WAIMAKARIRI DISTRICT COUNCIL

Risk Assessment and Financing Strategy relating to Major Natural Disasters

January 2018

180112002171

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Executive Summary

The most significant natural hazard risk facing the District and the Council is from a rupture of the Alpine Fault. GNS estimate that there is a 30% chance of a rupture occurring within the next 50 years.

The damage from such an event is likely to be extensive. The scenario anticipated by this Strategy is that the effects will be worse than were experienced during the 2010-11 Canterbury Earthquake sequence.

Purpose of this Strategy

This Strategy gives systematic consideration to the likelihood and severity of major natural disasters and assesses how they could impact on the Council's operations and its financial capacity and position.

This Strategy updates and refines the first assessment completed in 2014. The financial assessment has been updated to reflect both increases in replacement costs, and changes in infrastructure and resilience that have occurred over the past 3-4 years.

The Waimakariri District Council's Long Term Plan (LTP) 2018-2028 will reflect its priorities for the next 10 years, and will include its 30 year infrastructure strategy.

Risk Assessment

Risk assessments have identified that a major earthquake, either an Alpine fault rupture or a major local earthquake, would generate the greatest damage to the Council's assets. There is a 30% probability of 8.0 magnitude Alpine fault rupture occurring within the next 50 years (this probability remains unchanged from 2014). In the context of the Council's LTP and infrastructure strategy it is very relevant.

Other natural disasters that could also cause significant damage are floods or a tsunami, although the level of damage to Council assets will not be as high as for a major earthquake. However, there is a probability that flooding could recur with greater frequency.

This Strategy has assessed the financial effects of major natural disasters based on an expected 'worse-case' scenario, which is a major earthquake.

Financial Headroom in the LTP

The Council's 2015-25 LTP made a provision whereby it reflected a situation where the Council did not have insurance cover for an earthquake. It was estimated the Council needed to maintain 'headroom' in its borrowing policy of approximately $70 million.

This updated Strategy suggests this amount should be increased to $84 million for the 2018-2028 LTP.

Damage Assessment

The net book value of Council's assets, including roads and parks and reserves, exceeds $1.65 billion (30 June 2017). The Council does not insure roads (valued at $880 million) and reserves. The insured value of Council assets is as follows:

Building and Community facilities	$152 million
Residential Dwellings (mainly Elderly Persons Units)	$31 million
Above-ground Infrastructure (pump stations, well structures, ponds etc)	$154 million
Below Ground Assets (mainly pipes)	$709 million
Total Insured Value	$1,051 million

The 2010/2011 Canterbury earthquake series provided a very good insight into the damaging effects of earthquakes. The Council now has a very good understanding of how its assets will perform in a major earthquake event. The Council has, and will, spend about $139 million recovering from the 2010 and 2011 earthquakes.

Since 2010 the Council's recovery spend has been invested into improving the resilience of its assets and strengthening buildings to higher standards. All Council facilities and buildings have been strengthened to greater than 67% of the New Building Standard, with many now at 100% of the Standard. This should place the Council in a better position when the next major earthquake occurs.

This Strategy considers that the potential damage to Council assets, along with the costs to recover from an earthquake to be about **$210 million,** compared to the 2014 assessment of $172 million. The increase is due to the increased replacement costs estimates (following the 2017 revaluation) and an increase in the assets under Council ownership.

Most damage is anticipated to occur in areas where soils are liquefiable which badly affect buried infrastructure, especially deep gravity sewer mains. Experience from 2010 showed these assets to be the most vulnerable in an earthquake.

Sources of Recovery Funding

The Council will rely on several funding sources to recover from a major earthquake; namely continuing Crown and NZTA funding support, as well as having prudent insurance arrangements in place. The Council will also incur a share of the cost.

Any Council share of the recovery costs would need to be funded by borrowing as the Council does not anticipate having any significant cash or investment assets available to realise and contribute to a recovery. Maintaining headroom in the Council's borrowing, for the foreseeable future, is the only funding strategy available to it.

Accordingly, the Council needs to consider providing borrowing 'head-room' in its LTP to cater for an event. The desired outcome is that after the borrowing 'headroom' has been allowed for the Council will still live within its Treasury and Borrowing Policy limits.

The Council estimates that the damage to Council assets, along with the costs to recover from a major earthquake, to be about $210 million.

It is assumed that the current level of Government support for emergency response, contribution to below-ground infrastructure repair (currently 60%) and NZTA roading subsidy remains in place.

In total, this will fund about $106 million of the recovery costs, with $74 million recoverable from insurers and the Local Authority Protection Programme (LAPP, which funds the Council's 40% share of below-ground infrastructure asset repair) leaving about $32 million to be funded by the Council itself.

The Council has considered the unlikely, but possible, scenario where because of another major natural disaster in the country, or insurance region, insurance cover may not be in place when a major event occurs that seriously impacts the District. Following the 2010 earthquakes the Council lost its earthquake insurance cover for two years; although it has now been reinstated.

In the event the District was impacted by a major earthquake, and insurance cover was not in place, the Council's share of recovery costs could increase to about $104 million.

This Strategy recommends that not all the $104 million shortfall is accommodated within the LTP as it would probably constrain the Council's and community's priority spending initiatives to too great an extent. Rather this Strategy recommends that the Council considers providing borrowing 'head-room' of up to $84 million within its LTP.

With $84 million of borrowing 'head-room', and **no** insurance cover in place, it means the Council would need to undertake a prioritisation process. That would result in not all Council assets being replaced.

Funding would be available to restore fully all water, sewer, drainage and roading assets, but there would need to be a prioritisation process around the repair and restoration of community facilities, Council buildings and reserves within the District. This Strategy has developed a priority list for the restoration of services and assets that would help inform the Council's reinvestment decisions. It would mean that the Council would restore the vast majority of its assets and all its highest priority community facilities, such as town halls, libraries and aquatic facilities, but that the repair of some lower priority assets would be subject to an assessment of the funds available, desired levels of service, and the District's future needs.

A major natural disaster will, no doubt, place considerable financial stress on the businesses and residents of the community, and the Council would need to consider the ability of the community to withstand higher rates to fund additional borrowing. Community consultation about the proposed approach would be required. This Strategy notes that to fund an additional $84 million of debt the additional annual debt servicing cost per rateable property would be about $250-$300 per annum, for a period of 25 years.

1. Introduction

The Council's 2018-28 LTP reflects its priorities for the next 10 years, as well as its 30 year infrastructure strategy.

As part of Council's planning it needs to consider events that cannot be explicitly budgeted for, but could occur during the planning period. The major events that could directly impact on the well-being of the community and the viability of the Council are major natural disasters.

This Strategy gives systematic consideration of the probability and severity of major natural disasters and to assess how they could impact on the Council's operations and its financial capacity and position.

In forming a view this Strategy has sought to:

- Identify the types of natural disaster that could have significant financial consequences for the District, either singly or cumulatively.
- Model the 'worse case' scenario and identify what the potential financial effect could be.
- Consider the mechanisms to fund the recovery from that event(s).
- Provide information to allow the Council to determine what financial accommodation or 'head-room' it needs in its projected borrowing programme to take account of the event(s).
- Identify the Council's priorities for repairing and rebuilding its assets following a major natural disaster
- Determine what further information and assessment is required to improve its understanding and preparedness to address the consequences of a major natural disaster(s).

The Council has sought to determine the possible cost of recovering from a major natural disaster. By doing so, the intention is not to budget for that loss, rather it is to understand the potential financial consequences that may arise and then consider how best to plan for that in terms the LTP.

While the financial implications have been modelled on the 'worse case' event, which is major earthquake, the financial accommodation or borrowing 'head-room' created could be applied to any event that the Council needs to respond to, not just a major earthquake.

The Council has used the following key information to help inform its assessment:

- The Canterbury Group Civil Defence Plan 2014 that reflects detailed risk assessments identifying major natural disaster risks for the Canterbury Region, including the Waimakariri District.
- GNS information about the likelihood and consequences of a major Alpine fault rupture.
- Updated Flood and Tsunami modelling undertaken for the District by Ecan and GNS in 2017.
- An earthquake assessment for the District prepared by GNS on behalf of ECan, and liquefaction mapping undertaken for the Region.
- The LAPP assessment of the maximum probable loss for the District, undertaken by Risk Management Partners, on LAPP's behalf.
- Asset schedules prepared to support the 2017 insurance placement, reflecting up-to-date asset valuations and their replacement costs.
- Importantly, the knowledge and experience of Council staff gained from the major earthquake series that impacted Canterbury in 2010 and 2011, especially in regards to damage patterns in the District and response and recovery strategies developed since that time.

2. Natural Hazards and Risks Assessment

The Canterbury Civil Defence Group Plan (2014) has developed a risk profile for Canterbury. The Plan notes that while the process for developing the risk profile was thorough, comparison of events of very different natures is not straightforward, and the results will always be somewhat subjective.

Risk assessment involves consideration of two main factors — the nature of the hazard itself (scale and likelihood) and the opportunity the hazard has to impact on people, and to what degree.

There a number of threats to the District, the major ones being Natural Hazards, Those which consistently rank highest and therefore form the basis of this Strategy are Earthquake, Tsunami and Flood risk. Other events could however cause damage.

With this Strategy focus on the events that have the potential to cause the most damage and disruption, the Strategy should provide for the 'worst case' scenarios.

2.1. Major Risk Events

The Canterbury Civil Defence Emergency Management Group Plan highlights the events that are likely to cause the most damage and disruption are earthquake, tsunami and flood.

Earthquake Risk

The Canterbury region sits across the boundary of the Pacific Plate and the Australian Plate. A series of major faults across North Canterbury mark the plate boundary, and consequently the earthquake hazard in North Canterbury is high. As the 2010 and 2011 earthquakes have demonstrated, and more recently by the 2016 Hurunui-Kaikoura earthquake series, all of Canterbury can be affected by large earthquakes.

The Alpine Fault runs down the length of the South Island near the Central Divide. Experts[1] believe there is a 30% chance that there could be a magnitude 8.0 earthquake on this fault in the next 50 years. This would result in very strong shaking in the region lasting for 2-5 minutes, and could be of similar strength to the 2010 Darfield earthquake. Large and ongoing aftershocks will follow.

Earthquake fault mapping undertaken by GNS[2] in the Waimakariri District, commissioned by ECan, shows that there are 15 suspected or known active faults or folds at the ground surface in the Waimakariri District and the report suggests that events that break the ground surface could be capable of generating earthquakes of magnitude high sixes through to mid-high sevens. These could potentially have similar effects to the 2010 Darfield earthquake.

Tsunami Risk

The tsunami likely to generate the greatest risk to the Canterbury coast is a distant-source tsunami from South America. Near-source tsunamis such as from the Hikurangi subduction fault off the east coast of the North Island may also generate a tsunami; however, the effect of the near-source event is likely to less on the Waimakariri coast line.

While experts[3] believe that waves of up to ten metres are possible, this is very unlikely. Modelling shows that the coastal communities of Kairaki and The Pines Beach, along with Waikuku Beach, could be

[1] GNS Website: https://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Major-Faults-in-New-Zealand/Alpine-Fault

[2] General distribution and characteristics of active faults and folds in the Waimakariri District, North Canterbury ,D. J. A. Barrell J. G. Begg, GNS Science Consultancy Report 2012/326, Environment Canterbury Report R13/28,July 2013

[3] ECan Tsunami Presentation December 2017 – Trim No: 171215136484

inundated with 2-3 metres of water. Modelling suggests that the effects of a tsunami would not be felt far inland, although there may be some impacts on the lower reaches of the Kaiapoi River.

The amount of land that could be inundated by such a tsunami depends on the time of tide that the tsunami wave arrives. For areas affected, a tsunami is unlikely to be very destructive and although there would be about 16 hours of warning for a far-source tsunami.

Flood Risk

Flood modelling for the District shows storm events that affect the plains and foothills will produce the largest storm events, and damage, for the District.

The event most likely to cause major damage is a one-in-two hundred or one-in-five hundred year event that could see the Ashley River breached that would cause significant flooding across the District. The location of the breach would influence the effects. A breach at the confluence of the Ashley and Okuku Rivers would see flood flow pass to the west of Rangiora and into Kaiapoi. Modelling shows that flood waters in some parts of Kaiapoi could be up to 2 metres deep.

Rainfall events that generate a river breakout scenario are also the same weather patterns that would see extensive localised flooding. Accordingly, any river break-out would impact an already sodden and flooded District compounding the effects on communities.

With climate change occurring and with the probability of more frequent and heavier rainfall events, it is possible that the District could feel the effects of many smaller flood events that are still significant in the intervening periods.

2.2. Conclusion

The event that is most likely going to cause the greatest level of damage to the District and to the Council's assets is a major earthquake. This conclusion is also supported by the risk assessment undertaken by Risk Management Partners on behalf of the Local Authority Protection Programme in March 2014 (Trim Ref: 140617063706).

There will be other ongoing events, such as floods, that have a smaller affect, but are frequent. While such events are likely to cause significant disruption they are unlikely to challenge the overall financial viability of the Council. Rather, they become matters that can be absorbed into the overall financial planning of the Council as any one event is unlikely to cause major financial hardship to the Council.

The Risk Assessment and Financial Strategy should estimate the financial effects of major natural disaster based on a worse-case scenario, which is a major earthquake. However, any financial provision or borrowing 'head-room' created would then be available to help manage the effects of any natural disaster(s) that may occur during the planning period.

3. Impact on Community and Council

Major natural disasters have significant impacts on communities, in terms of financial loss, but also in terms of the loss of community well-being and the stress that it places on residents in the months and years that follow an event(s).

While it is valid to acknowledge other forms of 'loss', for the purposes of this Strategy it is necessary to constrain our assessment to the financial consequences for the Council.

We do not have an estimate of what the Maximum Probable Loss would be for the Council (other than for below-ground assets) if a major earthquake occurred. However, we do have some recent history that provides a very good indication of the types and level of damage that the Council can expect to see and the basis on which to make a preliminary estimate.

While the cost to the Waimakariri community has not been calculated from the 2010 and 2011 earthquakes, the following table summarises the costs the Council expects to incur arising from the earthquakes and identifies the various funding sources.

	Projected spend $M	Gov't/NZTA $M	Insurance/LAPP $M	Council $M
3 Waters	40	24	16	0
Roading	15	9	-	6
Community Facilities	48	7	12	29
General Recovery	16	8	2	6
Regeneration	20	-	-	20
Total	**139**	**53**	**30**	**61**

The above estimate includes work that flowed from Council decisions to strengthen and upgrade a number of community facilities as part of the repair programme. In particular, the Council has invested $12 million into a new Kaiapoi Library, $10.7 million to earthquake strengthening and extending the Rangiora Town Hall and $3 million into strengthening the Oxford Town Hall. In addition to that the Kaiapoi Aquatic Centre has been rebuilt from the ground up. These decisions have increased the Council spend over what otherwise would be the case and that investment should future-proof those assets. The above expenditure also reflects the $20 million being committed to the Regeneration of Red Zone areas.

Had the Council not made those decisions the Council's share of the net cost of the recovery would have been about $40 million less than that shown above.

4. Condition of Council's Assets including Infrastructure

The net book value of Council's assets, including roads and parks and reserves, exceeds $1.65 billion (30 June 2017). The Council does not insure roads (valued at $880 million) and reserves. The insured value of Council assets is as follows:

Building and Community facilities	$152 million
Residential Dwellings (mainly Elderly Persons Units)	$31 million
Above-ground Infrastructure (pump stations, well structures, ponds etc)	$154 million
Below Ground Assets (mainly pipes)	$709 million
Total Insured Value	$1,051 million

Of the Council's major fixed and infrastructure assets, many have been recently built, rebuilt, or have or will be strengthened by the end of 2015 to above 67% of the New Building Standard (NBS), and are therefore likely to withstand a major earthquake and be operational within a very short time thereafter. In addition to this, every other community facility the Council owns has or will be strengthened to in excess of 67% of the NBS.

4.1. Assessment Community Facilities and Council Buildings

The Council has community facilities and Council buildings valued for insurance purposes at 30 June 2017, at about $152 million replacement cost. The major facilities are noted below.

Building/Structure	Estimated Replacement Value ($millions)	Performance relative to New Building Standard
Kaiapoi Library (new)	14	100%
Rangiora Town Hall (strengthened and new)	13	67%+
Oxford Town Hall (strengthened and new)	4	67%+
Kaiapoi Aquatic Centre (rebuilt)	9	100%
Dudley Park Aquatic Centre (new)	14	100%
Rangiora Library (strengthened)	7	67%+
Rangiora Service Centre (strengthened)	16	67%+
Oxford Service Centre (new)	3	67%+

Woodend Community Centre (new and upgraded)	4	100%
Total	**84**	

4.2. Assessment of Above-Ground Infrastructure – recent new builds/upgrades

The insurance replacement sum for above-ground infrastructure totals $154 million (2017 insurance valuation). A lot of the infrastructure has been built in the last 10-15 years. Below is a list of more significant infrastructure that is likely to withstand an earthquake with a limited amount of damage. Other infrastructure tends to be spread around the District with pump stations scattered across towns, thereby reducing the concentration of risk. Where pump stations are built in more liquefaction prone areas foundations are more substantial than was previously the case.

Building/Structure	Estimated Replacement Value ($millions)	Performance relative to New Building Standard
Rangiora Water headworks	16	100%
Ocean Outfall – Pumping Stations/Structures and ocean outfall pipeline	26	100%
Rangiora Sewer headworks/STP	10	100%
Kaiapoi Sewer headworks/STP	20	100%
Pegasus Water headworks	8	100%
Oxford Water headworks	2	100%+
Oxford Sewage treatment plant	4	67%+
Kaiapoi Water headworks	6	67%+
Kaiapoi Sewer headworks	20	67%+
Kaiapoi Stormwater headworks/ponds	11	67%+
Rangiora Stormwater headworks/ponds	14	67%+

Woodend Water headworks	4	67%+
Total	**141**	

The Council is also built the new Ashley Cones Bridge worth $12 million which is an important transport link and is built to the latest earthquake standards.

4.3. Likely Impact on Continuing Use of Council Buildings and Above-Ground Assets

It is likely that all of the assets listed in the tables above, all of which are important to the functioning of the Council and its community, would remain in service and/or become functional relatively quickly after an event and at a relatively low cost.

All major or critical Council buildings and above-ground assets have been built or strengthened to a standard of at least 67% of NBS. However, the following key bridges present some risk:

- Waimakariri Gorge Bridge (old single lane bridge that connects the western part of the District to the Selwyn District, subject to some seismic analysis when the deck was recently replaced – co-owned with Selwyn District Council)
- Old Waimakariri River Bridge (old two lane bridge adjacent to the Motorway Bridge, although it was partially strengthened following the 2010 earthquake – co-owned with Christchurch City Council)
- Williams Street Bridge, Kaiapoi – (the structure is old but performed well in the 2010 earthquakes albeit the approaches were damaged).

Of these three bridges, the Williams Street Bridge is the one that would cause the most long term disruption if it was seriously damaged, and unusable, following an earthquake. Given its performance in the 2010 event, it is likely to be an event greater than the 2010 event to cause serious damage to the structure (damage to the approaches was repaired to allow access within days of the 2010 event). The loss of the other two major bridges in the District would be very inconvenient, but would result in less overall disruption as the Motorway Bridge is adjacent to the Old Waimakariri Bridge and the Waimakariri Gorge Bridge has lower volumes of traffic over it; however it will be a long detour for those who use it regularly.

5. Estimate of Damage to Council Assets

5.1. Estimate of Damage to Buildings and Above-Ground Infrastructure

The Council has not undertaken a formal assessment of the Maximum Probable Loss related to its buildings and above-ground infrastructure as a result of major earthquake, but given the significant strengthening, rebuild and new structures (which are all of the Council's critical structures) it is possible they may escape major damage in a future event. For the purposes of identifying an estimate of loss it may be prudent to anticipate $0.5 million of damage to every major/critical building and perhaps one total loss of a major/critical building of say $15 million, plus cumulatively another $5-10 million of damage to other Council buildings and above ground infrastructure assets, such as water headworks and well damage.

Based on these assumptions, there could be up to $30 million worth of building and above-ground infrastructure damage in a major event. This compares to an insurance claim of $18 million ($12 million for community facilities damaged and $6 million of above-ground infrastructure) as a result of the 2010 earthquake. It is noted that most of the damage to buildings in 2010 were to those not earthquake strengthened or sited on liquefiable soils.

Current earthquake insurance cover of $152 million is well in excess of this level of potential damage, meaning in the ordinary course of business, there is little residual risk for the Council in respect of above-ground buildings and structures. There may be an opportunity to review the future level of earthquake cover needed once a better assessment of the maximum probable loss is known.

If we lost insurance cover for whatever reason, then there would be an exposure to the Council while it waited for insurance cover to be reinstated. The most likely scenario where cover could be lost is if there was a major natural disaster event elsewhere in the country/insurance region that resulted in insurance market withdrawal of cover, or cover being so expensive it was prohibitive. Following the 2010 earthquake series the Council lost earthquake cover for 2-3 years. It is not inconceivable that cover could be lost for a period of up to ten years, or longer. If a major Wellington fault event occurred in the near-term that could be such a trigger.

It would be prudent to allow some headroom in the Council's borrowing to provide for this remote contingency – say 50% of the 'guestimated' assessed loss of $30M, ie $15M. This would be a very conservative position, and if it transpired there would need to be some form of prioritisation of the rebuild, and some revision of the level of service the Council could afford to provide the community.

5.2. Estimate of Damage to Below-Ground Infrastructure

Damage to below-ground infrastructure is likely to be the greatest as result of a major earthquake and it should be that scenario that generates the Maximum Probable Loss estimate for the District.

LAPP's Estimate

The Local Authority Protection Programme (LAPP) commissions Risk Management Partners Pty Limited to undertake a Risk Profile of each council to help them identify major natural hazard exposures to their below-ground infrastructure covered by the LAPP Fund and to estimate potential financial loss/exposure. (Trim Ref: 140617063706).

The last assessment completed by Risk Management Partners Pty Limited was in March 2014 and Council's asset value covered by the LAPP Fund was $375.3 million (note: that LAPP cover in 2017 has increased to $709 million).

Risk Management Partners Pty Limited had assessed the Council's expected losses from the major scenarios to be as follows:

- Earthquake with a 1-in-1000 year return period $27.64 million
- Flood with a 1-in-500 year return period $8.04 million
- Tsunami estimated as the same loss as a flood $8.04 million

The assessment does state that should there be a major regional event the losses could be significantly higher because:

- The loss estimates do not take into account additional costs such as emergency repairs and cost increases due to 'demand surge'.
- Actual damage may be higher especially in liquefaction prone land
- Some undervaluation of assets and the costs required to replace them.

A More Conservative Assessment

In the 2010 and 2011 earthquakes the damage to below-ground infrastructure is estimated to cost $40 million to restore, of which 60% was funded from the Crown, which leaves 40% or $16 million to be funded by the Council's insurer (LAPP) and the Council. LAPP contributed about $16 million to the loss.

From the 2010 earthquake series it is clear that below-ground infrastructure laid in liquefaction prone soils performed poorly. It is likely that a major earthquake will cause widespread liquefaction and damage to below-ground assets in those areas, with gravity sewer systems being worst affected, followed by stormwater and water systems. Waters systems made from more ductile materials have withstood the earthquakes well with relatively little damage even in liquefiable soils.

Following the 2010 earthquakes some of the most prone areas have been "Red Zoned' and rebuilding will not occur in those areas. As a result, while some infrastructure may traverse some Red Zoned areas, infrastructure will not be required to anywhere near the same extent as previously was the case in those areas.

It is reasonable to assume that the liquefiable soils in the east of the District will be the source of the greatest loss for below-ground assets in a future event. It is not inconceivable that a major Alpine fault rupture generates 2-5 minutes of intense shaking generating liquefaction and that could potentially result in a lot of the underground assets in Kaiapoi, Woodend and Pegasus being seriously compromised. This would also extend to the beach communities.

GNS[4] has prepared a liquefaction map for the Region identifying potentially liquefiable land –see Attachment 3. Within the District it identifies land in the eastern part of the District, extending west almost as far as Rangiora, as potentially liquefiable. Below is an assessment of the cost of damage if the eastern part of the District was subject to significant liquefaction. The scenario and assumptions adopted regarding the level of damage reflect our experiences in 2010, but anticipating more damage than was experienced in 2010, as follows:

- 50% of sewers are damaged needing replacement
- 20% of water mains need replacement
- 25% of stormwater pipes need replacement

[4]Review of liquefaction hazard information in Eastern Canterbury including Christchurch city and parts of Selwyn Waimakariri Hurunui districts report : (Trim No 130214010865)

The values used are the replacement costs used for the 2017 Asset Revaluation.

Asset Replacement Values and Damage Estimates for Below-Ground Infrastructure in Liquefiable Areas (based on 2017 Asset Revaluation: Trim Ref: 170904095154)

Asset /Location	Kaiapoi	Woodend	Pegasus	Waikuku Beach	Woodend Beach	Pines/Kairaki	Total
	$M	$M	$M	$M	$M	$M	$M
Sewer - value	81	17	29	8	2	2	139
(50% damage)	(40)	(9)	(16)	(4.5)	(1)	(1)	(71.5)
Water - value	32	8	15	3	N/A	0[5]	58
(20% damage)	(6)	(2)	(3)	(0.6)	(0)	(0)	(11.6)
Stormwater - value	32	8	6	0	0	0	46
(25% damage)	(8)	(2)	(1.5)	(0)	(0)	(0)	(11.5)
Total	**145**	**33**	**50**	**11**	**2**	**2**	**243**
(Total Damage)	**(54)**	**(13)**	**(20.5)**	**(5.1)**	**(1)**	**(1)**	**(94.6)**

Therefore, for the purposes of modelling a worse-case scenario, it is reasonable to assume the loss could be in the order of $95 million for damage to below-ground assets in liquefiable parts of the District.

Therefore, for the purposes of modelling a worse-case scenario, it is reasonable to assume the loss could be in the order of $95 million for damage to below-ground assets in liquefiable parts of the District.

Damage Estimates to Below-Ground Infrastructure in Non-Liquefiable Soils

Pipes laid in alluvial gravels performed very well in the 2010 earthquakes with a relatively small amount of damage incurred (in the order of $2-3 million). Selwyn District Council and Christchurch City Council experienced the same impacts with relatively little damage where pipes lay in alluvial gravels.

Most of the damage to pipes in alluvial gravels was joint damage caused by violent shaking. If an Alpine fault generated shaking for 2-5 minutes it is unknown how much worse the damage would be. However,

it is reasonable to assume that it would not be that significant – possibly not more than $10 million of damage in a very bad event.

5.3. Funding of Below-Ground Infrastructure Damage

To fund $105 million of repair costs ($95 million in liquefiable areas and $10 million in non-liquefiable areas), the Crown's current commitment is to contribute 60% or $63 million. This compares with the current damage estimates for the 2010 and 2011 earthquakes of about $40 million with the Government share being $24 million.

LAPP's estimate of Maximum Probable Loss of $27.6 million looks to be too low based on experiences in 2010 and 2011.

For the purposes of this Strategy it is assumed the Crown's funding arrangements will remain in place. Note, following a review of the sector's insurance arrangements, which is currently underway, this may alter. However, it is reasonable to assume the Crown would still have a role to play in funding future infrastructure recovery.

Based on the assessment above, Government would provide $63 million of funding and the Council's share of cost would be $42 million, which would be covered by insurance. In the worst case, and insurance cover is not available, the Council would need to fund the $42 million.

In the event the Council has to fund the entire share, it should adopt a conservative approach to ensure there is sufficient head-room left in its borrowings to provide for this.

5.4. Damage to Roading Infrastructure

Most damage in 2010 again occurred where soils liquefied. Very little damage occurred in other areas. For the 2010 earthquakes the estimated cost to repair Council roads is approximately $19 million, of which New Zealand Transport Agency (NZTA) will fund $11 million leaving $8 million as the Council share. This excludes those Red Zone roads that have been largely decommissoned and therefore not repaired.

It is reasonable to assume that in future major events the damage pattern could be similar. For the purpose of this Strategy it is assumed that shaking of 2-5 minutes from an Alpine rupture will result in more liquefaction than occurred in 2010, and therefore more roads would be damaged. For the purposes of this Strategy it is assumed that double the 2010 damage could occur, or about $40 million.

NZTA indicates for emergency events over a certain threshold should be funded at 20% over the normal Financial Assistance Rate (FAR) and that in major events further specific funding arrangements could be made. Where repair occurs over several years, the Council's current experience is that the agreed FAR is not as high as it would be case if repair occurred all in one year.

For modelling purposes it is assumed that 70% of the repair cost will be funded from NZTA, meaning the Council's share is about $12 million. This would need to be loan funded.

5.5. Damage to Recreation Reserves

Reserves, improvements to reserves, and playgrounds were damaged in the 2010 earthquakes. Again damage was predominantly confined to liquefiable areas, and it is reasonable to assume this could be the case again in a major event. In Kaiapoi assets along the Kaiapoi River, near the town centre, will be particularly exposed to risk, as would reserves in Pegasus and the beach communities, and to a lesser extent Woodend.

It is reasonable to assume that the damage could be up to $10 million to replace assets and renovate damaged reserves and sports grounds. This type of damage is not subject to insurance and it would fall on the Council to fund it.

Some prioritisation of restoration funding may be required. If there is no insurance available for other insured assets, potentially only half of the restoration costs should be accounted for in any borrowing head-room - ie $5 million.

5.6. Emergency Repairs

Prior to any major repairs occurring there will be a period of emergency repair works that will be ongoing for 1-2 years after a major earthquake, and possibly longer with subsequent aftershocks.

In 2010 significant funds were spent getting all infrastructure services operational and maintaining them at a level that provided a basic/adequate level of temporary service. Temporarily fixing broken sewers and other reticulation systems and then keeping them functional is very expensive, and ultimately most of this work has no long term value when replacement occurs. But it is essential to carry out this work to enable members of our community to remain in their homes.

While it is hard to estimate the temporary repair costs from the 2010/2011 earthquakes, it ran to somewhere between $7-10 million. Most of the funding for this was provided by the Government through Civil Defence grants; some of which were funded at 100% and then ongoing repairs at 60%.

It is not unreasonable to imagine in a future major event that these costs could be in the order of $20 million, assuming $15 million funded by the Government and the Council bearing the rest.

5.7. Other Community Support

The Council's experience in the 2010 earthquakes was that the community looked to the Council to provide support to the community in terms of social recovery, but also assisting with restoration of non-council owned community assets, hosting community meetings, supporting individuals and businesses, as well as providing rates relief.

While Government support was provided in 2010, it is not unreasonable for the Council to anticipate up to $5 million of its funding will also be needed to support the community.

6. Summary of Estimated Losses and Funding Sources

Council Funding Position with Full Crown and Insurance/LAPP Support

(Note: this assumes no betterment in the repair or change in level of service as a result of the event)

	Estimated Reinstatement Cost $M	Crown/NZTA funding $M	Insurance/LAPP funding $M	Council Share $M
Above-ground Infrastructure and Buildings	30	0	30	0
Below-ground Infrastructure	105	63	42	0
Roading	40	28	0	12

Reserves	10	0	0	10
Emergency Response/repairs	20	15	0	5
Community Support	5	0	0	5
Total	**210**	**106**	**72**	**32**

6.1. Funding Position Assuming No Insurance and LAPP support

In the event that, for whatever reason, insurance and LAPP support was not available, the Council would, based on the scenario presented above, need to fund $104 million for its share ($72m insurance/LAPP and $32 million Council share).

If that were the case the Council would likely prioritise which services and assets should be restored. As per the list contained in Section 9, the Council would most likely apply available funds to assets that have the highest priority (ie water, sewerage, drainage and roads). The reinstatement of community facilities and reserves has a lower priority.

Providing borrowing 'head-room' for the full $104 million may be a too conservative position, given the low probability of insurance not being in place. If the full amount of 'head-room' was provided for it would reduce the Council's ability to undertake other projects within the community that may be of equal, or greater, value compared to the restoration of all existing services and assets.

It is suggested for Community Facilities, Council Buildings and Reserves that only 50% of the estimated loss for these assets be factored into any borrowing-headroom provided, or $20 million (ie respectively 50% of $30 million and $10 million, as noted in the earlier loss estimates).

Accordingly, it is suggested that $84 million borrowing 'head-room' is reserved, in the event that insurance is not available, and that would be sufficient to provide for the full restoration of infrastructure services and 50% of estimated repair costs for community facilities, buildings and reserves. This is represented in the table below:

	Estimated Reinstatement Cost **$M**	**Crown/NZTA funding** **$M**	**Insurance/ LAPP funding** **$M**	**Council Share** **$M**	**Possible Head-room required in the Long Term Plan** **$M**
Above-ground Infrastructure and Buildings	30	0	0	30	15
Below-ground Infrastructure	105	63	0	42	42
Roading	40	28		12	12
Reserves	10	0	0	10	5
Emergency Response/repairs	20	15	0	5	5

Community Support	5	0	0	5	5
Total	**210**	**106**	**0**	**104**	**84**

7. Financing Options

Mechanisms to fund major natural disasters rely on several sources. This Strategy must make some assumptions about the sources of funding that could be available to fund disaster recovery.

The following assumptions have been formed:

Source of Funds	Extent of Reliance	Comment/Risks
Pre-event cash reserves	Nil	Councils in high growth areas typically are in net-debt position and Waimakariri is no exception. The funding required to support growth means the Council will be in 'net debt' position, with its cash management strategy being to utilise any share cash to reduce external debt levels. Accordingly, the Council should not plan to rely on any accumulated cash reserves being available, at least, in the next 10 years.
Crown/NZTA Funding	High	Unless there is a major change in Government sentiment, it is reasonable to assume that Crown and NZTA funding will be available in the event of a disaster. The strategy will need adjusting should any change be signalled in the future.
Insurance	Moderate – High	The Council currently has insurance cover adequate to recover from a major event and, provided that support remains in place, this will enable the Council to fully restore current levels of service. There is a risk, such as that followed the 2010 earthquakes that insurance cover could be withdrawn. Should that occur the Council is at some risk. Some account of that risk should be considered in any long-term borrowing strategy by providing additional borrowing head-room.
Sale of Disposable Assets	Nil-Low	The Council has very few investment assets, including a small forestry holding. In total investment assets are currently valued at about $5 million, so it will not make a significant contribution to funding the recovery, should they be able to be realised.
Council Debt	High	For any obligations outstanding that must be met by the Council, it will need to raise debt to fund its share. The Council is a shareholder in the Local Government Funding Agency (LGFA) and this has provided a very reliable source of debt funding for the Council. In the event of a disaster we anticipate that funding source to remain in place. For whatever reason that was not the case, then Council would need to seriously reprioritise recovery spending, seek alternative market support, and look for further Government/Crown intervention.

To fund the Council's share of the cost of recovering from a major natural disaster, with or without insurance/LAPP support, it will almost certainly be via borrowing.

In making decisions around securing funding the Council would need to consider the certainty associated with securing that funding from the LGFA, the markets, or the Crown as a last resort. It would also need to take account of any expected terms of borrowing, especially the applicable interest rates, repayment terms and security.

Another key factor that would need serious consideration is the ability of a community to meet additional borrowing costs. A major natural disaster will, no doubt, place considerable financial stress on the businesses and residents of the community and the Council would need to consider the ability of the community to withstand a higher rate impost to fund the additional borrowing. Community consultation about the proposed approach would be required. It is noted that to fund an additional $84 million of debt that would translate into an annual debt servicing cost of about $250-$300 per rateable property, per annum for a period of 25 years (based on approximately 24,000 ratepayers). The actual rate impact would depend on a number of things including; the Council's restoration priorities, the number of ratepayers, the level of borrowing required, how borrowing would impact Council's treasury policy limits, and lender's risk appetite which flows through into lending terms and conditions.

8. Conclusions on Council's Financing Strategy

Essentially, the only viable option for the Council to fund its share of recovering from a major natural disaster is through maintaining 'head-room' in its borrowing policy.

From the analysis conducted, the Council's net share of funding required to recover from a major earthquake event is about $32 million, if full insurance cover is available.

If, for whatever reason, insurance is not available the unfunded damage would be about $104 million. For insurance not to be available in any viable form would be the result of an unlikely, but not impossible, set of circumstances.

To protect the Council and community against that rare set of circumstances and fully provide for borrowing 'head-room' within the Long Term Plan of $104 million it may be a too conservative position to hold, and thereby unreasonably constrain the Council to too great an extent.

Providing $84 million borrowing 'head-room' would allow the Council to continue delivering its critical functions enabling the Council to fully restore all roads and critical infrastructure and then allow it to reinstate the vast majority of community facilities and reserves, but there may need to be some decisions made about the priority of any rebuild spend. The Council should engage the community about the funding options facing the community and its view on spending priorities. This is outlined further in Section 9 of this Strategy.

If $84 million capacity is provided within its future borrowing limits, the Council would need to consider how this impacted its overall Long Term Plan in terms of what it can afford and whether the full provision of $84 million can be accommodated within its borrowing plan.

Accordingly, the Council should retain 'head-room' within its Long Term Plan and should consider providing up to $84 million of borrowing 'head-room'.

9. Priorities for Council Spending and Restoration of Council Assets

In the event the Council does not have sufficient funds to fully restore its assets and current levels of service, it will need to prioritise its investment of available funds. This may mean, in some circumstances, not all assets would be replaced as they may not align with future needs, or there are insufficient funds for their replacement.

The priority for the restoration, repair, or rebuild of Council assets would be in the following priority order:

Top Level Priorities

1 Water supplies to all communities
2= Sewer systems for Council reticulated systems
2= Major drainage trunk mains and pump stations
2= Strategic, Arterial and Collector Roads, including bridges on those routes
5 Rangiora airfield (for emergency response/recovery purposes)
6 Southbrook Refuse Transfer Station
7 Other local roads, including footpaths
8 Other drainage networks
9 Rangiora Service Centre
10 Rangiora and/or Kaiapoi Library (in the event one was severely damaged)
11 Dudley Park and/or Kaiapoi Aquatic Centre (in the event one was severely damaged)
12 Rangiora Town Hall
13 Oxford Town Hall
14 Oxford Service Centre and Library

Lower Level Priorities (all, subject to funding availability and future need assessment)

15 Public toilets
16 Major children's playgrounds
17 Main sports grounds turf renovation
18 Other community facilities
19 Other reserves, sports grounds and playgrounds
20 Walkways and passive recreational areas

10. Future Actions and Risk Mitigation Strategies

This Strategy raises some issues that require further investigation and consideration to improve the Council's understanding of its risks, feasible risk reduction strategies, and its possible financing options. The following actions are suggested to be undertaken over the next three years:

- Gaining a better understanding of the Maximum Probable Losses for Council Buildings and Above-Ground assets, as well as Below-Ground assets.

- Determining whether the level of Natural Disaster insurance cover is appropriate, especially that provided under the Material Damage policy.

- Continuing to review Long Term Plans to determine whether sufficient 'head-room' is available to cover the Council's share of any loss.

- Determining whether any further detailed engineering assessment is required of any other critical infrastructure assets and, in particular, determining whether there should be any further strengthening work undertaken on three major bridges in the District that have not been subject to any major earthquake strengthening work.

- Continuing to apply resilient technologies when new and replacement infrastructure is installed.

- Continuing to engage the community about restoration priorities within the community in the event funding is not available to meet the full restoration of Council services

- Engaging with the LGFA about it preparedness to provide funding support in the event of a major natural disaster, seeking clarity about the availability of funding and any terms and conditions that may be associated with that support. Engagement with other funders and/or the Crown (possibly on a sector-wide basis) may need to follow those discussions.

Attachment 1 - GNS Assessment of Liquefaction Prone Land

(From Review of liquefaction hazard information in Eastern Canterbury including Christchurch city and parts of Selwyn Waimakariri Hurunui districts report): (Trim No 130214010865)