

EARTHQUAKE COMMISSION

INCREASED FLOODING VULNERABILITY (IFV) AND/OR INCREASED LIQUEFACTION VULNERABILITY (ILV) LAND DAMAGE

CONSOLIDATED POLICY STATEMENT

SEPTEMBER 2016

This policy statement consolidates the policies contained in the statements published by the Earthquake Commission (EQC) in relation to the settlement of Increased Flooding Vulnerability (as amended September 2014) and Increased Liquefaction Vulnerability (October 2015) and confirm EQC's policies in relation to properties which have suffered both Increased Flooding Vulnerability and Increased Liquefaction Vulnerability.

Some amendments to the language of the policies relating to Increased Flooding Vulnerability and Increased Liquefaction Vulnerability have been made to clarify the statement of the policies. However, no change from the policies contained in the September 2014 and October 2015 policy statements is intended.

PART A: INTRODUCTION

- 1 As a result of the series of earthquakes experienced by the Canterbury region between 4 September 2010 and 23 December 2011 (the **Canterbury earthquake sequence**) the physical characteristics of some parcels of residential land in Canterbury have changed with the result that:
 - 1.1 the vulnerability of such land to flooding has increased; and/or
 - 1.2 the vulnerability of such land to liquefaction damage in future earthquake events has increased.
- 2 The Earthquake Commission (**EQC**) administers the statutory insurance against natural disaster damage to residential land provided by the Earthquake Commission Act 1993 (the **Act**).
- 3 Given the number of properties affected by increased vulnerability to flooding and/or increased vulnerability to liquefaction as a result of the Canterbury earthquake sequence, and the issues that these vulnerabilities raise with the administration of the statutory insurance provided by the Act, EQC has determined to adopt policies that ensure the consistent and appropriate treatment of these issues.
- 4 This statement records the policies that EQC will use in relation to the settlement of claims for natural disaster damage to residential land affected by either or both increased flooding vulnerability and increased liquefaction vulnerability.
- 5 Each of the policies described in this statement has been considered and adopted by EQC on advice from its expert engineering and valuation advisors.
- 6 While EQC expects that the policies set out in this statement will provide a full and fair settlement of claims involving either or both increased flooding vulnerability and increased liquefaction vulnerability in most cases, any claimant is entitled to provide further information (or an alternative interpretation of existing information) and ask EQC to reconsider its decisions regarding whether the property is damaged, and, if

so, what settlement is appropriate. In such cases, EQC will consider any further information the claimant provides and is open to changing its decision.

PART B: RECOGNITION OF FORMS OF NATURAL DISASTER DAMAGE

Increased Flooding Vulnerability is a form of “natural disaster damage”

- 7 Increased Flooding Vulnerability is a physical change to residential land¹ as a result of an earthquake that adversely affects the uses and amenities that could otherwise be associated with the land by increasing the vulnerability of that land to flooding events.
- 8 Increased Flooding Vulnerability will be accepted by EQC as natural disaster damage to residential land for the purposes of the Act in accordance with the policies described in Part (C) of this policy statement.

Increased Liquefaction Vulnerability is a form of “natural disaster damage”

- 9 Increased Liquefaction Vulnerability is a physical change to residential land as a result of an earthquake which adversely affects the uses and amenities that could otherwise be associated with the land by increasing the vulnerability of that land to liquefaction damage in future earthquake events.
- 10 Increased Liquefaction Vulnerability will be accepted by EQC as natural disaster damage to residential land for the purposes of the Act in accordance with the policies described in Part (C) of this policy statement.

PART C: ASSESSMENT OF INCREASED FLOODING VULNERABILITY AND INCREASED LIQUEFACTION VULNERABILITY

Assessment of Increased Flooding Vulnerability

- Flood modelling

- 11 In order to assess changes to the vulnerability of residential land to future flooding events, EQC has undertaken flood modelling of the Styx, Avon, Heathcote, Sumner and Kaiapoi catchments.
- 12 Further detail of EQC’s modelling can be found in Tonkin + Taylor Limited, *Canterbury Earthquake Sequence - Increased Flood Vulnerability Assessment Methodology* (April 2014).
- 13 EQC will primarily assess the flooding vulnerability of a parcel of residential land based on the expected flood depth for that residential land predicted in a 1% AEP event (that is, an event which has a 1% chance of being exceeded within a calendar year).
- 14 EQC will assess the change in flood depth in a 1% AEP flood event caused or contributed to by the reduction in the height of the land, relative to sea level (the **exacerbated flood depth**), as a result of an earthquake event. To ensure consistency with the Act:
- 14.1 the assessment is of the exacerbated flood depth caused or contributed to by the reduction in the height of the land only. This may be less than change in flood depth in a 1% AEP flood event, which may also reflect physical changes,

¹ “Residential land” is used in this policy statement as it is defined in the Earthquake Commission Act 1993, s 2(1).

whether occurring as a direct result of an earthquake or otherwise, to land or infrastructure outside the particular residential land in question; and

14.2 the impact of future climate change on flood depth is not taken into account.

15 The reduction in the height of the land, relative to sea level, has been measured using Digital Elevation Models (**DEMs**) derived from Light Detection and Ranging (**LiDAR**) surveys of the Canterbury region undertaken in 2003 and after each of the major earthquakes in the Canterbury earthquake sequence. Where possible, this data has been cross-checked against survey points to verify the accuracy of each set of LiDAR data and DEM data.

- **Thresholds for recognising Increased Flooding Vulnerability**

16 EQC has determined thresholds for recognising Increased Flooding Vulnerability as natural disaster damage based on the limitations of the LiDAR and flood modelling evidence available to EQC, and by applying its judgement as to when vulnerability to future flooding events can be expected to adversely affect the uses and amenities that would otherwise be associated with the land.

17 In order for residential land to qualify as having Increased Flooding Vulnerability, the residential land must satisfy the following:

Threshold 1: The exacerbated flood depth on the residential land has increased by 0.2 m or more as a result of the Canterbury earthquake sequence.

Threshold 2: The exacerbated flood depth on the residential land has increased by 0.1 m or more as a result of a single earthquake event.

Threshold 3: The residential land has suffered observable land damage as a result of the Canterbury earthquake sequence.

Threshold 4: The change in flooding vulnerability to the residential land has caused the value of the property to decrease.

18 The thresholds have been developed to provide robust assessments for the significant majority of properties in the Canterbury region. However, a limited number of instances have been identified for which an exception should be made. These are:

18.1 *Event exception:* properties with 0.2 m or greater exacerbated flood depth over the Canterbury earthquake sequence and that have suffered observable land damage, but which have not suffered 0.1 m or greater exacerbated flood depth in any one event;

18.2 *Uplift exception:* properties in specified areas of tectonic uplift for which there is evidence that differential subsidence has increased their flood vulnerability; and

18.3 *Land damage exception:* properties with 0.2 m or greater exacerbated flood depth over the Canterbury earthquake sequence, and 0.1 m or greater exacerbated flood depth in any one event, but which have not suffered recorded observable land damage.

- 19 The assessments of the first three thresholds and properties falling within the exceptions will be made by EQC's expert engineers, Tonkin + Taylor, on the basis of automated processing of flood modelling data and manual engineering review with site-specific inspections to determine whether the property has suffered potential Increased Flooding Vulnerability. All properties will then be reviewed by a senior engineer prior to being identified as having potential Increased Flooding Vulnerability.
- 20 Once a site specific assessment (including review by a senior engineer) has been made of whether each property in a geographic location has potentially suffered Increased Flooding Vulnerability, Tonkin + Taylor will carry out a final engineering review of all properties at an area-wide level. This review will consider whether there is evidence that properties may have been inappropriately assessed as not having Increased Flooding Vulnerability. The vulnerability of properties to higher frequency events and patterns of exacerbated flood depths of between 0.1 m and 0.2 m will also be considered in this review.
- 21 Further detail on the technical application of the above steps can be found in Tonkin & Taylor Limited, *Canterbury Earthquake Sequence - Increased Flooding Vulnerability Assessment Methodology* (April 2014).
- 22 The engineering assessment methodology has been reviewed and endorsed by an Independent Peer Review Panel of international flooding experts.
- 23 Where a parcel of residential land is confirmed by Tonkin + Taylor as potentially having suffered Increased Flooding Vulnerability, EQC will request an assessment of the property to be made by an independent valuation professional. EQC will rely on the assessment of the independent valuer to determine whether the residential land satisfies the fourth threshold. Further information on the valuation methodology is provided in Part (F) of this policy statement.

Assessment of Increased Liquefaction Vulnerability

- 24 In order for residential land to qualify as having Increased Liquefaction Vulnerability, the residential land must satisfy the following criteria:
 - Criterion 1:* The residential land has a material vulnerability to liquefaction damage after the Canterbury earthquake sequence at 100-year return period levels of earthquake shaking.
 - Criterion 2:* The vulnerability to liquefaction damage of the residential land in future earthquakes has materially increased at up to 100-year return period levels of earthquake shaking as a result of ground surface subsidence of the land caused by the Canterbury earthquake sequence.
 - Criterion 3:* The increase in vulnerability to liquefaction damage of the residential land must have caused the value of the property (the residential land and associated buildings combined) to decrease.
- 25 EQC will assess each of these criteria on the balance of probabilities, based on relevant publically available information at the time of its assessment together with land damage information held by EQC, taking into account the limitations of that information, and by applying its judgement as to when vulnerability to future liquefaction damage can be expected to materially adversely affect the uses and amenities that would otherwise be associated with the land.

- 26 The assessments of the first two criteria will be made by EQC's expert engineering advisors, Tonkin + Taylor. In the case of residential land that satisfies the first two criteria, EQC will determine whether the third criterion is satisfied on the advice of its expert valuation advisors.
- 27 Based on expert advice, EQC does not consider that it is practical to apply these criteria to individual events within the Canterbury earthquake sequence. Accordingly, these criteria will be applied by considering the increase in vulnerability caused by the Canterbury earthquake sequence as a whole. Properties identified as having Increased Liquefaction Vulnerability will then be separately assessed by Tonkin + Taylor to determine which of the events in the Canterbury earthquake sequence are likely to have materially contributed to the Increased Liquefaction Vulnerability for the purpose of assessing the amount to be paid in settlement of each event.
- **Engineering assessment**
- 28 In order to assess changes to the vulnerability of residential land to liquefaction damage in future earthquake events, EQC's expert engineering advisors, Tonkin + Taylor, have developed a methodology to assess changes in vulnerability of land to liquefaction damage.
- 29 The engineering assessment methodology has been reviewed and endorsed by an independent Expert Peer Review Panel of international liquefaction experts.
- 30 Further detail of the engineering assessment methodology can be found in Tonkin + Taylor's report entitled "*Increased Liquefaction Assessment Methodology*" (October 2015).
- 31 EQC will assess changes in vulnerability to liquefaction damage in a future earthquake based on:
- 31.1 the vulnerability of the residential land to liquefaction in up to a 1 in 100 year return period levels of earthquake shaking (that is, the levels of shaking which on average is expected to occur at least once in every 100-year period);
 - 31.2 a current level of seismicity of a 1 in 100 year level of shaking that is consistent with the values specified by the Ministry of Business, Innovation and Employment *Guidance: Repairing and rebuilding houses affected by the Canterbury earthquakes* (2012 and 2014);
 - 31.3 the mean and median liquefaction vulnerability having regard to seasonal groundwater level variation based on current groundwater levels;
 - 31.4 the assumption that the cracking of the land caused by the Canterbury earthquake sequence is repaired, where EQC has or will pay the cost of repairing that damage in a way that also removes the effect of cracking on liquefaction vulnerability.
- 32 The assessments of the first two criteria will be made by Tonkin + Taylor on the basis of geotechnical investigations, modelling of liquefaction vulnerability and manual assessments of the relevant publicly available information. The information publicly available includes:

- 32.1 ground surface levels, relative to sea level, measured using Digital Elevation Models (**DEMs**) derived from aerial Light Detection and Ranging (**LiDAR**) surveys of the Canterbury region undertaken in 2003 and after each of the major earthquakes in the Canterbury earthquake sequence. Where Tonkin + Taylor have this information, this data has been cross-checked against measured survey points to verify the accuracy of each set of LiDAR data and DEM;
 - 32.2 soil composition data obtained from geotechnical investigations, including an extensive subsurface drilling campaign;
 - 32.3 groundwater levels throughout Canterbury, which have been the subject of ongoing monitoring;
 - 32.4 aerial photographs taken after each of the main Canterbury earthquakes;
 - 32.5 land damage observations in the Canterbury earthquake sequence, relative to the estimated levels of shaking in each of the earthquakes; and
 - 32.6 geotechnical modelling of expected vulnerability to liquefaction and liquefaction damage given soil composition and depth to ground water.
- 33 All properties will be reviewed by a senior engineer prior to it being determined whether they satisfy the first two criteria.
- **Valuation assessment**
- 34 Where residential land is assessed by Tonkin + Taylor as satisfying the first and second criteria, EQC will rely on an assessment of EQC's expert valuation advisors as to whether the identified changes in liquefaction vulnerability have caused the value of the property (the residential land and relevant associated buildings combined) to decrease.
- 35 Further information on the valuation approach is provided in Part (F) of this policy statement.

PART D: SETTLEMENT

- 36 EQC will generally settle claims for natural disaster damage to residential land where the damage to the land includes either or both Increased Flooding Vulnerability and Increased Liquefaction Vulnerability by payment (rather than reinstatement). However, EQC may elect to settle claims by reinstatement where it considers that the particular circumstances of the affected properties make this appropriate.
- 37 The payment made by EQC will be the amount necessary to indemnify the claimant, so far as money is able to do so, against the financial loss arising from the natural disaster damage.
- 38 The financial loss to the claimant may be assessed in one or a combination of two ways:
- 38.1 the amount it would cost the claimant to remediate the Increased Flooding Vulnerability and/or Increased Liquefaction Vulnerability of the land using a repair methodology (the **repair cost**); or

- 38.2 the loss of market value of the insured property as a result of the natural disaster damage (the **Diminution of Value**).
- 39 While EQC's preference is to assess the financial loss to the claimant as the repair cost (together with any Diminution of Value of any damage not remediated by the repair methodology), the nature of Increased Flooding Vulnerability and Increased Liquefaction Vulnerability means that a repair methodology of one or both forms of damage may not be technically feasible or able to be undertaken lawfully, or in any event will not be undertaken given the high costs and practicality of undertaking the repairs. In these circumstances, the claimant's true financial loss is best reflected in the Diminution of Value of his or her entire insured property.
- 40 Accordingly, EQC will settle the financial loss to the claimant arising from Increased Flooding Vulnerability and Increased Liquefaction Vulnerability based on the Diminution of Value of the property unless EQC is satisfied that:
- 40.1 there is a repair methodology for the repair of either the Increased Liquefaction Vulnerability or the Increased Flooding Vulnerability of the land;
 - 40.2 the claimant intends to undertake the repair of the land within a reasonable period of time using that methodology;
 - 40.3 the residential land has **not** been sold by the claimant; and
 - 40.4 the repair cost is **not** disproportionate to the Diminution of Value of the property, having regard to the particular circumstances of the claimant (including his or her stated intentions in relation to repair of the land),
- in which case EQC will settle the claim by payment of the repair costs for the type of land damage for which there is a repair methodology, and which the claimant intends to undertake.
- 41 Where repair of either Increased Flooding Vulnerability or Increased Liquefaction Vulnerability can and will be undertaken but the other type of natural disaster damage cannot or will not be repaired (or the repair cost would be disproportionate), EQC will settle the claim by making payment of the sum of the repair cost of one type of natural disaster damage plus the Diminution of Value attributable to the other type of natural disaster damage that will not be repaired.
- 42 For the purposes of repairing Increased Flooding Vulnerability, a **repair methodology** is one that:
- 42.1 does not require the removal of the residential building in order to enable repairs to the land to be undertaken; and
 - 42.2 does not require resource consent under the Resource Management Act 1991 in order to enable repairs to be lawfully undertaken or which the claimant demonstrates that he or she can obtain resource consent for.
- 43 For the purposes of repairing Increased Liquefaction Vulnerability, a **repair methodology** is one that:
- 43.1 is an established land repair technique recommended by a prudent engineering advisor;

- 43.2 will remediate the Increased Liquefaction Vulnerability of an area of damaged land that is sufficient to provide a building platform for a residential building comprising one or more dwellings to at least the same level of vulnerability to liquefaction present on the land prior to the Canterbury earthquake sequence;
- 43.3 is able to be practically carried out on the parcel of residential land and without requiring the consent of other land owners; and
- 43.4 all necessary consents can be obtained from the relevant regulatory authorities.

PART E: ASSESSMENT OF REPAIR COSTS

- 44 Where remediation of the Increased Flooding Vulnerability or Increased Liquefaction Vulnerability of the damaged land has been undertaken prior to the date of settlement, EQC will assess the repair costs as the reasonable cost of the repairs actually undertaken.
- 45 Where no remediation of the Increased Flooding Vulnerability or Increased Liquefaction Vulnerability of the damaged land has occurred at the date of settlement, EQC will take account of any information provided by the claimant as to the repair to be undertaken.
- 46 EQC will rely on the assessments of its expert engineering advisors as to whether repairs will remediate either or both of the Increased Flooding Vulnerability or the Increased Liquefaction Vulnerability of the damaged land and the reasonable costs of those repairs. Where repairs have already been undertaken, that assessment will be based on the state of engineering knowledge and practice at the time of commitment to the repairs.
- 47 If the area of land that has been or is to be repaired is less than the area of land that has suffered Increased Liquefaction Vulnerability damage, EQC will settle the claim by payment of the repair costs together with any residual Diminution of Value associated with the remaining area of damaged land.

PART F: ASSESSMENT OF DIMINUTION OF VALUE

- 48 Where EQC settles a claim by making payment of the Diminution of Value attributable to the Increased Flooding Vulnerability and/or Increased Liquefaction Vulnerability of the residential land, EQC will rely on assessments of the Diminution of Value certified by EQC's expert valuation advisors.
- 49 Where a property is affected by both Increased Flooding Vulnerability and Increased Liquefaction Vulnerability and neither type of natural disaster damage is repaired, EQC's expert valuation advisors will consider the overall Diminution of Value attributable to both types of natural disaster damage.
- 50 Where the residential building that was on the land prior to the Canterbury earthquake sequence remains on the land, the Diminution of Value that will be assessed by the expert valuation advisors will be:
- 50.1 the discount from the price that would have been paid for the property (the residential land and residential buildings combined) that would be agreed between a willing buyer and a willing seller because of the Increased Flooding

Vulnerability and Increased Liquefaction Vulnerability caused by ground surface subsidence to the land, with knowledge about that change and its impact on the vulnerability of the land to flooding and liquefaction in future earthquake events, the cost of repair options, and advice from competent and reasonable advisors taking account of the information available to EQC;

- 50.2 assessed on the date of the first earthquake in the Canterbury earthquake sequence.
- 51 Where the residential building that was on the land prior to the Canterbury earthquake sequence does not remain on the land, the Diminution of Value will be assessed having regard to the circumstances of the claimant and his or her intended use of the land.
- 52 In each case, the overall Diminution of Value assessed will not take into account:
- 52.1 any change in value to the property resulting from external changes or effects, whether from the earthquakes or otherwise (including regulatory changes);
- 52.2 any general stigma arising from the earthquakes; and
- 52.3 any changes in value to non-insured residential land and buildings.
- 53 The assessments of the Diminution of Value will be made in accordance with methodologies, practices, and procedures developed by EQC's expert valuation advisors and endorsed by the independent Expert Valuation Panel nominated by the New Zealand Institute of Valuers and the Property Institute of New Zealand to provide a peer review of the work undertaken by EQC's expert valuation advisors.

PART G: ADDITIONAL ISSUES

- 54 Where a repair methodology that remediates the Increased Liquefaction Vulnerability has been undertaken by or funded by a third party, such as the claimant's private insurer, EQC will take account of this in determining the appropriate settlement for the claimant. EQC's policies on this issue will be published separately.