m	Contents $m	Land $m	CHE $m	Total $m
31 December 2017 ILVR					
Paid to date	7,694	476	488	1,502	10,160
Estimated future payments	325	2	208	78	613
Gross ultimate incurred claims	8,020	477	696	1,580	10,772
Movements over period					
Payments	79	0	16	32	128
Estimated future payments	208	(0)	(94)	31	145
Gross ultimate incurred claims	288	0	(78)	62	272
30 June 2018 ILVR					
Payments	7,774	476	504	1,534	10,287
Estimated future payments	534	2	114	108	757
Gross ultimate incurred claims	8,307	478	618	1,642	11,044

Canterbury earthquakes only
Comparison to 31 December 2017 ILVR Results

	EQ1			EQ2			EQ3			EQ4			AS			Total		
	Jun 18 $m	Dec 17 $m	Change $m	Jun 18 $m	Dec 17 $m	Change $m	Jun 18 $m	Dec 17 $m	Change $m	Jun 18 $m	Dec 17 $m	Change $m	Jun 18 $m	Dec 17 $m	Change $m	Jun 18 $m	Dec 17 $m	Change $m
Gross ultimate claims excl CHE, undiscounted - central estimate																		
Land	69	100	-30	487	537	-50	57	55	+2	4	4	+0	1	1	+0	618	696	-78
Building	2,517	2,445	+72	5,076	4,884	+192	399	387	+13	113	109	+4	203	196	+7	8,307	8,020	+288
Contents	126	126	+0	303	303	-0	29	29	+0	12	12	+0	7	7	+0	478	477	+0
Total	2,712	2,670	+42	5,865	5,723	+142	485	471	+15	129	125	+4	211	204	+7	9,402	9,193	+210
Claims handling expenses (CHE)																		
Paid	484	476	+8	843	820	+23	116	116	-1	39	39	-0	51	50	+1	1,534	1,502	+32
Future	26	19	+7	56	40	+16	21	15	+6	3	2	+1	2	1	+1	108	78	+31
Total	511	495	+15	900	860	+39	137	131	+6	42	41	+1	53	52	+1	1,642	1,580	+62
Gross ult claims incl CHE, undisc - central est	3,222	3,165	+57	6,765	6,584	+181	622	602	+20	171	166	+5	264	256	+8	11,044	10,772	+272
Reconciliation to gross outstanding (OS)																		
Gross ult cost incl CHE, undisc - central est	3,222	3,165	+57	6,765	6,584	+181	622	602	+20	171	166	+5	264	256	+8	11,044	10,772	+272
Paid claims costs excl CHE	(2,514)	(2,484)	-30	(5,476)	(5,419)	-57	(446)	(440)	-6	(121)	(120)	-1	(196)	(195)	-1	(8,753)	(8,657)	-96
Paid CHE	(484)	(476)	-8	(843)	(820)	-23	(116)	(116)	+1	(39)	(39)	+0	(51)	(50)	-1	(1,534)	(1,502)	-32
Gross OS incl CHE, undisc - central est	224	205	+19	445	344	+101	61	46	+15	11	7	+4	17	10	+6	757	613	+145
Reinsurance recoveries, undiscounted - central estimate																		
Past payments recoveries	(1,465)	(1,431)	-34	(2,478)	(2,478)	+0	-	-	-	-	-	-	-	-	-	(3,943)	(3,908)	-34
Future payments recoveries	(220)	(201)	-19	(0)	(0)	-0	0	(0)	+0	0	(0)	0	-	-	-	(220)	(201)	-19
Total expected recoveries	(1,686)	(1,632)	-54	(2,478)	(2,478)	-0	0	(0)	+0	0	(0)	0	-	-	-	(4,163)	(4,109)	-54
Net ult inc claims incl CHE, undisc - central est	1,537	1,533	+3	4,287	4,106	+181	622	602	+20	171	166	+5	264	256	+8	6,881	6,663	+218
Reconciliation to net outstanding																		
Gross OS incl CHE, undisc - central est	224	205	+19	445	344	+101	61	46	+15	11	7	+4	17	10	+6	757	613	+145
Future payments recoveries	(220)	(201)	-19	(0)	(0)	-0	0	(0)	+0	0	(0)	+0	-	-	+0	(220)	(201)	-19
Net OS including CHE, undisc - central est	3	4	-1	445	344	+101	61	46	+15	11	7	+4	17	10	+6	537	412	+125
Discounting	(1)	(0)	-1	(9)	(5)	-5	(1)	(1)	-1	(0)	(0)	-0	(0)	(0)	-0	(13)	(6)	-7
Net OS including CHE, disc - central est	2	4	-2	436	339	+96	59	45	+14	11	7	+4	16	10	+6	524	406	+118
Net risk margin, diversified, 85% PoA	2	3	-1	249	215	+34	34	28	+5	6	4	+2	9	7	+3	300	257	+43
Net OS including CHE, disc - 85% PoA	4	7	-3	684	554	+130	93	73	+19	17	11	+6	26	17	+9	824	663	+161

5.1.5 *Movement in results*

9(2)(j)

[redacted]

5.1.6 *Drivers of results*

9(2)(h) and 9(2)(j)

[redacted]

5.1.7 *Implications of results*

The implication of these issues is that the reduction in the ultimate land claims costs has been more than offset by the increase in building and estimated CHE costs.

5.2 Scenario modelling

We have carried out scenario modelling on a number of key provisions within the Canterbury earthquake model. These were calculated as gross central outstanding figures and are shown in Appendix E.1.

5.3 Claims handling expenses (CHE)

5.3.1 *Canterbury earthquakes*

The Claims Handling Expenses ('CHE') related to settling Canterbury earthquake claims will continue for as long as there are outstanding claims.

The current EQC budget projects costs to 30 June 2019 although we expect costs to be incurred beyond this point, primarily due to individual and insurer litigation – which is constrained to a large extent by the court process. The issue of reopened claims is also highly uncertain and will affect the actual CHE costs.

The expected ultimate CHE has been increased by $62 million.

5.3.2 *CHE rates*

The table below illustrates the estimated ultimate CHE for the Canterbury earthquakes and also illustrates this as a percent of the gross ultimate claims costs.

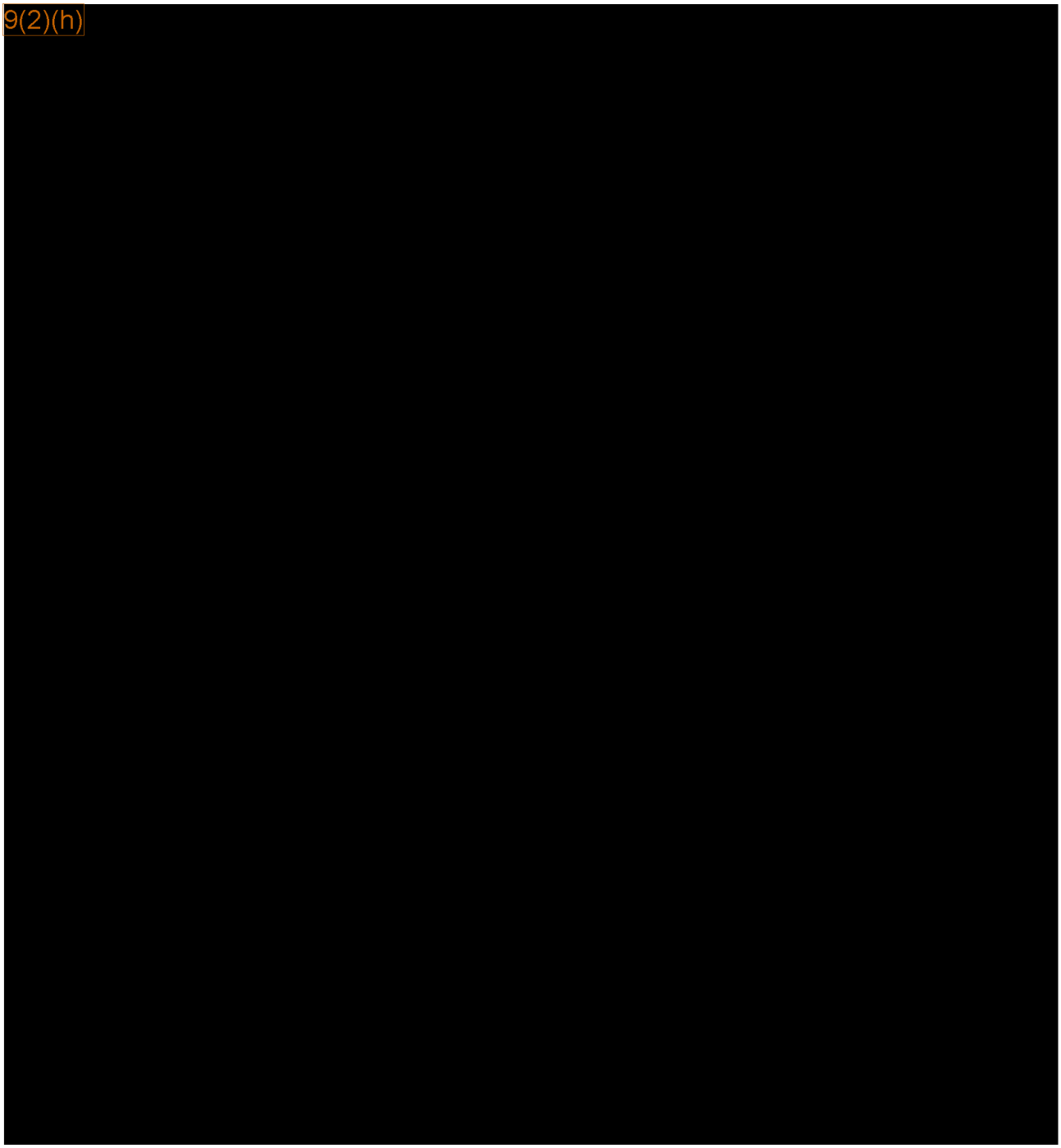
Canterbury earthquakes only
CHE - 30 June 2018 valuation

	EQ1	EQ2	EQ3	EQ4	AS	Total
Total CHE $m	510.5	899.8	136.7	41.9	53.3	1,642.2
CHE % of gross ultimate excl CHE	18.8%	15.3%	28.2%	32.5%	25.2%	17.5%
CHE % of gross ultimate incl CHE	15.8%	13.3%	22.0%	24.5%	20.1%	14.9%

5.4 Breakdown of properties with land exposure

The chart below illustrates the split of all properties with an open or closed Canterbury land exposure.

9(2)(h)



5.5 Scenario Analysis

There are six scenarios that have been modelled to inform the ultimate land claims costs and these are:

9(2)(j)

[redacted]

5.6 Scenario probabilities

9(2)(h) and 9(2)(j)

[redacted]

9(2)(h) and 9(2)(j)

5.6.1 *Scenario summaries*

The table below summarises the distribution of potential outcomes.

9(2)(j)

5.6.2 *Scenario results*

9(2)(h) and 9(2)(j)

5.7 Breakdown of land claims costs

The table below shows the decomposition of the ultimate land claims costs both, with and without allowance for the weighted litigation scenarios described above.

We have also illustrated the net impact of the litigation allowance on the risk margin.

9(2)(h)

The central estimate ultimate cost of land claims is $618 million. 9(2)(h)

9(2)(h)

9(2)(h)

6 Kaikoura earthquake claim liabilities

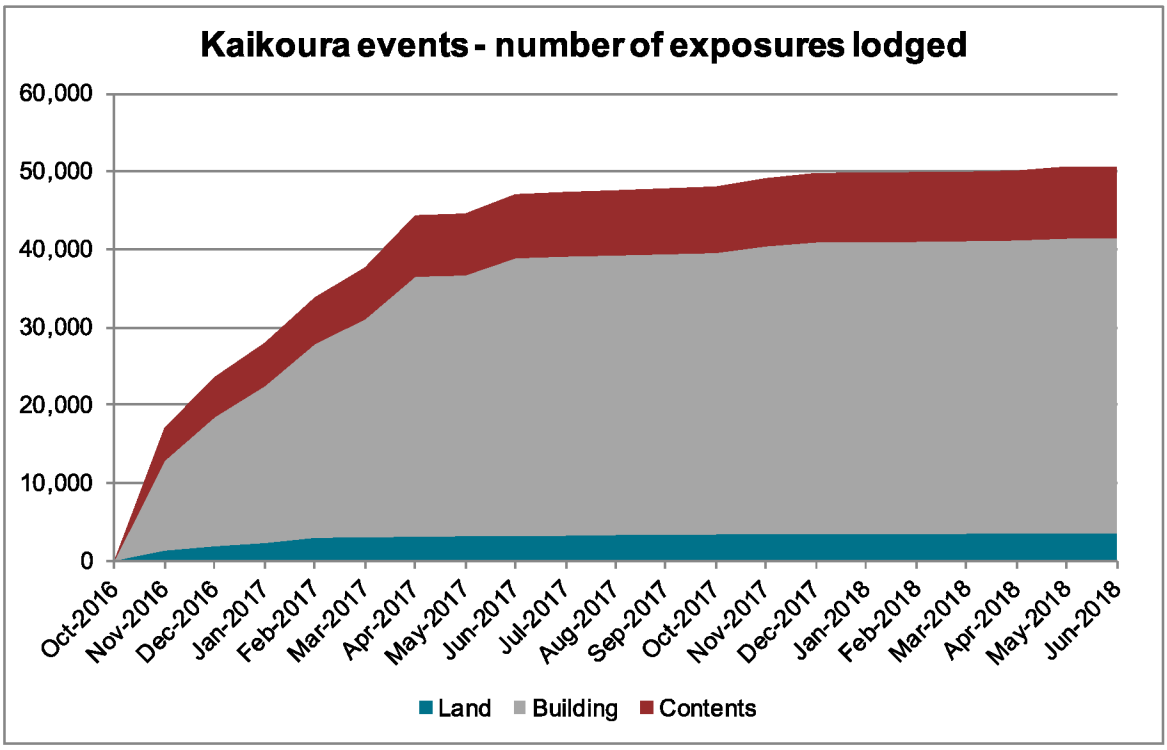
With the implementation of the MoU there will necessarily be a lag in claims information finding its way into EQC's claim management system. This has the effect of delaying any informational changes to the Kaikoura earthquake model.

The results in the section have been derived partly based on the claim statuses in the ADE. For the Kaikoura event, most claims remained open as at this date. Consequently, there has been a significant degree of judgement applied in regard to the likely outcome of these open claims.

6.1 Experience to date

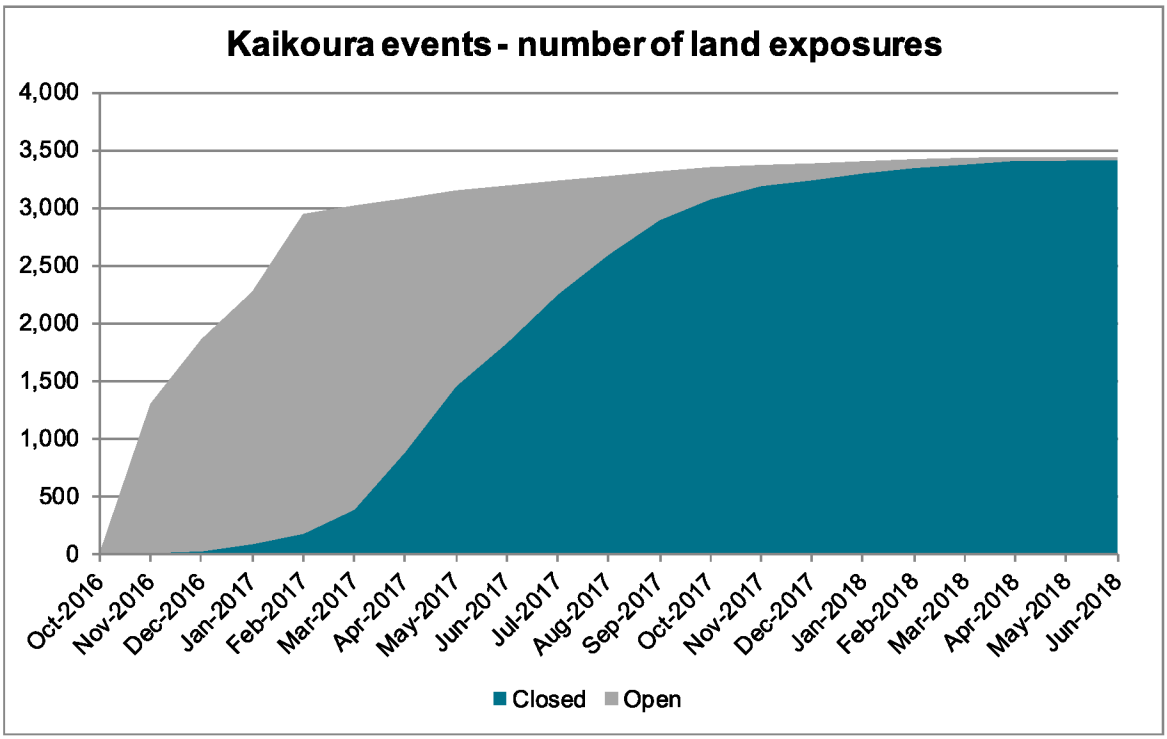
6.1.1 Exposure statuses

The chart below illustrates the number of exposures lodged to date in respect of the Kaikoura events.



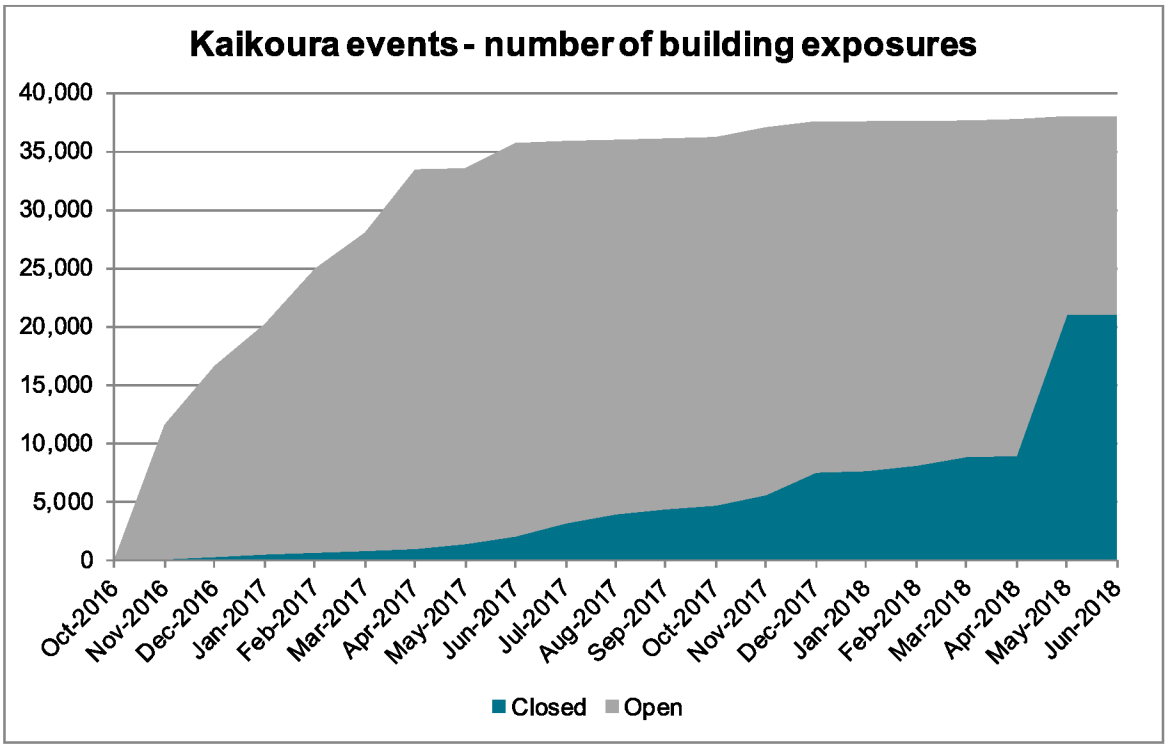
Whilst the majority of exposures were opened in CMS within the first 90 days after the events, there were still a significant number opened after this. This can be due to delays between the claimant notifying the insurer/EQC and EQC opening the relevant exposure on the claim.

The following chart drills down into the land exposures.



As all land exposures are managed by EQC, there has been a clear and consistent pattern in terms of closing land exposures.

A very different picture is presented in regard to building exposures (below).



The MoU, combined with various IT issues, has created some challenges for EQC in identifying whether or not a building exposure is closed. Whilst there was a drive to close building exposures in the lead up to CMS4 migration in May, there are still a significant number of exposures remaining open.

6.1.2 *Costs incurred to date*

The table below summarises the claims cost experience of Kaikoura to date.

Kaikoura experience to 30 June 2018

	Land claims	Contents claims	Insurer managed non-MUB building claims	EQC managed non-MUB building claims	WGN MUB building claims	Total
Number of exposures						
Closed - zero	2,573	2,745	5,300	1,583	293	12,494
Closed - non-zero	840	2,979	12,671	1,078	71	17,639
Open - zero	16	2,052	8,886	126	125	11,205
Open non-zero	10	1402	7,743	22	103	9,280
Total	3,439	9,178	34,600	2,809	592	50,618
Proportion non-zero (to date)						
Closed exposures	25%	52%	71%	41%	20%	59%
Open exposures	38%	41%	47%	15%	45%	45%
Total	25%	48%	59%	39%	29%	53%
Paid to date						
Closed exposures	$9.3m	$8.0m	$192.5m	$17.5m	$3.4m	$230.7m
Open exposures	$0.0m	$5.6m	$149.9m	$0.6m	$18.9m	$175.1m
Accruals & adjustments	$0.0m	($0.9m)	$33.3m	$0.0m	$0.0m	$32.4m
Total	$9.4m	$12.7m	$375.7m	$18.2m	$22.3m	$438.2m
Average paid per non-zero exposure						
Closed exposures	$11.1k	$2.7k	$15.2k	$16.3k	$48.3k	$93.5k
Open exposures	$3.8k	$4.0k	$19.4k	$29.2k	$183.4k	$239.8k
Total	$11.0k	$2.9k	$18.4k	$16.5k	$128.3k	$16.3k
Estimated number of units						
Closed - zero					1,493	
Closed - non-zero*					1,000	
Open - zero					1,456	
Open non-zero*					2,208	
					6,157	
Average paid per unit with non-zero building paid						
Closed exposures					$3.4k	
Open exposures					$8.6k	
Total					$7.0k	

*Where there is a non-zero paid for the buliding (some units may have zero paid)

The categorisation of the table above is a function of the methodology employed (see Appendix C).

6.2 Valuation results – Kaikoura earthquake

6.2.1 Estimated claims costs – Kaikoura earthquake

The results from our simplified model are shown below.

Central estimate undiscounted excl CHE

	Paid to date $m	Future $m	Ultimate $m
Model components			
Insurer managed non-MUB building claims	342.4	52.0	394.4
Land claims	9.4	0.1	9.5
Contents claims	13.6	5.0	18.7
EQC managed non-MUB building claims	18.2	1.1	19.3
WGN MUB building claims	22.3	13.9	36.2
Total	405.9	72.2	478.1
Reconciliation items*			
Land	-		-
Building	0.9		0.9
Contents	(0.9)		(0.9)
Total	(0.0)	-	(0.0)
Accruals**			
Land	-		-
Building	32.4		32.4
Contents	-		-
Total	32.4	-	32.4
Total			
Land	9.4	0.1	9.5
Building	416.2	67.1	483.3
Contents	12.7	5.0	17.7
Total	438.3	72.2	510.5

*To match the trial balance

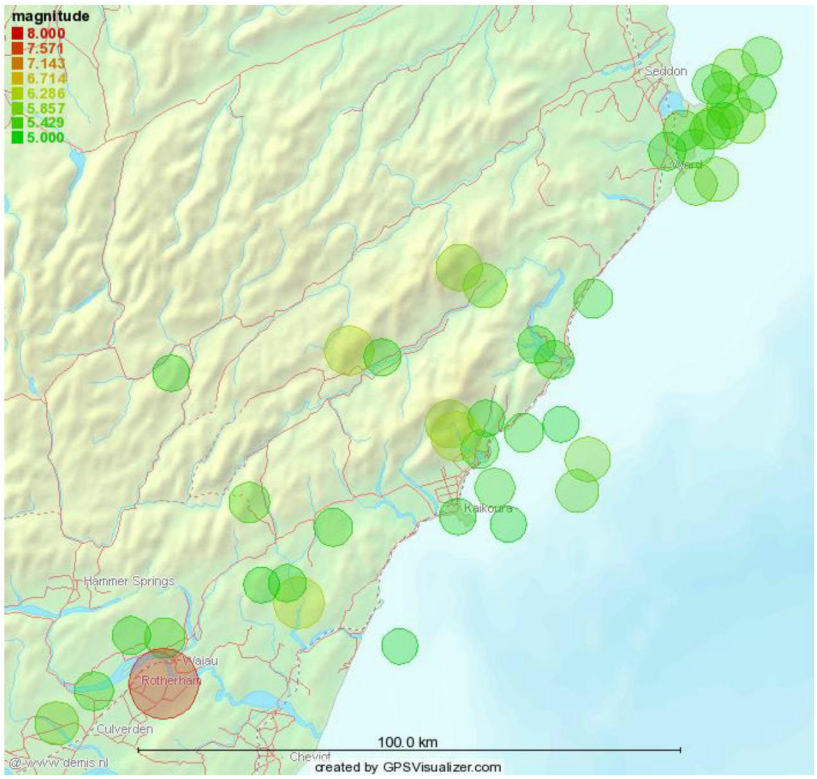
The estimate ultimate claims costs including CHE are $616 million.

6.3 Background

The 2016 Kaikoura earthquake was a magnitude 7.8 earthquake in the South Island of New Zealand that occurred two minutes after midnight on 14 November 2016. The earthquake started at about 15 kilometres north-east of Culverden and 60 kilometres south-west of the tourist town of Kaikoura and at a depth of approximately 15 kilometres. Ruptures occurred on multiple fault lines in a complex sequence that lasted for about two minutes. The cumulative magnitude of the ruptures was 7.8, with the largest amount of that energy released far to the north of the epicentre.

The shaking caused significant damage for areas immediately around the fault lines that ruptured, including a number of very large land slips. It also caused significant shaking in Wellington although this most affected medium rise buildings which had natural shaking frequencies similar to that produced by the earthquake.

The chart below illustrates the quakes greater than magnitude 5.0 that occurred on 14 November 2016. The size and colour of the circles represent the magnitude of the quakes.



Source: GeoNet project, sponsored by EQC, GNS Science and LINZ

6.3.1 *Valuation developments*

Previously we have used an exposure-based model to determine the ultimate claims costs. This was primarily due to the lack of claims data with which to create a claims-based model.

For this valuation we have developed claim based models for the five categories of exposure that are still open. These categories are; Land, Contents, Building (MuBs), Building (EQC managed) and Building (insurer managed).

The model is in two parts, an average cost per claim model for the four less material claim categories and a multi-state model for the most material category, Building - insurer managed non-MUB exposures. Further details can be found in Appendix C.3.

Claims handling expenses

We have assumed CHE costs of $105 million. This is $4 million higher than the figure that we assumed as at December 2017.

6.3.2 *Areas of judgement*

The largest area of uncertainty, and that requiring the most judgement, is the remaining cost of open Kaikoura claims, particularly those where the insurer may consider a claim to be finalised, but the information in EQC's claim management system does not yet provide clarity on the status of the claim.

6.3.3 *Drivers of results*

Key drivers of the result are:

- The likelihood that a currently open exposure will close with/without further payment.
- The average cost where a claim does incur further payment
- The likelihood with which a claim will reopen.

6.3.4 *Implications of results*

The most material implication of the Kaikoura event is that there will be significant costs for EQC.

6.4 Claims handling expenses (CHE)

6.4.1 *CHE rates*

The table below illustrates the estimated ultimate CHE for the Kaikoura earthquake and also illustrates this as a percent of the gross ultimate claims costs.

Kaikoura earthquakes only
CHE - 30 June 2018 valuation

	KEQ
Total CHE $	105.5
CHE % of gross ultimate excl CHE	20.7%
CHE % of gross ultimate incl CHE	17.1%

6.5 Scenario analysis

The Kaikoura valuation model uses a range of assumptions to allow for the possibility that a claim might reopen (the assumptions vary over time and according to whether or not there has been anything paid on the claim to date). These assumptions result in an allowance for reopened claims which equates to around 10% of insurer-managed non-MUB exposures reopening with a total cost of some $28 million. The table below shows the impact of varying the reopen assumptions to achieve different reopened rates.

Reopen rate scenario testing

	Central estimate undiscounted excl CHE					
	Future cost			Ultimate cost		
Scenario	$m	Δ $m	Δ %	$m	Δ $m	Δ %
Base (reopen rate 10%)	72.2			510.5		
Reopen rate 5%	58.1	(14.2)	-20%	496.3	(14.2)	-3%
Reopen rate 15%	86.2	14.0	19%	524.5	14.0	3%
Reopen rate 20%	100.5	28.2	39%	538.7	28.2	6%

Our baseline assumption is that the central estimate undiscounted future costs of claims is $72 million. If the eventual reopen rate were to reduce to 5%, we would expect the future claims cost to be $58 million, a 20% reduction.

7 BAU claim liabilities

The central estimate outstanding claims (excluding CHE) for BAU events is $24 million as at 30 June 2018. The tables below summarise the quantum as at the valuation date.

BAU outstanding claims as at 30 June 2018
Undiscounted central estimate excluding CHE

	Land $000s	Building $000s	Contents $000s	Total $000s
BAU				
Open claims	6,471	1,174	26	7,671
IBNR	1,120	1,055	25	2,200
Total	7,592	2,229	50	9,870
BAU PP				
Open claims	9,357	4,533	74	13,964
IBNR	0	0	0	0
Total	9,357	4,533	74	13,964
All loss periods				
Open claims	15,828	5,707	100	21,634
IBNR	1,120	1,055	25	2,200
Total	16,948	6,761	125	23,834

7.1 CHE rates

The provision for BAU Claims Handling Expenses is $7.2 million.

The table below illustrates the estimated outstanding CHE for BAU claims and also illustrates this as a percent of the net central outstanding claims costs. Note that while the measurement for this is outstanding costs (rather than ultimate costs for Canterbury and Kaikoura), the CHE % is comparable to the percentages shown for the Canterbury and Kaikoura events.

BAU claims only
CHE - 30 June 2018 valuation

	BAU
CHE provision $	$7.2m
CHE % of net OS claims	30.1%

7.2 Large events

Over the past several years, there have been a number of significant BAU events. These are shown in the table below.

It is worth noting that the reliability of the figures is heavily dependent on the correct classification of each BAU claim to the correct event.

BAU results by event as at 30 June 2018

	Land	Building	Contents	Total
Paid to date ($000s)				
Cyclone Gita (LSF, Feb 2018)	2,011	1,785	291	4,088
Christchurch 15km E, 15km, 5.7	1	721	7	729
May 2012 Earthquake - EVT/201205/0003	1	4,292	117	4,410
April 2017 Landslip/Storm/Flood	14,491	3,265	52	17,807
January 2013 Earthquake - EVT/201301/0001	0	1,575	38	1,613
Christchurch 15km E, 15km, 5.7 - EVT/201602/0011	380	49,074	1,718	51,172
December 2016 Earthquake - EVT/201612/0001	0	326	0	326
Auckland/Coromandel Storm Event (LSF, Mar - EVT/201703/0011	7,153	1,185	10	8,348
January 2017 Earthquake - EVT/201701/0001	0	137	1	138
February 2017 Earthquake - EVT/201702/0001	0	237	2	239
Undiscounted central estimate excl CHE ($000s)				
Cyclone Gita (LSF, Feb 2018)	981	507	20	1,508
Christchurch 15km E, 15km, 5.7	0	604	5	609
May 2012 Earthquake - EVT/201205/0003	17	338	0	355
April 2017 Landslip/Storm/Flood	2,469	415	0	2,884
January 2013 Earthquake - EVT/201301/0001	11	124	0	136
Christchurch 15km E, 15km, 5.7 - EVT/201602/0011	1	96	1	98
December 2016 Earthquake - EVT/201612/0001	0	118	2	120
Auckland/Coromandel Storm Event (LSF, Mar - EVT/201703/0011	615	237	5	857
January 2017 Earthquake - EVT/201701/0001	1	105	3	109
February 2017 Earthquake - EVT/201702/0001	1	84	3	87
Other	10,675	6,578	99	17,351
Total	14,770	9,206	137	24,113
Estimated ultimate ($000s)				
Cyclone Gita (LSF, Feb 2018)	2,992	2,292	311	5,595
Christchurch 15km E, 15km, 5.7	1	1,325	12	1,338
May 2012 Earthquake - EVT/201205/0003	18	4,630	117	4,765
April 2017 Landslip/Storm/Flood	16,960	3,680	52	20,691
January 2013 Earthquake - EVT/201301/0001	11	1,699	38	1,748
Christchurch 15km E, 15km, 5.7 - EVT/201602/0011	381	49,170	1,719	51,269
December 2016 Earthquake - EVT/201612/0001	0	444	2	446
Auckland/Coromandel Storm Event (LSF, Mar - EVT/201703/0011	7,768	1,422	15	9,204
January 2017 Earthquake - EVT/201701/0001	1	241	5	247
February 2017 Earthquake - EVT/201702/0001	1	321	4	326

The table above shows that most of the outstanding claims liability for BAU is attributed to 'Other' events. This is, in part, due to the different way that events are identified in CMS8.

8 Overall results

8.1 Claims incurred

The gross incurred claims costs for all Canterbury and Kaikoura EQ events, incurred to 30 June 2018, include:

- Claims costs paid to date
- Claims costs expected to be paid in future (the OS claims liability).

Claims costs paid to date are known, but those to be paid in the future are unknown and so must be estimated. The approach that we have taken is to estimate the ultimate incurred claims costs and then deduct payments made to 30 June 2018 in order to determine the estimated OS claims liability.

The ultimate incurred claims costs are calculated in respect of Canterbury and Kaikoura earthquake events only.

It is not useful (or practical) to include ultimate incurred claims costs from BAU events as this would include a vast number of smaller events which may have been materially settled. This makes comparisons of BAU claims costs between valuations meaningless.

No risk margins have been calculated and no discounting has been applied to the estimated ultimate incurred claims costs.

The outstanding claims liabilities are in respect of all outstanding EQC claims (Canterbury and Kaikoura earthquakes plus BAU) and are discounted for the time value of money and include risk margins at the 85th percentile.

8.2 All outstanding claims

8.2.1 Ultimate and outstanding claims liabilities – all claims

The table below summarises the key components of the gross ultimate claims costs and the derivation of the outstanding claims liabilities ('OSCL') as at 30 June 2018

The net discounted OSCL at a probability of adequacy of 85% is $1,004m. The largest component of the liabilities is in respect of the EQ2 event, followed by the Kaikoura earthquake claims.

All EQC claims
Gross ultimate claims costs to net outstanding claims liabilities - 30 June 2018 valuation

	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	BAU $m	KEQ $m	Total $m
Gross ultimate claims excl CHE, undisc - central est	2,712	5,865	485	129	211		510	9,913
Claims handling expenses (CHE)	511	900	137	42	53		105	1,748
Gross ult claims incl CHE, undisc - central est	3,222	6,765	622	171	264	n.a.	616	11,660
Reinsurance recoveries, undiscounted - central estimate	(1,686)	(2,478)	0	0	0	-	0	(4,163)
Net ult inc claims incl CHE, undisc - central est	1,537	4,287	622	171	264	n.a.	616	7,497
Net claims costs paid to date	(1,049)	(2,999)	(446)	(121)	(196)		(438)	(5,249)
CHE paid to date	(484)	(843)	(116)	(39)	(51)		(78)	(1,612)
Discounting	(1)	(9)	(1)	(0)	(0)	(0)	(2)	(15)
Net OS including CHE, disc - central est	2	436	59	11	16	31	98	652
Net risk margin, diversified, 85% PoA	2	249	34	6	9	12	40	352
Net OS including CHE, disc - 85% PoA	4	684	93	17	26	43	137	1,004

8.2.2 Movement in net outstanding claims liabilities – all claims

The table below shows the movement in the net outstanding claims liabilities since 31 December 2017.

The net OSCL (85% probability of adequacy, discounted) has decreased from $1.042b as at 31 December 2017 to $1.004b as at 30 June 2018.

The principal drivers of the change in total claims liabilities in decreasing order of impact are:

- Claim payments; $281m of net payments since 31 December 2017.
- Risk margin has decreased by $10m.
- Discounting has increased by $8m.
- Actuarial determination; this has increased by $261m on a net of reinsurance basis.
  - +$218m as a result of the Canterbury earthquakes.
  - +$6m as a result of the Kaikoura earthquake.
  - +$36m for new storm events.

The following table provides a reconciliation and explanation of the movement in outstanding claims liabilities, by event.

All EQC claims
Reconciliation of change in outstanding claims liability from 31 December 2017 ILVR

	Prior Periods (to 31 Dec 2017)							Current		All Periods		
	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	BAU $m	Subtotal $m	KEQ	BAU $m	CEQ $m	KEQ	BAU $m	Total $m
Net OSCL (85% PoA, discounted) as at 31 December 2017	7	554	73	11	17	24	n.a	329	27	663	329	51	1,042
Remove net risk margin (85% PoA)	(3)	(215)	(28)	(4)	(7)	(5)	n.a	(94)	(6)	(257)	(94)	(11)	(362)
Net OSCL (central estimate, discounted) as at 31 December 2017	4	339	45	7	10	19	424	235	21	406	235	40	680
Remove discounting	0	5	1	0	0	0	6	1	0	6	1	1	7
Net OSCL (central estimate, undiscounted) as at 31 December 201	4	344	46	7	10	19	430	236	21	412	236	40	688
Estimated net paid over period	(4)	(80)	(5)	(1)	(2)	(21)	(115)	(142)	(24)	(93)	(142)	(46)	(281)
Change in net actuarial determination	3	181	20	5	8	20	339	6	16	218	6	36	261
Net OSCL (central estimate, undiscounted) as at 30 Jun 2018	3	445	61	11	17	18	655	100	13	537	100	31	668
Add discounting	(1)	(9)	(1)	(0)	(0)	(0)	(15)	(2)	(0)	(13)	(2)	(0)	(15)
Net OSCL (central estimate, discounted) as at 30 June 2018	2	436	59	11	16	18	542	98	13	524	98	31	652
Net diversified risk margin (85% PoA, discounted)	2	249	34	6	9	5	n.a	40	7	300	40	12	352
Net OSCL (85% PoA, discounted) as at 30 June 2018	4	684	93	17	26	23	n.a	137	20	824	137	43	1,004

8.3 Premium liabilities

The table below summarises the key results of the estimation of EQC's premium liabilities as at 30 June 2018. The premium liabilities will be used in the liability adequacy test.

The total value at 75% probability of adequacy is $234 million. This is greater than the $197 million unearned premium reserve. This means that an additional unexpired risk reserve will be required in the accounts as at 30 June 2018.

The largest component ($101 million) relates to projected costs of future claims arising from major events (other than those related to Canterbury earthquakes) during the period of the runoff of risks on the books as at 30 June 2018. These claims are modelled by Minerva.

The next largest component ($69 million) relates to projected costs of future claims arising from Canterbury earthquakes during the period of the runoff of existing risks as at 30 June 2018.

The component relating to the enhanced seismicity following the Kaikoura earthquake ($40 million) is slightly lower than as at 31 December 2017. Although the Kaikoura event is more recent, it is expected that the future costs will be smaller than the Canterbury component due to the relative lack of exposure around Kaikoura.

The other claims costs relate to future BAU (small) claims and the associated reinsurance and administration expenses.

The cost to EQC of reinsurance has increased considerably for cover negotiated since the Canterbury events. The future reinsurance costs for unexpired risks are $84 million.

Estimated Premium Liabilities - 30 June 2018

	BAU $m	Minerva $m	Cant EQ $m	KEQ $m	Total $m
Unearned premium reserve					197
Cost of future claims from unexpired risks					
Gross claims, undiscounted - central estimate	17	48	52	34	151
Administration and reinsurance costs for unexpired risks					
Claims administration expenses	2	5	5	3	16
Policy (non-claims) admin expenses for unexpired	5	0	0	0	5
Future reinsurance costs for unexpired risks	0	63	16	5	84
Reinsurance recoveries					
Reinsurance recoveries, undiscounted	0	(13)	(3)	(1)	(18)
Net premium liabilities, undiscounted - central estimate	24	103	70	41	238
Discounting	(0)	(2)	(1)	(1)	(4)
Net premium liabilities, discounted - central estimate	24	101	69	40	234
Diversified risk margin, discounted - 75% PoA					0
Net premium liabilities, discounted - 75% PoA					234

Note that the reason that the risk margin is $0 is because the distribution of potential claims is very skewed. The central estimate is the average of all possible outcomes; this includes some very low probability but high severity events. As a consequence, the central estimate (mean) outcome is greater than the 75th percentile.

The outcome of the liability adequacy test is often taken as a proxy for the adequacy of the levies (premium rates) that are charged. Consequently, the outcome above suggests that the current levy rates are less than sufficient to cover the expected costs of claims. However:

- The expected claims costs are currently inflated due to the heightened seismic conditions in Canterbury.

- The central estimate claims costs may not be the best decision-making tool for setting levy rates for such a highly-skewed distribution.
- EQC's considerations differ from insurers and will include such factors as the Crown's appetite for managing earthquake risk including pre and post-funding.

8.3.1 Material implications of the results

As the net discounted premium liability at 75% probability of adequacy ($234 million) exceeds the unearned premium reserve ($197 million) it will be necessary to hold an additional unexpired risk reserve. It is noted that the levy rate was increased in November 2017 and the full effects of this will not be seen in respect of the LAT until December 2018.

8.3.2 Quality control processes

The valuation was subject to internal peer review and the results were compared to those from previous ILVRs.

Actual vs. expected experience

The current data does not support an exact analysis of actual claims experience against that expected from the 31 December 2017 premium liabilities calculations. This is because there is no way of identifying incurred claims costs arising from unexpired risks as at the previous valuation. However, it is still interesting to compare the estimated cost of claims incurred in the current period with the undiscounted central estimate future claims costs from 31 December 2017.

8.4 Quality control processes

The valuation was subject to internal peer review. In addition, all results were compared to those of the previous valuations.

9 Uncertainty, Limitations and Reliances

9.1 General comment

There is inherent uncertainty in any estimation of insurance liabilities – estimates of liabilities are based on assumptions and deviations from estimates are normal and to be expected. The estimates are therefore a probability statement rather than an absolute judgement.

The actual ultimate incurred claim costs arising from the Canterbury earthquake events will not be known until the last claim is settled.

The actual ultimate incurred claim costs arising from the Kaikoura earthquake will take some time to estimate accurately. There is very little data with which to form an estimate.

9.2 General sources of valuation uncertainty

The general sources of error in the estimation of liabilities include:

- Normal variation that is inherent in any random process.
- The valuation model being a poor representation of reality.
- Incorrect valuation assumptions arising from:
  - Assumptions being derived from an unrepresentative sample.
  - Underlying experience drifting over time and chosen assumptions failing to accurately follow the 'drift' – this could be due to internal factors such as changes in the claims process or external factors such as changes in the legal environment, cost inflation etc.
- Incomplete or poor-quality data.
- Errors in calculations.

All of these sources of error are potentially present in this investigation.

9.3 Key uncertainties

9.3.1 Exceptional uncertainties arising from the Canterbury earthquakes

The Canterbury earthquakes have resulted in a high level of uncertainty. Some of the key sources of uncertainty are:

- The impact of multiple events on the allocation of damage, EQC coverage and EQC's reinsurance coverage.
- Severe land damage and a very complex land claims environment from engineering, valuation and legal perspectives.
- Claims development. There has been considerable progress within EQC in regard to the operational aspects of assessing and settling claims, especially in trying to process land claims. However, for a number of reasons, outcomes of that progress cannot be fully reflected in the information available for the valuation, and so there remains residual uncertainty in the valuation results.
- Legal uncertainties outside the EQC Act. This includes recent cases brought against EQC in respect of negligence claim. These are outside the scope of this report.
- Whether a particular claim has been satisfactorily resolved without reopening.

Consequently, even at this relatively late stage of claims development, there is still a degree of unavoidable uncertainty regarding the future claims costs.

As noted in our previous reports, as the claims are settled and as the reasonableness of the model and its assumptions are refined and tested against the emerging claims experience, the level of uncertainty will reduce.

9.3.2 *Land valuation uncertainties*

The list below sets out some specific sources of uncertainty regarding the estimation of EQC's land liabilities. These sources include, but are not limited to interpreting the land cover provisions in the Act with respect to:

- Legal aspects
- Valuation, and
- Engineering challenges

Some practical outcomes of the uncertainty associated with the valuation are:

- The actual claims outcome will differ to some degree from the estimates.
- There are confidence ranges in the estimated liabilities for each event.
- Different practitioners could legitimately arrive at quite different estimates of claims cost.

9.3.3 *Uncertainties arising from the Kaikoura earthquake*

The Kaikoura earthquake has resulted in a level of uncertainty. Although it is being settled considerably quicker than the Canterbury earthquake sequence, there is still some uncertainty remaining to identify, quality and settle all earthquake damage. It is acknowledged that much of this may simply be in respect of reporting. Specific sources of uncertainty include:

- The Memorandum of Understanding ('MoU') places claims handling in the hands of insurers.
    - This necessarily delays the receipt of information surrounding each claim.
    - There is not perfect consistency in how claims are managed across all insurers, affecting the claims outcome.
- There is little information as to the extent of residential building damage in the South Island. Many properties will be rural and access to these will be limited. While EQC will now be aware of the settlements that have been made, it will not know whether these are sufficient in the light of future demand surge.
- There is little detailed and quantifiable information on the extent of damage to residential apartment buildings in Wellington that are managed by insurers. This would facilitate some assurance that settlements are sufficient.

9.3.4 *Data sources*

EQC has a number of data systems that enable it to settle claims. There are a number of issues with these systems from a management reporting perspective and this includes the data that is used for the actuarial valuation.

It has not inhibited our ability to produce an estimate of the ultimate claims costs, but it does add uncertainty to that estimate.

9.4 Limitations

In this report, we provide the results of our investigations together with an outline of the matters considered and the methods and assumptions applied to obtain these results. Opinions and estimates contained in this report constitute our judgement as at the date of the report.

This report must be read in its entirety. Individual sections of the report, including the Executive Summary, could be misleading if considered in isolation from each other.

This report is addressed to the management and Board of EQC and should not be provided to or used by any other party (except as specified below) without the express written permission of MJW. This limitation has been provided with the intention of preventing the use of the report for purposes for which the analysis was not intended. MJW will not be liable for the consequences of any third party acting upon or relying upon any information or conclusions contained within this report.

MJW has agreed to a request from EQC that this report may be provided to EQC's auditor, reinsurance broker (AON Benfield), reinsurers, legal counsel (Chapman Tripp), geotechnical engineers (Tonkin + Taylor) and the New Zealand Treasury. In agreeing to this request, we point out in particular that this report is addressed to EQC, and therefore we do not warrant or represent that any information, analysis or results set out in it are sufficient or appropriate for any other parties' purposes. This report cannot substitute for any investigations that any other party may wish to carry out for its own purposes, and the authors of this report and MJW will not accept any liability to any other party arising from the use of this report.

9.4.1 IMAT and Official Information Act (OIA)

It is recognised that EQC will publish the ILVR on its website.

This report will be covered by the OIA and therefore will be released subject to any redactions allowable under the OIA.

The limitations above also apply to any other reader of this report.

9.5 Key reliances

In completing this report, considerable reliance has been placed on data and information supplied to MJW by EQC and its external advisors. The most important reliances were placed on the data sources listed in Section D.1.

More details regarding data, information and reliances are set out throughout Section D.

9.6 Quality control and risk management processes

The estimation of EQC's liabilities, particularly the building component, involves constructing multiple complex statistical models.

The data, methodology and results that drive, and are output from, these models undergo a variety of quality control and audit processes.

We undertake to ensure the robustness of these by:

- Internal peer review, including:

    - Detailed review of data, assumptions, methodology and results.
    - Periodic rotation of staff which allows, over time, a 'fresh set of eyes' over aspects of the valuation process.
  - Data validation where possible to independent sources (e.g. management accounts, daily reports)
  - Analysis of change in assumptions for reasonableness.
  - Comparison of results to previous models and valuations.
  - Comparing results to alternative models.
- External review, including
    - Discussions with EQC staff
    - Discussions with external auditors at year ends.

Earthquake Commission

20 August 2018

Insurance Liability Valuation as at 30 June 2018

Appendices

MELVILLE JESSUP WEAVER

Willis Towers Watson Alliance Partner

A EQC – Background

A.1 EQC structure and role

EQC is a NZ Government-owned Crown entity whose origins stretch back to 1945 and is currently established under the Earthquake Commission Act 1993 ('the Act') and associated schedules and regulations.

EQC's role may be summarised as follows:

- To provide insurance against insured perils.
- To administer the Natural Disaster Fund (NDF), including investments, and obtain reinsurance.
- To facilitate research and education about matters relevant to natural disaster damage and its mitigation.
- To undertake other functions as required by the Minister of Finance or the Minister Responsible for the Earthquake Commission.

A Government Guarantee ensures that EQC will be able to meet its financial obligations in all circumstances.

Details on EQC's operations including what is covered under EQC insurance, can be found on its website www.eqc.govt.nz or in previous ILVRs.

A.1.1 Reinstatement of cover limits

Following the High Court's declaratory judgment on 2 September 2011 (EQC v the Insurance Council / Vero / IAG; and Tower Insurance v EQC) the issue of the reinstatement of EQC's cover after an event has now been clarified.

In summary, EQC is generally liable for up to $100k plus GST for each building claim and $20k plus GST for each contents claim; i.e. there is immediate reinstatement of cover after each natural disaster event as long as the contract of fire insurance is in force.

B Canterbury land settlement

B.1.1 Ministerial Direction - Unclaimed damage

Given the need to apportion the costs of the claims between the various earthquake events, there is the issue that damage is deemed to have occurred to events where no valid claim has been lodged.

In these cases, there is therefore a possibility that the insured may not be covered for all of the damage that has occurred due to a lack of claim lodgement for a particular event. As a consequence, there have been a number of Ministerial Directions to clarify the issue.

For the purposes of this ILVR, the relevant directions were given on:

- 19 December 2012. Relates to residential building and states that all apportioned residential building damage will be covered by EQC, so long as at least one valid claim has been made for that residential building.
- 19 December 2013. An amendment to the previous residential building direction stating that no excess shall apply to apportioned damage where no valid claim was made.
- 29 October 2015. Relates to residential land and states that all apportioned residential land damage will be covered by EQC (subject to the land cap), so long as at least one valid claim has been made. Excesses will be deducted from all apportioned damage claim payments

These directions have consequences for the gross and net exposure of EQC in that all damage is covered by EQC (subject to there being at least one claim) but not necessarily the reinsurers.

B.1.2 Remediation of land claim damage

Canterbury land suffered visible and other forms of land damage. Other land damage includes ILV and IFV. Visible flat land damage is broken into 7 categories, descriptions of which can be found on the EQC website www.eqc.govt.nz.

Shown below is the manner in which EQC is settling the various land claim categories. The land damage may be broken down into 4 broad groups as discussed below.

- Repair of damage categories 1 – 7 on the flat.
- Repair of, or compensation for, ILV damage on the flat (formerly known as category 8 damage).
- Repair of, or compensation for, IFV damage on the flat (formerly known as category 9 damage).
- Repair of damage on the Port Hills.

Damage categories 1 – 7 on the flat

The land damage reinstatement costs have been calculated for each property on an individual property basis.

Diminution of value

Diminution of Value ('DoV') measures the reduction in a property's market value which has been caused by IFV or ILV land damage.

This is consistent with the indemnity principle of insurance and is being used by EQC (amongst other options) to settle land claims.

ILV damage on the flat

EQC's policy in respect of ILV damaged land considers

- Whether the property qualifies for settlement
- The costs and ability to repair the land and the DoV that has been incurred.

IFV damage on the flat

Flooding encompasses both flooding from rivers which exceed their capacity during prolonged rainfall and also overflowed flow path stormwater run-off during shorter, more intense rainfall events.

EQC's policy in respect of IFV damaged land considers

- Whether the property qualifies for settlement
- The costs and ability to repair the land and the DoV that has been incurred.

Repair of damage on the Port Hills

Port Hills land damage is more conventional as there is no liquefaction. Compared to damage on the flat, it is more straightforward to assess on a case by case basis. However, it is more difficult to assess, estimate and/or reinstate on a grouped basis.

Further details can be found on EQC's website www.eqc.govt.nz.

C Kaikoura Earthquake – Methodology and Assumptions

This appendix summarises the methodology used to estimate the cost of the Kaikoura earthquake of 14th November 2016. The Kaikoura model only deals with damage from the earthquakes, not damage from the storms in Wellington shortly afterward (which are addressed using the standard BAU model).

The methodology has changed for this valuation with a move towards attempting to make use of the (in some cases limited) information available in regard to claim and exposure statuses. The previous model was an exposure-based model which more loosely reflected the experience to date.

C.1 Claim/exposure status models

All exposures have been categorised into the following groups based on their status at the valuation date.

- Land exposure
- Contents
- Building
  - Wellington MuBs
  - EQC managed non-MuBs
  - Insurer managed non-MuBs

The majority of the claims costs arise from the last of these categories, insurer managed building claims. This was modelled using a Markov chain multi-state model and is detailed further below.

In respect of the first four, there are a smaller number of open exposures remaining and a simplified approach was taken i.e. a stochastic average cost per claim model.

C.2 Average cost per claim models

The average cost per claim models simulate, for each open exposure:

- Whether or not some non-zero cost will be incurred
- The ultimate cost (zero or otherwise) for that exposure.

The simulation takes into account any costs already paid to date on an exposure.

For the Wellington MUBs the simulation was undertaken at a whole building level i.e. treating each building as a single exposure and incurring costs in proportion to the number of units which appear to be included in claim(s) for that building. For the small number of buildings for which we have some case estimate reserve figures available, these were also incorporated: the model uses a weighted average between the simulated result and the case estimate reserve.

The table below summarises the assumptions used.

Kaikoura assumptions as at 30 June 2018

All claims other than insurer managed non-MUBs

	Land claims	Contents claims	EQC managed non-MUB building claims	WGN MUB building claims
Average claim size	11,000	2,750	40,000	8,000
Claim size CoV	175%	150%	150%	200%
Proportion finalising non-zero	50%	70%	25%	70%
Weighting applied to reserve (where available)				50%

CoV - coefficient of variation

C.3 Multi-state model

In respect of insurer managed building claims, a multi-state model was used. Each exposure was either categorised as open or closed (at various points in time). Exposure were then further categorised as:

- Having made no payments to date
- Having made one payment to date (or a single month in which payments were made)
- Having made more than one payment (over more than one month).

The multi state model then applies transition probabilities for each claim, moving between exposure states and potentially incurring costs in each state.

There are a large number of assumptions used in the multi-state model for insurer-managed non-MUBs, and it is not straightforward to present these in a simple table. However, the table below summarises some of the key outputs from the model which give some indication of the effective average assumptions.

Kaikoura key outputs as at 30 June 2018

Insurer managed non-MUBs

Total building exposures	34,600
Of which ultimately non-zero	22,679
Proportion non-zero	66%
Ultimate building cost	$438m
Effective cost per non-zero exposure	$19k

For more detail in regard to the multi-state model please contact the authors.

D Data and Information

D.1 Sources of data – Canterbury earthquake claims

The most important sources of data for the Canterbury earthquake investigations were:

- Actuarial Data Extracts from the Claim Centre Claims Information Management System ('ADE').
  - Data as at 7 May 2018 was supplemented with extra information from CMSv4 (Claims_General) to create a proxy ADE as at 30 June 2018.
  - An extract as at 30 June 2018 was received on 11 July 2018
- ACE apportionment data from the Business Intelligence Unit ('BIU') – see below.
- Small PAT results - see below.
- EQR paid data.
- Claim Stage Gate report as at 2 July 2018
- Listing of all Kaikoura claim payments
- Claim-to-address mapping data from the BIU.
- Land cost calculations from EQC & T+T.
- Fletcher Construction completion cost data.
- Trial Balances as at 30 June 2018.
- A Minerva model run generated in January 2011.
- Discussions with EQC employees and contractors.

D.1.1 ACE & Small PAT

Properties with building damage are managed either by EQC or by the relevant insurer. Generally, all properties with building damage less than the EQC cap ($100,000 +GST) per claim will be managed by EQC with the remainder ('overcap properties') managed by the insurer.

To assess whether a property is overcap, a manual Apportioned Cost Estimates ('ACE') process is carried out. This will indicate whether any claim has expected damage of more than the cap and therefore whether it should be handed over to the insurer. All overcap properties, and some undercap properties, will have ACE data.

Undercap properties were not, as a rule, manually apportioned. For the purposes of the valuation and for reinsurance, undercap properties have been apportioned using a statistical model, developed by the statistician, Dr David Baird. The statistical apportionment method is referred to as Small PAT (Proxy Apportionment Tool).

D.1.2 Actuarial Data Extract from ClaimCentre

Weekly Actuarial Data Extracts (ADE) have been taken from ClaimCentre v4. This is in the process of being archived as EQC have moved to ClaimCentre v8.

We have therefore used extracts from both ClaimCentres along with other complementary data sources as not all claims are being recorded in the new Claims management system.

V4 and V8 are structured as single database tables. Each record relates to a single claim (itself relating to up to three sub-claims) with many fields describing the claim's details.

D.1.3 *ACE damage data*

The ACE damage data (as at 30 June 2018) consisted of a table, provided by the BIU, showing apportioned damage estimates for a number of Christchurch properties. There were approximately 130,000 properties in the table although many of these had yet to be populated with apportionment information. There were 50,636 approved properties from this data set that were used in the building model. The table below details how the usable properties were derived from the total data set. It is in respect of all review statuses.

ACE data cleaning process

		Sum of Raw ACE Estimates					
	Number of Properties	EQ1 $m	EQ2 $m	EQ3 $m	EQ4 $m	AS $m	Total $m
Raw ACE Data	130,253	1,665	5,241	236	29	49	7,219
Remove:							
NAs	(75,958)	-	-	-	-	-	-
Duplicates	(37)	-	-	-	-	-	-
Property ID errors & non-approved	(3,622)	(97)	(247)	(9)	(2)	(4)	(360)
Extremely large estimates (>$100m)	0	-	-	-	-	-	-
Data used in model	50,636	1,568	4,994	226	27	45	6,859

D.1.4 *EQR paid data*

The EQR paid data (as at 30 June 2018) consisted of a table, provided by the BIU, showing the amounts paid to substantively completed properties. There were approximately 68,000 properties from this data set used in the model.

D.1.5 *Tonkin + Taylor land data and assumptions*

The land valuation model has been constructed using information from T+T and supplemented with information from EQC and their advisors.

D.1.6 *Output from the Minerva loss model*

Output from the Minerva model was the same as that used for the 30 June 2012 valuation. This output was provided by EQC in July 2011. No more recent outputs have been provided as there has been no input of revised parameters following the Christchurch events.

D.2 Sources of data – Kaikoura earthquake claims

D.2.1 *Actuarial Data Extract from ClaimCentre*

The ADE was also used to assist in the Kaikoura earthquake claims costs.

D.2.2 *KaikouraApp*

Insurer managed claims are not contained in CMSv8 and are held on a separate table, called KaikouraApp.

D.3 Sources of information

The additional sources of information used for the investigation were:

- Trial balance for the period ending 30 June 2018.
- Small PAT results.
- Daily reports supplied by the BIU.
- Reports supplied by the Fletcher Construction EQR.
- T+T land claims cost model.
- Information from the Treasury website.
- Discussions and correspondence with various relevant EQC staff, contractors and advisors.

D.4 Validation of data

The data validation process carried out for this valuation, necessarily differed to previous valuations. We had previously validated the ADE to the daily summary report and the trial balance.

For this valuation there was no daily summary report available to use. In addition, there were difficulties in obtaining the 'final' ADE from CMSv4. These issues and their resolution are discussed below.

D.4.1 ADE from CMSv4

The Actuarial data Extract had been created from an IBM process that queried the DataWarehouse each week and uploaded a password protected file to a secure FTP site. We would receive an email later that day with the randomly generated password.

In late April we noticed that the emails had stopped as the email service had been switched off. This was not a material issue as IBM could still manually encrypt the ADE and send us the password. We received an ADE as at 7 May 2018 using this process.

In late May 2018, the link between claim centre and the DataWarehouse was lost. Unfortunately, there was a number of claims updates processed before ClaimCentre v4 was archived on 31 May 2018. We understood that EQC were going to try to rebuild the ADE.

Shortly after 30 June 2018, we received an extract from CMSv4 (claims_general.psv). It was not in the same format as the regular ADE files but did appear to contain the correct number of claims.

For our valuation process, we needed source data in the same format as the ADE we had been receiving. Consequently, we supplemented the ADE file we received as at 7 May 2018 with the information from the claims_general.psv file. We labelled this file, ADE20180630_CG.

On 11 July 2018, EQC completed their rebuild of the ADE file and uploaded it to the secure FTP site.

Given the events that occurred, we went to extra efforts to validate the data that was provided. The validation checks that were performed included:

- Reconciliation of ADE20180630_CG against the Trial balance
- Reconciliation of ADE20180630_CG against ADE20180630
- Reconciliation of 'Claims_general' file against a CMS payments file provided by EQC Finance

The results are shown in the subsections below.

D.4.2 ADE (CG) vs Trial balance

This table shows the comparison between the ADE created by MJW to the claims payments from the trial balance.

Claims payments
Reconciliation of ADE (7 May + CG.psv) to trial balance

	Payment Type		
	ClaimCentre $m	EQR $m	Total $m
Actuarial Data Extract			
EQ1	1,620	500	2,120
EQ2	3,922	1,363	5,285
EQ3	412	526	937
AS/EQ4	229	174	403
Total	6,182	2,563	8,745
Trial Balance			
EQ1	1,617	498	2,114
EQ2	3,927	1,358	5,285
EQ3	416	502	918
AS/EQ4	226	202	429
Total	6,187	2,560	8,746
Difference			
EQ1	4	2	6
EQ2	(5)	5	(0)
EQ3	(5)	24	19
AS/EQ4	2	(28)	(26)
BAU*	-	-	-
Total	(4)	3	(1)

We note that the ADE figures were adjusted to allow for the LINZ claim payments made outside CMS.

D.4.3 ADE (CG) vs ADE

This table shows the ADE created by MJW compared to the ADE uploaded by EQC.

Validation of ADE's

ADE (7 May 2018 with CG.psv) Vs ADE_11Jul2018

	Event					
	EQ1 $000s	EQ2 $000s	EQ3 $000s	EQ4 $000s	AS $000s	Total $000s
ADE_20180630_norec (created from CG)						
Building*	1,932,343	4,586,983	860,241	159,921	218,977	7,758,464
Land	29,248	321,433	11,358	1,223	778	364,040
Contents	125,564	302,506	28,966	12,474	7,304	476,814
Total	2,087,155	5,210,921	900,565	173,618	227,058	8,599,318
ADE_20180630_norec (11 Jul 2018)						
Building*	1,932,343	4,586,982	860,241	159,921	218,977	7,758,463
Land	29,248	321,433	11,358	1,223	778	364,040
Contents	125,564	302,506	28,966	12,474	7,304	476,814
Total	2,087,155	5,210,921	900,565	173,618	227,058	8,599,317
Difference - 30 June 2018						
Building*	0	1	0	0	0	1
Land	0	0	0	0	0	0
Contents	0	0	0	0	0	0
Total	0	1	0	0	0	1

D.4.4 CG vs Loss Run data from finance

This table shows the comparison between the claims general file against the CMS payments file provide by EQC Finance

Validation of Claims General
Comparison to CMS Payment file

	Event					
	EQ1 $000s	EQ2 $000s	EQ3 $000s	EQ4 $000s	AS $000s	Total $000s
Claims General - 30 June 2018						
Building	1,433,578	3,221,985	335,036	108,930	96,679	5,196,207
Land	29,248	321,433	11,358	1,223	782	364,044
Contents	125,564	302,506	28,966	12,474	7,310	476,820
Total	1,588,390	3,845,923	375,360	122,627	104,771	6,037,072
CMS Payment file - 30 June 2018						
Building	1,433,577	3,221,983	335,036	108,906	96,218	5,195,721
Land	29,248	321,433	11,358	1,223	778	364,040
Contents	125,564	302,506	28,966	12,474	7,304	476,814
Total	1,588,389	3,845,922	375,360	122,603	104,299	6,036,574
Difference - 30 June 2018						
Building	1	2	0	23	461	487
Land	0	0	0	0	4	4
Contents	0	0	0	0	6	6
Total	1	2	0	23	471	497

D.4.5 Summary

In summary, the reconciliations showed that the data used for the valuation was appropriate and correct.

Overall the level of agreement is satisfactory for our purposes.

D.4.6 Other data

The other data sources were not able to be reconciled against the accounts but were reconciled against other sources where relevant and possible.

D.5 Reliances

The key data and information upon which we have placed reliance are described in Sections D.1 to D.2.1 above.

D.6 Concerns and qualifications

D.6.1 General comments regarding the data held by EQC

The main area of concern with respect to the use of the data for actuarial purposes is that the claim payment information is held in many different systems which makes it challenging to capture all payments.

This is exacerbated with the introduction of the new claims management system and retirement of the existing system.

In addition to this, it is making it increasingly more difficult to analyse trends and justify the assumptions that are chosen. This has been mitigated to some extent through the management of the Claim Stage Gate report maintained by the Canterbury Business Unit.

D.7 Recommendations

D.7.1 Progress against previous recommendations

Several data-related recommendations were set out in Section 3.6 of the 30 June 2016 report. The progress against these recommendations is as follows:

- Rationalise sources of claims information. *Not started*

D.7.2 Current Recommendations

The recommendations that were noted in the previous ILVR are outstanding. We would repeat these recommendations so that the information that EQC has acquired from Canterbury and Kaikoura can be used for reporting, research and analysis.

D.8 Adequacy and Appropriateness

The quality of the results in this report relies on the accuracy and completeness of the data and information supplied. Overall, and subject to the significant but unavoidable issues identified in Sections D.6, we consider that the information provided to us was adequate and appropriate for the purposes of this valuation.

E Canterbury earthquake scenario modelling

E.1 Building provision

We have carried out scenario modelling in respect of; reopened undercaps, reopened overcaps, and individual litigation provision. These are shown below.

E.1.1 Reopened undercaps

The reopened undercap provision is highly dependent upon the average settlement costs and the number of months that claims continue to reopen. The table below shows the effect of varying these two assumptions.

Number months Claims reopen	Average Cost - 20% ($m)	Base ($m)	+ 20% ($m)
18	66	83	99
24	101	126	151
30	136	170	203

E.1.2 Reopened overcaps

The reopened overcap provision applies a probability for each claim going overcap. We then assumed that all claims with a probability greater than 85% will go overcap. For these properties a residual payment to cap was made plus an allowance for Cap Cost Review amounts. The table below illustrates the impact of varying these assumptions.

	# props	Total ($m)	Change to base
BASE CASE: Draft ILVR (85% threshold, $35k CCR*)	999	87.2	
Scenario 1: 80% threshold for modelled overcaps ($35k CCR)	1,454	116.7	+29.4
Scenario 2: 90% threshold for modelled overcaps ($35k CCR)	580	59.2	-28.1
Scenario 3: 85% threshold, no allowance for CCR	999	52.3	-35.0
Scenario 4: 85% threshold, allowance for $45k CCR	999	97.2	+10.0

*CCR - Cap Cost Review

E.1.3 Individual litigation provision

9(2)(h)

Number of future cases
9(2)(h) [redacted]

F Outstanding Claims Liabilities – Valuation Methodologies

F.1 Liability components

EQC's outstanding (OS) claims liabilities to be included in its accounts for 30 June 2018 are, in summary, an estimate of the total value of liabilities arising from all claims incurred up to the valuation date of 30 June 2018.

Claims incurred will include both reported and unreported claims as at the valuation date. Liabilities are calculated both net and gross of reinsurance.

The OS claims liabilities include both claim payments that will be made after the valuation date and the associated claims handling expenses.

The direct claims payments have been calculated to include the valid claims costs payable to insureds, as defined by the Earthquake Commission Act 1993 ('the Act'). The claims handling costs include the administration costs and allocated overheads associated with the management of those claims.

Insurance accounting standards also require the OS claims liabilities to be discounted for the time value of money and to include the addition of a risk margin to increase the probability of adequacy of the provision.

Based on the comments above the key liability components are:

- Direct claims costs of reported, open claims; this part of the liability comprises:
  - Case estimates held within ClaimCentre.
  - An allowance for IBNER (incurred but not enough reported) claims costs where the case estimates are considered to be insufficient.
- Direct claims costs of reported, closed claims that reopen (Reopened).
- Non-reinsurance recoveries.
- Claims handling expenses.
- Reinsurance recoveries.
- Risk margins.
- Discounting for the time value of money.

F.2 Valuation groupings

The OS claims liabilities are subdivided by:

- Event (EQ1 – EQ4, BAU, KEQ).
- Sub-claim (land, building and contents).

This subdivision is necessary because different cover and reinsurance rules apply to the different valuation groupings and the underlying data for the creation of assumptions also varies.

F.3 Valuation methodology

In summary, the valuation model selected may be described as an aggregate stochastic frequency / severity model. The model itself runs in an MS-Excel spreadsheet and the R statistical package.

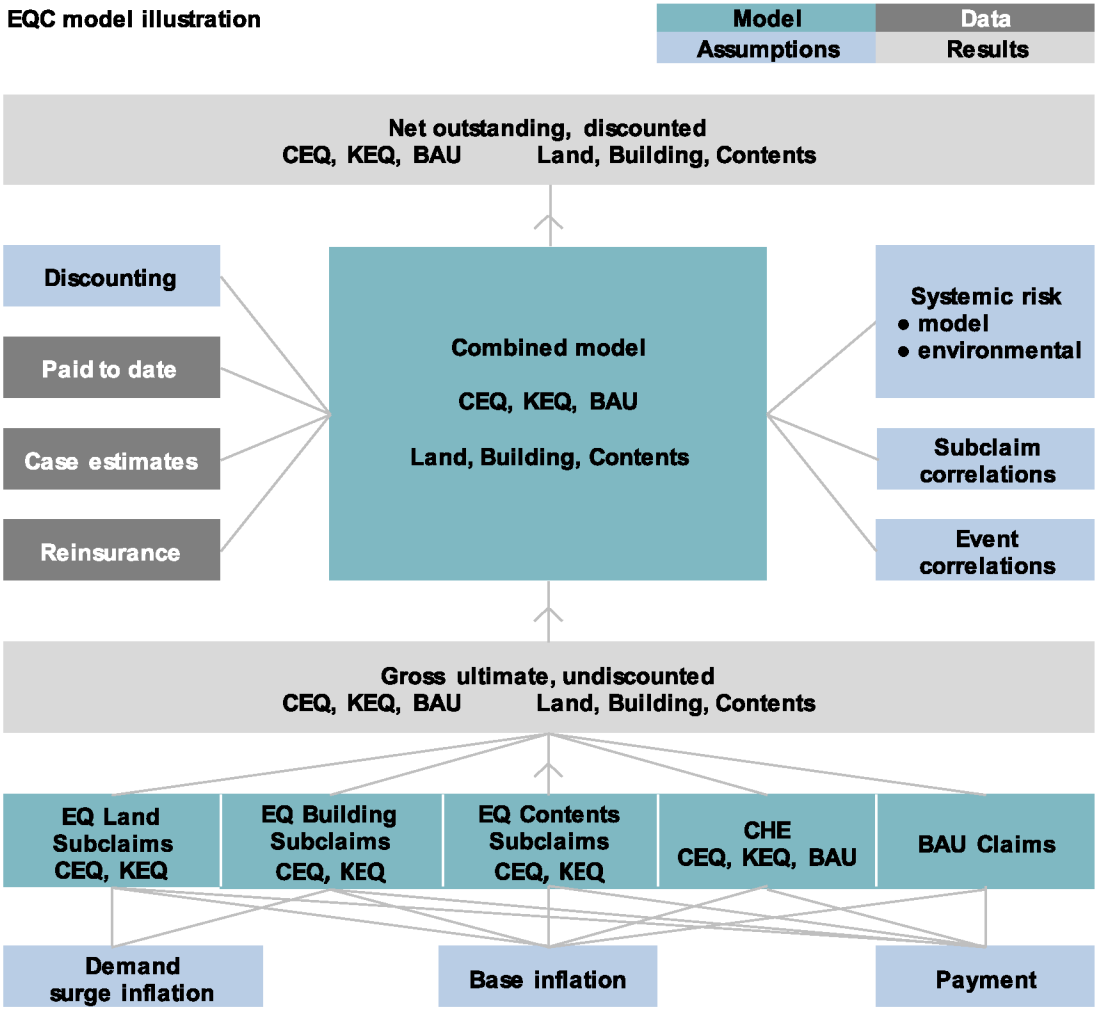
F.4 Gross incurred claims costs

The costs paid to date are known with certainty, but those to be paid in the future are unknown and so must be estimated. The approach that we have taken is to first estimate the projected ultimate claims costs and then to deduct payments made to 30 June 2018 in order to determine the estimated OS claims liability.

F.4.1 Diagrammatic illustration of the valuation model

The diagram below illustrates the components and overall structure of the valuation model.

The structure represents the process for a single run of the model. Each event will have its own unique set of assumptions but needs to be run in parallel in the model as it is the aggregate claims position across the whole entity that must be captured.



The model is run 10,000 times and the output (which is subdivided by the valuation groups described earlier) from each run is collected to form an aggregate gross claims distribution. The central estimate claims cost is found by taking the mean value of the distribution and the 85% probability of adequacy estimate is found by taking the 85th percentile of the distribution.

F.5 Changes since previous valuation

There have been no material changes in methodology since the previous valuation.

F.6 Assumptions required

The assumptions required are driven by the structure of the valuation model. The key assumptions are shown in Section 3 and 4. For a full set of assumptions, please contact the authors.

G Premium Liabilities – Methodology and Assumptions

G.1 Liability components

In summary, EQC's premium liabilities are an estimate of the total value of net liabilities associated with the run-off of EQC's unexpired risks as at 30 June 2018. The focus is therefore on claims incurred as a result of events after the 30 June 2018 valuation date, i.e. future claims. This is in contrast to the OS claims liabilities, which relate to claims incurred up to 30 June 2018, i.e. past claims.

The premium liabilities comprise several components:

- The cost of future claims (net of reinsurance) arising from the unexpired risks.
- The claims handling expenses for the future claims arising from the unexpired risks.
- The cost of policy administration for the run-off of the unexpired risks.
- The cost of the reinsurance cover for the unexpired risks.

The estimate is set at a 75% probability of adequacy and discounted for the time value of money.

The premium liabilities are not included in EQC's balance sheet but will be used for the Liability Adequacy Test (LAT) of the unearned premium reserves (UPR). If the premium liabilities exceed the unearned premium reserves, then an additional unexpired risk reserve is required to make up the extent of shortfall. If the premium liabilities are less than the UPR then the UPR remains unchanged.

G.2 Valuation groupings

Because the focus of the premium liabilities is on future claims – for which, by definition, there can be no claims data held by EQC - the valuation groupings used for the premium liabilities are very different from those used for the OS claims liabilities.

G.2.1 Event valuation groupings

As we are now dealing with future claims it is not possible to categorise claims by event dates, however we must consider the sources from which future claims may arise. At the time of writing this report these are:

- 'BAU' (Business As Usual) claims
- Minerva claims - catastrophe event claims arising from earthquakes in NZ outside Canterbury
- Enhanced seismicity claims – claims arising from future earthquakes in the Canterbury or Kaikoura earthquake sequence.

The first two event groups above are traditional ones for the estimation of EQC's premium liabilities. The last item reflects the fact that the first two items were based on a 'stable' environment whereas the seismic conditions are more uncertain now. It is expected that this component will reduce over time as seismic conditions stabilise.

G.3 Valuation methodologies

We have decided to use a stochastic approach as it facilitated the determination of the risk margin and allowed us to directly model the effects of the catastrophe reinsurance.

This is consistent with the approach used for components of the OS claims liabilities so some of the assumptions developed for that work have been used.

G.4 Changes in methodology

The methodology has not materially changed from the previous valuation.

G.5 Assumptions required

The assumptions are driven by the valuation methodology. In the following sections, we set out the assumptions for each event group and provide some background to the assumption and how it was derived.

G.5.1 Minerva

The Minerva component is based on output from the Minerva model in 2011. The only assumption used here is the inflation rate, which is 2.5% p.a.

G.5.2 BAU

The assumptions used for the BAU component are frequency and severity based. Please see the authors for details on these assumptions.

G.5.3 Enhanced seismicity claims

The Enhanced seismicity claims component is based on the probabilities of aftershocks in the Canterbury and Kaikoura region. The tables are available from the authors upon request.

G.5.4 Non-acquisition expenses

The premium liabilities require assumptions on the policy administration costs and the costs to manage and settle claims. It is assumed that:

- The average annual policy administration costs for unexpired risk is $5m
- The average claims handling cost per claim is $1,495.

G.6 Changes in assumptions

Given the underlying claims process and the valuation methodology, the assumptions are largely based on those used for the 31 December 2017 valuation. The latest GeoNet Canterbury forecasts were released on 1 September 2017. The latest GeoNet Kaikoura forecasts were released on 14 May 2018.

H EQC Reinsurance

H.1 EQC reinsurance

H.1.1 Historical Cover

EQC utilises catastrophe reinsurance to reduce net claims volatility.

As from 1 June 2010, and effective for EQ1, EQC reinsurance programme was made up of three layers, providing a total of NZD 2.4775b* cover excess of NZD 1.5b first loss deductible:

- Layer 1: NZD $500m xs NZD $1,500m
- Layer 2: NZD $1,500m xs NZD $2,000m
- Layer 3: NZD $500m xs NZD $3,500m

*Note that EQC co-insured 1.5% or NZD 22,500,000 of Layer 2 (on the 2009 3-year placement).

This cover was placed in tranches and layers subject to different terms.

This reinsurance structure was the same for the 2011/12 year.

Current cover

From 1 June 2018, the reinsurance programme has four layers, beginning at NZD $1,750m and finishing at $6,650m.

In addition to this, there is a three-year aggregate layer (incepted 1 June 2016) which provides $500m cover for contributing losses, with a $1,000m deductible.

I Glossary

Accounting standard

In New Zealand, the accounting standards of the NZ Institute of Chartered Accountants apply. The standard most relevant to **insurance entities** is *NZ IFRS4 Insurance Contracts*.

Actuarial Data Extract (ADE)

A data extract used to facilitate an actuarial valuation. The data is typically sourced from the claims and policy administration systems.

Actuary

In general, in New Zealand an actuary is a Fellow or Accredited Member of the New Zealand Society of Actuaries or equivalent body.

Aggregate excess of loss reinsurance

See **catastrophe reinsurance.**

Apportioned Cost Estimate (ACE) data

A number of properties have had their building damage apportioned between events in a manual fashion. This process uses all available information on that property (quantity surveyor reports, land damage information, neighbourhood damage, customer reports etc.) to inform the apportionment. These apportionments are called Apportioned Cost Estimates and will be included the ACE data set. The ACE data set includes all overcap properties and a number of undercap properties too.

Attachment date

See **inception date**.

Best estimate

In the context of scenarios, a best estimate means a realistic future scenario, rather than a deliberately pessimistic or optimistic one. Also, see **central estimate**.

Brokerage

An alternative term for commission paid to a **broker**.

Broker

An intermediary who acts for an insured in negotiating their insurance. The broker usually receives payment by way of commission from the insurer with whom the business is placed.

Business as Usual (BAU)

A distinction has been drawn between claims that are related to the Canterbury Earthquake Sequence or the Kaikoura earthquake and those that are from other events (earthquake or other). These other events are referred to as Business as Usual (BAU) events.

Canterbury Earthquake Sequence ('CES')

The sequence of earthquakes and aftershocks in the Canterbury area from 4 September 2010 to the end of 2011. This included four main earthquakes on 4 September 2010, 22 February 2011, 13 June 2011 and 23 December 2011.

Cap Cost Review

The process by which EQC determine which costs do or do not contribute towards a customer's cap. The process includes consideration of:

- Valid works. Costs of the work completed to the residential building that achieve EQC's repair standard.
- Workmanship. Costs of works completed to the residential building through CHRP/IHRP that need redoing due to poor quality of those works.
- Affected works. Cost of works completed to the residential building that need redoing because (a) missed earthquake damage and/or (b) a revised repair strategy is required to achieve EQC's repair standard.
- Additional repairs required. Cost of works currently required.
- Corrective costs.
    - Costs reasonably required to undo an original repair strategy before the new repair strategy can be pursued (that wouldn't have been required if all information was known and the repairs now required were completed the first time). OR
    - Costs reasonably required to repair an artificial surface or driveway because either the customer or their insurer have already carried out earthquake damage repairs to that artificial surface or driveway and the work (or parts of) will now need to be redone to enable the new foundation repair strategy to be completed.

Case estimate

The amount recorded by the insurer's claims personnel (including external claims assessors) as being the amount required to settle an open claim, based on the information available on that particular case. When a claim is first reported and recorded, a nominal placeholder estimate may be entered into the system. Estimates should be updated as extra information comes to light and adjusted to reflect any partial payments that may be made prior to final settlement.

Catastrophe

A catastrophe event for an insurer is generally considered to be a single event that results in one or more claims for very large amounts or in an aggregation of many claims collectively costing an extremely large amount. The nature and impact of potential catastrophe events will vary by insurer according to their business, amount of capital and risk management arrangements. Examples include earthquakes and terrorism.

Catastrophe reinsurance

Usually an excess of loss reinsurance arrangement providing cover to an insurer against very high losses arising from a **catastrophe** event, which meets the definition of 'catastrophe' as specified in the reinsurance policy. The nature and extent of the cover available / provided depends on the nature of the underlying insurer's business and the terms available for such protection. For some events, such as storm or earthquake, the reinsurer may impose a specified time limit on when claims may be covered under the catastrophe treaty.

Cedant or ceding insurer

An insurer who has ceded (passed on) all or part of the risks it has underwritten by way of reinsurance. Analogous to an insured who cedes risk to an insurer.

CEDAR

Canterbury Earthquake Defect And Repair review. MBIE commissioned an independent survey of the repairs of a sample (101 properties) of the earthquake-damaged Canterbury homes selected from more than 2,700 addresses provided by the Earthquake Commission (EQC), Housing New Zealand, and insurers Southern Response and IAG. The survey also included a small sample of houses where homeowners had opted out of an insurer-led home repair programme.

The aim was to assess the Building Code compliance of structural repairs that were exempt from a building consent under Schedule 1 (repairs and maintenance) of the Building Act.

Central Estimate

An estimate that contains no deliberate or conscious over- or under-estimation. NZ Accounting standards define this to be the mean of the probability distribution of future outcomes. Also, see **probability of adequacy**.

Claim frequency

The number of claims divided by exposure over a given time period. This could apply to **reported** or **incurred** claims.

Claims handling expenses (CHE)

The expenses involved in the processing and settlement of claims. Note that this term usually relates only to indirect claims expenses such as internal general administration claims costs. Expenses such as assessors' fees or legal costs, that arise in relation to specific claims, are termed direct expenses and are usually treated as part of the cost of those claims.

Claims paid

The amount paid in respect of claims.

Claims provision and claims reserve

These are both terms used to refer to the amount held or required to provide for future payments on outstanding claims. These terms are sometimes seen as being interchangeable. However, there are variations in the precise usage of both terms according to the context in which they appear.

A claims provision is often used to refer to the amount held in an insurer's accounts. In management accounts, claims reserve may refer to the total **case estimates**, possibly with an additional amount for **IBNR** claims. In actuarial contexts, the technical terms are, respectively, **incurred claims liability** and **outstanding claims liability**. These amounts might also include allowances for **CHE**, **discounting**, **claims paid**, and a **risk margin**. Figures may be given **net** or **gross of reinsurance**.

Closed claims

Those claims for which records have been closed, because settlement has been made and no recoveries are expected. However, see **reopened** claims.

Cover

The extent and nature of protection provided by an insurance policy. This will be defined in the policy documentation.

Deductible

See **excess.**

Demand surge

The increase in the cost of insurance claims following a major loss event. The event puts pressure on the demand for labour and materials to pay for repairs which, in the absence of increased supply, increases the price of these costs.

Diminution of Value (DoV)

Diminution of Value, in the context of IFV or ILV is the loss in value suffered by the homeowner, as a result of the land damage that caused the loss. In assessing the DOV, it does not include any change in value resulting from matters other than the land damage (e.g. a change in the building regulations and practices after the 2010-2011 Canterbury earthquakes).

Discounting

Discounting refers to the (absolute) reduction, for the time value of money, of any future cashflows. The extent of discounting is a consequence of two factors: length of time until payment and the discount rate with an increase in either of these increasing the impact of discounting. Cashflows which have been discounted are said to be *present values*.

Actuarial **professional standards** state that **risk-free discount rates** must be used to calculate present values.

Effective date

The effective date of an **ILVR** is the date to which the valuation calculations apply.

Excess

The amount of an insured loss that must be borne by the policyholder before the insurer becomes liable to make a claim payment. The amount of the excess will be set out in the policy documentation.

Excess of loss reinsurance

A non-proportional form of reinsurance whereby the insurer pays the cost of a claim up to a specified point (their **retention**) and the reinsurer pays the remainder of the cost. The amount payable by the reinsurer is usually subject to a specified maximum amount which may apply per claim or to the total amount. Also, see **catastrophe reinsurance**.

Experience

The term used to describe the results of blocks of insurance business, particularly when the results are the subject of detailed analysis.

Future Claim Liability (FCL)

A term sometimes used to refer to the **premium liability** arising from unearned policies. It is the value of future claim payments and related **CHE**, arising from future events for which the insurer is liable.

Green Zone

Canterbury land areas such that land repair / rebuild can begin. The Green Zone was further divided into commercial zoned land, Port Hills land, rural land, and three residential flat land categories. The three residential flat land categories describe how the land is expected to perform in future earthquakes, and also describe the foundation systems most likely to be required in the corresponding areas. Also, see Red Zone, TC1, TC2, and TC3.

Gross

Refers to the amounts of premiums, claims and expenses before allowing for the costs or income (including commission as well as claim recoveries) from reinsurance and other non-reinsurance recoveries.

Inception date

Inception date is the date on which cover commences.

Increased Flooding Vulnerability (IFV)

The physical change to land as a result of an earthquake which adversely affects the use and amenity that could otherwise be associated with the land by increasing the vulnerability of that land to flooding events.

Increased Liquefaction Vulnerability (ILV)

The physical change to land as a result of ground subsidence from an earthquake which materially increases the vulnerability of that land to liquefaction damage in future earthquakes.

Incurred

A term relating to claims arising from events that occurring in a specified period.

There are differences in the precise usage of the term according to the context in which it appears. In some contexts, it may refer to the group of claims *occurring* in the period (whether **reported** to the insurer or not) and their eventual cost. In accounting contexts, the term may refer to the amount of *claims payments made plus the change in outstanding claims provisions* from the start to the end of the period.

In an actuarial context, 'incurred' costs are taken to mean the claim costs cost which arise or come to light) during the period. An alternative expression of this is: claim payments made plus outstanding estimates (inclusive of **IBNR** and **IBNER**).

Further differences may also apply in regard to the inclusion (or not) of **CHE** and **risk margins.** Clarification should be provided in the actuarial commentary as to the precise meaning applied. It should also be stated whether there has been allowance for **discounting** in the quantification of future payments to be made on these claims. Also see **discounting** and **ultimate cost**.

Incurred but not reported (IBNR)

Any claim or claim amount for which, at a particular point in time, the loss event has occurred, but the insurer has not yet been notified and/or the claim entered into the claims system. Any **outstanding claims liability** must include an allowance for these claims.

Incurred but not enough reported (IBNER)

A monetary amount relating to **reported** claims. IBNER is defined as the ultimate cost of the claim less the current **case estimate** and could be positive or negative. The **outstanding claims liability** must include an allowance for this.

Incurred claims

Claims that were **incurred** during a specified time period.

Incurred claims liability

See **Outstanding Claims Liability**.

Indirect claims handling expenses

See **claims handling expenses**

Insurance liability valuation report (ILVR)

A report detailing a valuation by the **actuary** of the **insurance liabilities** of an insurer.

Joint Assessment and Review Team (JART)

The process whereby EQC and the relevant insurer would review building claims to assess whether it was likely to go overcap and if so, how it should be apportioned and settled. The JART report is a summary of the properties that had open building issues, categorised by the reason for the issue.

Kaikoura Earthquake ('KEQ')

The earthquake and related aftershocks that occurred on 14 November 2016, beginning 15 km north-east of Culverden and proceeded north-east through Kaikoura to Seddon.

Liability adequacy test (LAT)

A test applied under the **accounting standard** which consists of a comparison of the **unearned premium**, less deferred acquisition costs (DAC), against the **premium liability**. If the test indicates a deficiency, the DAC must be written down by an appropriate amount in the entity's income statement. If the deficiency is greater than the DAC, a premium deficiency reserve must be set up.

Material

In the context of an actuarial report, an item is deemed material if it is significant in the professional judgement of the actuary. This may not necessarily correspond exactly with 'material' as applied in an accounting context.

Net

Refers to the amounts of premiums, claims and expenses after allowing for the costs or income (including commission as well as claim recoveries) from reinsurance and other non-reinsurance recoveries.

Net outstanding claims liability

See **outstanding claims liability.**

Non-reinsurance recoveries

Non-reinsurance recoveries refer to the recoveries against claim payments that come from entities other than reinsurers. It includes amounts in respect of salvage and third parties. It doesn't refer to excesses and deductibles that are deducted from the claim.

Open claims

Those claims that have been **reported** to the insurer but are not regarded as finally settled as claim payments and/or recoveries associated with the claim, may occur in future.

Outstanding Claims Liability (OCL)

The expected value of future payments on claims that were **incurred** on or before the **effective valuation date**. This usually includes future **CHE** associated with those claims, allows for **discounting**, and includes a specified **risk margin**. It may be calculated **gross** or **net of reinsurance** and **non-reinsurance recoveries**.

Outstanding Claims Provisions

The amount in the insurer's accounts providing for **outstanding claims liabilities** at the accounting date.

Premium Liabilities

The value of future claim payments and related **CHE**, arising from future events for which the insurer is liable at the date of calculation.

Probability of adequacy

The statistical probability that a reserve or provision will ultimately prove to be adequate to provide for all relevant payments to be made.

Professional Standard

The form of professional guidance as issued by the New Zealand Society of Actuaries, or such other professional body as may be stated.

Red Zone

Canterbury land areas such that land repair would be prolonged and uneconomic. This includes flat land areas, which sustained significant crustal thinning and Port Hills areas which were at imminent risk of cliff collapse or rockfall. Also see Green Zone, TC1, TC2, and TC3.

Reinstatement premiums

Premiums that become payable under reinsurance treaties, particularly catastrophe reinsurances, when all or part of a layer of cover has been 'used' by the insurer making a claim, but the insurer wishes to reinstate full coverage for the remaining term of the treaty. A 'free reinstatement' may sometimes be included in the original terms of a treaty.

Reopened claims

Claims that had been regarded as settled (i.e. no further claim payments or recoveries) but for which claims records have since been reopened because an additional payment or receipt has been made or is now expected to be made. The **Outstanding Claims Liability** must take the possibility of claims reopening in future into account.

Reported

Claims are said to be reported if the insurer has been notified of their existence. This is in contrast to **IBNR** claims.

Resolved

For exposures settled by cash payment, the valid building, contents or land exposure is recorded as resolved when the claimant has been paid for that exposure. In the case where the building exposure is settled by managed repair, building exposures are only recorded as resolved when all planned repairs are complete (but the 90-day defect liability and warranty period may not have expired) and the customer has received a full cash payment from EQC for all contents and land exposures. Exposures are also considered resolved if the exposure has not been accepted and the customer informed.

Retention

The amount of risk retained by the direct insurer above which an excess of loss reinsurance will be triggered. Also see **excess**.

Risk-free discount rates

These are the rates of interest that would be available on a theoretical, riskless investment. In practice, they are the rates available on very secure investments, such as government bonds of suitable durations, which may be assumed to be free of default risk.

Risk Margin

The amount of extra provision over and above the **central estimate** which is intended to allow for the inherent uncertainty of insurance liabilities. The relevant **probability of adequacy** associated with the increased amount should be stated.

Sensitivity

The uncertainty in the calculation of insurance liabilities due to the assumptions involved. Accounting and **professional standards** require statements of the effects on the results to be illustrated by sensitivity tests. These involve reviewing the calculations after varying key assumptions.

Technical Category 1 – TC1

TC1 refers to Green Zone land where it was assessed that future land damage from liquefaction was unlikely. Residential buildings on TC1 land required no special foundation systems, relative to most flat land throughout New Zealand.

Technical Category 2 – TC2

TC2 refers to Green Zone land where it was assessed that minor to moderate land damage from liquefaction was possible in future large earthquakes. Residential buildings on TC2 land require face some restrictions on the type of foundation that is permitted, subject to the house design.

Technical Category 3 – TC3

TC3 refers to Green Zone land where it was assessed that moderate to significant land damage from liquefaction is possible in future large earthquakes. Residential buildings on TC3 land require a site specific geotechnical investigation and a specific engineering foundation design.

Uncertainty

Where full, known information is not available, uncertainty exists as to the exact nature and extent of the ultimate outcome. In particular, there is inherent uncertainty in any estimation of insurance liabilities, which are necessarily based on assumptions, usually derived from analyses of past experience. Deviations from estimates are normal and are to be expected. See also **central estimate, probability of adequacy** and **sensitivity**.

Unearned Premium

The proportion of written premium that relates to the risk still to be covered after the balance date or effective date of the valuation. The calculation usually assumes that premium is earned evenly over the term of a policy, except for unusual types of risk where this is clearly not the case (for example, Contractors All Risks). Should a policy be cancelled, the unearned premium as at the cancellation date may be refunded to the policyholder, possibly after allowance for expenses incurred.

Unearned Premium Reserve (UPR)

The total amount of **unearned premiums** held, reflecting the periods of future cover to be provided under policies in force at the balance date or effective date of the valuation.

Valuation date

The **effective date** as at which a valuation has been made.