

Minutes

Zoning Review Advisory Group

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| Date & time | 9.00 am – 5.00 pm Wednesday 11 July, Thursday 12 July, Friday 13 July 2012 | | | | | | | | | | |
| Location | CERA Offices, Christchurch | | | | | | | | | | |
| Meeting | <table border="0"> <tr> <td>Review Panel:</td> <td>Attendees:</td> </tr> <tr> <td>- Keith Turner – Independent Chair</td> <td>-</td> </tr> <tr> <td>- Diane Turner – General Manager, Strategy, Planning and Policy, CERA</td> <td>-</td> </tr> <tr> <td>- Jan Kupec – Chief Geotechnical Engineer, CERA</td> <td>-</td> </tr> <tr> <td>- Susan Newell, Senior Legal Officer, CERA</td> <td>-</td> </tr> </table> <p style="text-align: right;">Withheld under section 9(2)(a)</p> | Review Panel: | Attendees: | - Keith Turner – Independent Chair | - | - Diane Turner – General Manager, Strategy, Planning and Policy, CERA | - | - Jan Kupec – Chief Geotechnical Engineer, CERA | - | - Susan Newell, Senior Legal Officer, CERA | - |
| Review Panel: | Attendees: | | | | | | | | | | |
| - Keith Turner – Independent Chair | - | | | | | | | | | | |
| - Diane Turner – General Manager, Strategy, Planning and Policy, CERA | - | | | | | | | | | | |
| - Jan Kupec – Chief Geotechnical Engineer, CERA | - | | | | | | | | | | |
| - Susan Newell, Senior Legal Officer, CERA | - | | | | | | | | | | |
| Background Papers | <ul style="list-style-type: none"> ▪ Terms of reference for the Zoning Review Advisory Group ▪ Cabinet Paper – Land Decisions June 2011 ▪ Cabinet Paper – Kaiapoi Orange Zones – Aug 2011 ▪ Cabinet Paper – Decisions on Canterbury Orange Zones – Oct 2011 ▪ Cabinet Paper - Canterbury Rezoning Announcements – Nov 2011 ▪ Briefing Paper – Rezoning Orange Zones in Wainoni, Avonside, Burwood and Dallington – Feb 2012 ▪ Briefing Paper – Rezoning Orange Zones in Central City South, Richmond South and Linwood – Mar 2012 ▪ Cabinet Paper – Parklands East Review – Mar 2012 ▪ Parklands East Report (Tonkin and Taylor) - Mar 2012 ▪ Comparison of damage in Green and Red Zones across Christchurch ▪ Christchurch RRZ – Properties Requesting Rezoning Map ▪ Kaiapoi RRZ – Properties Requesting Rezoning Map ▪ Information Sheet - Green Zone Technical Category 3 (TC3) | | | | | | | | | | |
| Meeting objectives | <ol style="list-style-type: none"> 1 Consider all applications from property owners in greater Christchurch wishing to have their zoning reassessed. 2 Make recommendations to the Minister for Canterbury Earthquake Recovery for changes where it is found that: <ol style="list-style-type: none"> a. The zoning of a property is inconsistent with the criteria agreed by Cabinet; OR b. There are anomalies in the zoning of a property due to: <ol style="list-style-type: none"> i. The zoning boundary not adopting the underlying fee simple (legal) boundary for cross-lease or unit title properties; or ii. The green zoning of an individual property, or a small number of properties, would result in clearly not viable infrastructure servicing costs. (This would typically be because such properties are serviced by infrastructure wholly or partly in a red zone, or the main purpose of the | | | | | | | | | | |

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infrastructure is to service properties in a red zone.)

| Subject | ACTION / Issues |
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| Introduction – | <p>Welcome and discussion of the key responsibilities for the Group.</p> <p>The Group was taken on orientation site visits to key red and green zones as background to their considerations.</p> <ol style="list-style-type: none"> 1. The purpose of the Group is to check that: <ul style="list-style-type: none"> • The red/green criteria have been consistently applied; and • Boundary lines have been drawn sensibly, in accordance with the criteria taking into account existing boundaries). 2. The Group must reach a joint recommendation; Keith Turner (Chair) has a casting vote if required. 3. The Group will report its findings to the Minister for Canterbury Earthquake Recovery. 4. The Minister will make recommendations to Cabinet based on the Groups findings. |
| Background – Policy | <p>Overview of the policy framework for zoning. Please find a summary hand out on the zoning criteria agreed by Cabinet attached. (Appendix 1)</p> <p>- Withheld under section 9(2)(a)</p> |
| Background – Geotechnical data | <p>Overview of the background and methodology used in the geotechnical assessment undertaken to inform the policy decisions. Summary data has been prepared for each area and will be discussed and attached as appendices to this report. An overview map was presented (see appendix 2)</p> <p>Broad-level reviews and critiques of Tonkin and Taylor work have been undertaken by Professor Geoff Martin (University of Southern California), Professor Tom O'Rourke (Cornell University) and Beca Infrastructure & John Wood Consulting (Consulting Engineers NZ). Tonkin and Taylor's normal internal review processes have been followed.</p> <p>- Withheld under section 9(2)(a)</p> |
| Background – Infrastructure Considerations | <p>Overview of the water supply and wastewater network in Christchurch and what implications the land zoning process has on the provision of these services.</p> <p>- Withheld under section 9(2)(a)</p> |

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| | <p>Overview of the roading infrastructure in Christchurch and what implications the land zoning process has on the provision of these services.</p> <p>- Withheld under section 9(2)(a)</p> |
| <p>Site visits</p> | <p>The Group made site visits to a range of green zone and red zone areas which are representative of the areas under review to confirm its assessment of geotechnical and community wellbeing factors. This included all areas where the available data indicated that a possible change in zoning should be given detailed consideration</p> |
| <p>Findings</p> | |
| <p>Area 1 – Kaiapoi South</p> | <p>The Group reviewed the key geotechnical issues for Kaiapoi South and the summary data (attached in appendix 3) which showed that:</p> <ul style="list-style-type: none"> • Extensive moderate to severe large-scale lateral spreading has occurred towards the Kaiapoi River and Courtenay Stream (between The Oaks and Bowler Street). Large scale perimeter treatment and ground improvement works would be required to address the damage and future risk in these areas before repair and rebuilding of homes would be possible. • Minor to moderate liquefaction was observed in the red zone between Bowler Street and Williams Street and the pattern of ground cracking (an arc shape back to Hilton Street) suggests that a scarp feature may have started to form due to block-type lateral ground movements. Area wide perimeter treatment or very specialised foundations would be required to gain consent for house rebuilding and limit options for future development in this area. • Based on the available geotechnical data, the group considered that the property at [redacted] was set back sufficiently from the area of most lateral spreading for the damage to this property to be addressed on an individual basis. • In other green zone areas, minor liquefaction and cracking was observed however the damage in these areas can be addressed on an individual basis. All TC2 type foundation solutions (robust raft slabs, deep piles or surface structures) are likely to be feasible. <p>Other points of note:</p> <ul style="list-style-type: none"> • [redacted] Withheld under section 9(2)(a) • Many of the properties in the area between Bowler Street and Williams Street in the red zone have only minor to moderate observed damage from the recent earthquakes. However the existence of major cracking along Hilton Street, combined with the proximity to the river and underlying ground conditions, suggests that in a future design-level earthquake there is a high risk of significant |

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| | <p>lateral spreading.</p> <p>RESOLVED: Withheld under section 9(2)(a)</p> <p>1. THAT # should be rezoned from red to green.</p> <p>Reasons for Decision: Withheld under section 9(2)(a)</p> <p>The Group agreed that on balance does not meet the criteria to be zoned red and is situated on the edge of the red zone. After reviewing the geotechnical data and visiting the site the Group agreed that this property was set back sufficiently from the area of most severe lateral spreading for the damage to be addressed on an individual basis through the normal insurance process. Due to its location adjacent to the green zone, infrastructure is readily available.</p> <p>2. THAT no other changes to zoning in Kaiapoi South be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all other properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>Despite limited observed damage in the red zone between Bowler Street and Williams Street the high risk of future damage means it is unlikely property owners will be able to obtain building consents and insurance in the future in this area without area wide works first being undertaken to prevent risk. The lateral spreading failure mechanism is assessed as being similar to the rest of the area despite a lesser state of advance and therefore the area meets the criteria to be zoned red.</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 2 – Kaiapoi North and West</p> | <p>The Group reviewed the key geotechnical issues for Kaiapoi North and West and the summary data (attached in appendix 4) which showed that:</p> <ul style="list-style-type: none"> ▪ Extensive moderate to severe large-scale lateral spreading towards the Kaiapoi River has been observed in the current red zone (adjacent to the river). Large scale perimeter treatment and ground improvement works would be required to address the damage and |

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future risk in these areas before repair and rebuilding of homes would be possible.

- Moderate to severe liquefaction has occurred in the current red zone due to very low lying ground, shallow groundwater and deep deposits of soils with high susceptibility to liquefaction. Area wide fill would be required to raise the land before repair and rebuilding of homes would be possible. This would require all structures to be removed, similar to preparing a new subdivision.
- In the green TC3 zone between Peraki St and Rich St minor to moderate liquefaction has occurred with local scaled lateral movement in some areas. Two types of TC3 foundation solutions (ground improvement or surface structures) are likely to be feasible in these areas.
- In other green zones minor to moderate liquefaction has occurred however all TC3 foundation solutions (site ground improvement, surface structures or deep piles) and in some cases TC2 foundation solutions (robust raft slabs) are likely to be feasible.

Other points of note:

- In the green zone in Kaiapoi West between Peraki St and Rich St the Waimakariri District Council (WDC) is undertaking additional repair to the culvert which will provide additional ground stabilisation in this area [CAB (11) 24/15 refers].

RESOLVED

1. **THAT** [redacted] Withheld under section 9(2)(a) should be rezoned from red to green.

Reasons for Decision:

Withheld under section 9(2)(a)

The group agreed that [redacted] is the last property on the border of the red/green zones and damage at this property is able to be addressed on an individual basis through the normal insurance process.

2. **THAT** no other changes to zoning in Kaiapoi North and West be recommended.

Reasons for Decision:

The Group agreed that for all other properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.

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| | <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 3 – Pines Beach to Kairaki</p> | <p>The Group reviewed the key geotechnical issues for Pines Beach to Kairaki and the summary data (attached in appendix 5) which showed that:</p> <ul style="list-style-type: none"> • In the current Kairaki red zone adjacent to Kairaki Creek there has been extensive large-scale lateral ground movement towards the creek. To enable rebuilding in this area large scale perimeter works (15-30 metres wide along the full length of the riverbank) would be required to protect from further ground movement. • In the Pines Beach red zone at the sand dune edge there has been extensive large scale lateral ground movement in the sloping ground at the front edge of the sand dunes. Significant area wide engineering would be required to stabilise the sloping ground at the front of the sand dunes such as deep ground improvements and/or flattening and reinforcement of the sand dune edge. • In addition, moderate to severe liquefaction has occurred in both Kairaki and Pines Beach due to low lying ground, shallow groundwater and deep deposits of soils with high susceptibility to liquefaction. Up to one metre of new fill would be required to raise the land and enable individual properties to be rebuilt. This would require all structures to be removed, similar to preparing a new subdivision. • In the Pines Beach green zone there was little or no evidence of liquefaction. In some areas minor ground cracking was observed. In these areas, all TC2 type foundation systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible to rebuild on an individual property basis. <p>RESOLVED:</p> <ol style="list-style-type: none"> 1. THAT no changes to zoning in Pines Beach and Kairaki be recommended. <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |

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| <p>Area 4 – Brooklands to Spencerville</p> | <p>The Group reviewed the key geotechnical issues for Brooklands to Spencerville and the summary data (attached in appendix 6) which showed that:</p> <ul style="list-style-type: none"> • Alongside Styx River extensive moderate to severe large-scale lateral spreading has occurred towards the river. To enable rebuilding in this area large scale perimeter works (15 metres wide, 8 metres deep along the full length of the riverbank) would be required to protect from further ground movement. • In addition, moderate to severe liquefaction has occurred in the current red zone due to low lying ground, shallow groundwater and near surface soils with high susceptibility to liquefaction. Up to one metre of new fill would be required to raise the land and enable individual properties to be rebuilt. This would require all structures to be removed, similar to preparing a new subdivision. • In the current green zone widespread moderate liquefaction has occurred. In these areas all TC3 foundation systems (site ground improvement, surface structures or deep piles in some areas) are likely to be feasible for rebuilding on an individual property basis. <p>RESOLVED:</p> <p>1. THAT no changes to zoning in Brooklands to Spencerville be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable damage to be addressed. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 5 - North Burwood to North New Brighton</p> | <p>The Group reviewed the key geotechnical issues for North Burwood to North New Brighton and the summary data (attached in appendix 7) which showed that:</p> <ul style="list-style-type: none"> • In most of the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In green TC3 areas at the south end of Putake Drive minor to moderate local scale-lateral ground movements towards the storm water channel has occurred on some properties. In these areas, two |

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| | <p>TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis.</p> <ul style="list-style-type: none"> In the current green zone TC2 areas little evidence of liquefaction was observed at ground surface but in some areas minor ground cracking was observed. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>Other points of note:</p> <ul style="list-style-type: none"> The culvert at the south end of Putake Drive will be repaired by Christchurch City Council (CCC) providing additional stabilisation of the channel and adjacent ground. This will make the process of rebuilding on an individual basis more efficient and effective. [CAB Min (11) 41/24 refers] <p>RESOLVED:</p> <ol style="list-style-type: none"> THAT no changes to zoning in North Burwood to North New Brighton be recommended. <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 6 - East Burwood</p> | <p>The Group reviewed the key geotechnical issues for East Burwood and the summary data (attached in appendix 8) which showed that:</p> <ul style="list-style-type: none"> The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River to the south and the Anzac Drive wetlands to the east. Extensive very severe liquefaction has also occurred. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank and wetland edge) and extensive area-wide fill would be required to address the damage and future risk in these areas before repair and rebuilding of homes would be possible. 23 properties at the eastern end of Kingsbridge Drive including Stening Place and Schumacher Place were previously zoned green. The available geotechnical data shows that the land in this area to the east of the creek has been affected by large-scale lateral spreading towards the wetlands. The ground conditions and engineering challenges faced in this area are similar to the red zoned land directly to the south and east, and would require area wide works to enable repair and rebuild to occur. Properties in Kingsbridge Drive to the west of the creek (including |

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| | <p>Flaxon Place) were filled and compacted in a more recent stage of subdivision construction than the area to the east of the creek and have more favourable ground conditions. This area has not experienced large-scale lateral spreading, and does not require area-wide works before repair and rebuilding of homes can occur. In effect the good crust of well-compacted gravelly fill which was placed during subdivision development means that area-wide works have already been completed.</p> <ul style="list-style-type: none">• Significant damage has occurred to properties in the green zone section of Stour Drive. The geotechnical data indicates that it is technically feasible to address this damage on an individual property basis following the DBH guidance document for TC3 foundations.• In the remainder of the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis.• In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis.• In the current green zone TC2 areas little evidence of liquefaction was observed at ground surface but in some areas minor ground cracking was observed. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>Other points of note:</p> <ul style="list-style-type: none">• The 16 green zone properties in Stour Drive are able to be repaired on an individual basis as outlined above. However due to their location bordered by red zone on three sides within the immediate neighbourhood, these properties are isolated, in that the rest of their immediate community – being the Stour Drive subdivision has been zoned red. This may have an adverse effect on infrastructure (see appendix 9) and community wellbeing of these remaining property owners.• 23 properties at the eastern end of Kingsbridge Drive, Stening Place and Schumacher Place are isolated, due to their location bordered by red zone on the north and east of the immediate neighbourhood. These 23 properties, plus the other green zone properties in Kingsbridge Drive and Flaxon Place are also isolated because the main access routes pass through about a 1km length of red zone. This isolation may have an adverse effect on community wellbeing of these residents.• Withheld under section 9(2)(a) |
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Withheld under section 9(2)(a)

RESOLVED:

1. **THAT** 23 properties at the eastern end of Kingsbridge Drive including Stening Place and Schumacher Place (see appendix 26) should be rezoned from green to red.

Reasons for Decision:

The Group agreed that 23 properties currently in the green zone at the eastern end of Kingsbridge Drive including Stening Place and Schumacher Place have experienced major lateral spreading which would require area wide works to enable rebuilding. These area-wide works have been assessed as being uncertain, disruptive, not timely or not cost effective therefore these properties meet the criteria to be zoned red.

2. **THAT** a recommendation be made to CCC to consider new access route for remaining properties in Kingsbridge Drive and Flaxon Place to reduce isolation.

Reasons for Decision:

The Group agreed that all other properties currently in the green TC3 zone in Kingsbridge Drive and Flaxon Place meet green zone criteria and the damage to these properties can be addressed on an individual basis. While the Group notes that they are isolated with access currently through the red zone, an alternative access route could be considered. There are 75 properties in the subdivision which is enough to sustain a working community in a similar way to how it has previously functioned therefore on balance there is not enough reason to make changes to the zoning in this case.

3. **THAT** 16 properties in Stour Drive (see appendix 25) should be rezoned from green to red.

Reasons for Decision:

The Group agreed that it is likely that it would be geotechnically feasible for the significant damage to these properties to be addressed on an individual basis and therefore these properties meet green zone criteria. However they are extremely isolated in terms of community and infrastructure, and therefore the group feel that they fall within the intent of the red zone criteria and on balance should be rezoned red.

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| | <p>4. THAT no other changes to zoning in East Burwood be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all other properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 7 - West New Brighton</p> | <p>The Group reviewed the key geotechnical issues for West New Brighton and the summary data (attached in appendix 10) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River to the south and the Anzac Drive wetlands to the west. Extensive very severe liquefaction has also occurred. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank and wetland edge) and significant area wide fill would be required to address the damage and future risk in these areas before repair and rebuilding of homes would be possible. • The property at [redacted] (back section) in the current red zone. The available geotechnical data indicates that the damage to this property is able to be addressed on an individual basis through the normal insurance process, without the need for area-wide works. • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction (e.g. Baker St and the neighbouring streets) or moderate local scale lateral ground movement. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas little evidence of liquefaction was observed at ground surface but in some areas minor ground cracking was observed. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>Other points of note:</p> <ul style="list-style-type: none"> • Significant damage has occurred to the 17 properties in the current |

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| | <p>green zone area at the south end of Wattle Drive and the west end of Willryan Ave. These properties are able to be repaired on an individual basis as outlined above, however due to their location bordered by red zone on all sides within the immediate neighbourhood, these properties are isolated which may have an adverse effect on infrastructure and community wellbeing.</p> <p>RESOLVED:</p> <p>1. <i>THAT</i> Withheld under section 9(2)(a) be rezoned from red to green.</p> <p>Reasons for Decision:</p> <p>Withheld under section 9(2)(a) The Group noted that the property at is the last property on the border of the red zone and has access through the green zone on Bower Avenue. It was agreed that the available geotechnical data shows that it can feasibly be repaired or rebuilt using TC3 foundation solutions through the normal insurance process therefore on balance it meets the criteria to be zoned green.</p> <p>2. <i>THAT</i> 17 properties in Wattle Drive and Willryan Ave (see appendix 25) should be rezoned from green to red.</p> <p>Reasons for Decision:</p> <p>The Group agreed that it is likely that it would be geotechnically feasible for the significant damage to these properties to be addressed on an individual basis and therefore these properties meet green zone criteria. However they are extremely isolated in terms of community and infrastructure, and therefore the group feel that they fall within the intent of the red zone criteria and on balance should be rezoned red.</p> <p>3. <i>THAT</i> no other changes to zoning in West New Brighton be recommended.</p> <p>Reasons for Decision:</p> <p>The group acknowledged that many green zone TC3 properties in this area have experienced significant damage from liquefaction and the resulting ground settlement. The geotechnical data shows that these green zone areas have not experienced large-scale lateral spreading and the damage to these properties can be addressed on an individual basis without the need for area-wide engineering works to be undertaken.</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as</p> |
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| | <p>being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all other properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 8 – Central North Christchurch</p> | <p>The Group reviewed the key geotechnical issues for Central North Christchurch and the summary data (attached in appendix 11) which showed that:</p> <ul style="list-style-type: none"> • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. near streams in Fendalton and St Albans). In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>RESOLVED:</p> <p>1. THAT no changes to zoning in Central North Christchurch be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 9 Edgeware to Avonside</p> | <p>The Group reviewed the key geotechnical issues for Edgeware to Avonside and the summary data (attached in appendix 12) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River. Large-scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank) would be required to address future risk in these areas before repair and rebuilding of homes would be |

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| | <p>possible.</p> <ul style="list-style-type: none">• In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or in some cases deep piles) are likely to be feasible to address damage on an individual property basis.• In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. alongside Dudley Creek). In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis.• In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis.• 6 properties at <i>Withheld under section 9(2)(a)</i> were previously zoned green however the available geotechnical data shows that this area has also experienced significant lateral spreading towards the Avon which would require area wide works to enable repair and rebuild to occur.• 17 properties in Swanns Road/River Road/Glade Ave were previously zoned green however the available geotechnical data shows that this area has also experienced significant lateral spreading towards the Avon River which is likely to require area wide works to enable repair and rebuild to occur. <p>Other points of note:</p> <p>Further geotechnical analysis was undertaken and reported back to the panel on the area between Swanns Road, River Road and Glade Ave.</p> <ul style="list-style-type: none">• The properties at <i>Withheld under section 9(2)(a)</i> are extremely isolated with their access solely through the red zone. This would require ongoing maintenance of severely damaged roading and other infrastructure. <p>RESOLVED: <i>Withheld under section 9(2)(a)</i></p> <p>1. THAT <i>should be rezoned from green to red.</i></p> <p>Reasons for Decision:</p> <p>The Group noted that the five properties at <i>Withheld under section 9(2)(a)</i> are on the border of the green zone. It agreed that further</p> |
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| | <p>consideration of the geotechnical data shows that area wide works are likely to be required to address future risk in these areas before repair and rebuilding of homes would be possible and therefore on balance these properties meet the criteria to be zoned red.</p> <p>2. THAT 23 properties in Swanns Road, River Road and Glade Avenue (see appendix 25) should be rezoned from green to red.</p> <p>Reasons for Decision:</p> <p>The Group agreed for 23 properties currently in the green zone in Swanns Road, River Road and Glade Avenue area wide works would be required to address the lateral spreading risk before repair or rebuilding of these properties would be possible. These area-wide works have been assessed as being uncertain, disruptive, not timely or not cost effective, and therefore these properties meet the criteria to be zoned red.</p> <p>3. THAT no other changes to zoning in Edgeware to Avonside be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all other properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 10 – North Dallington to Horseshoe Lake</p> | <p>The Group reviewed the key geotechnical issues for North Dallington to Horseshoe Lake and the summary data (attached in appendix 13) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River and Horseshoe Lake as well as extensive very severe liquefaction. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank) and significant area wide fill would be required to address future risk in these areas before repair and rebuilding of homes would be possible. • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. |

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- In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. De Ville Place). In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis.
- In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis.

Other points of note:

- 18 properties in Sutton Place (see appendix 14) are able to be repaired on an individual basis as outlined above, they are isolated with access currently through the red zone however alternative access could be considered by CCC.

RESOLVED:

1. **THAT** a recommendation is made to CCC to consider a new access route for remaining properties in Sutton Place to reduce their isolation.

Reasons for Decision:

The Group agreed that the 18 green zoned properties in Sutton Place meet the criteria to be zoned green. While the Group notes that they are isolated with access currently through the red zone, alternative access could be considered by CCC. There are enough homes here to sustain a working community and that the health and wellbeing of residents would not be adversely affected. On balance the group recommend that these properties remain green.

2. **THAT** no changes to zoning in Edgeware to Avonside be recommended.

Reasons for Decision:

The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.

The Group agreed that for all properties currently zoned green the

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| | geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis. |
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| <p>Area 11 – South Dallington</p> | <p>The Group reviewed the key geotechnical issues for South Dallington and the summary data (attached in appendix 15) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank) would be required to address future risk in these areas before repair and rebuilding of homes would be possible. • In the current green zone TC3 areas widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. Halberg Street, McBratneys Rd, Dallington Tce and Landy Street). In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. <p>Other points of note:</p> <ul style="list-style-type: none"> • Six properties in Porritt Place (see appendix 16) are able to be repaired on an individual basis as outlined above, however due to their location surrounded by and accessed solely through the red zone, these properties are extremely isolated which may have an adverse effect on community wellbeing. <p>RESOLVED:</p> <ol style="list-style-type: none"> 1. THAT six properties in Porritt Place (see appendix 25) be rezoned from green to red. <p>Reasons for Decision:</p> <p>The Group agreed that it is likely that it would be geotechnically feasible for the significant damage to these properties to be addressed on an individual basis and therefore these properties meet green zone criteria. However they are isolated in terms of community and infrastructure, and therefore the group feel that they fall within the intent of the red zone criteria and on balance should be rezoned red.</p> |
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| | <p>2. THAT no other changes to zoning in South Dallington are recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all other properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 12 – Avondale</p> | <p>The Group reviewed the key geotechnical issues for Avondale and the summary data (attached in appendix 17) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River as well as extensive very severe liquefaction. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank) and significant area wide fill would be required to address future risk in these areas before repair and rebuilding of homes would be possible. • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. • 10 properties in Briarmont Street, Hulverstone Drive, Orrick Crescent and Cowes Street, Avondale were previously zoned green however available geotechnical data shows that this area has also experienced significant lateral spreading towards the Avon River which is likely to require area wide works to enable repair and rebuild to occur. <p>Other points of note:</p> |

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| | <ul style="list-style-type: none"> • is zoned green with access through a long drive from Hulverstone Drive where all other surrounding properties are zoned red. • Further geotechnical analysis was undertaken and reported back to the panel on the area along the boundary line between Briarmont Street, Hulverstone Drive, Orrick Crescent and Cowes Street. An assessment was made of lateral ground displacements inferred from the LiDAR ground survey. This indicated that for dwellings which are set back at least 90m from the river's edge in this area damage can feasibly be addressed on an individual basis following the recommendations of the DBH TC3 guidance document. <p>RESOLVED:</p> <ol style="list-style-type: none"> 1. THAT 10 properties in Briarmont Street, Hulverstone Drive, Orrick Crescent and Cowes Street (see appendix 25) be rezoned from green to red. <p>Reasons for Decision:</p> <p>The Group agreed that 10 properties currently in the green zone in Briarmont Street, Hulverstone Drive, Orrick Crescent and Cowes Street bordering the current red zone have experienced major lateral spreading are likely to require area wide works to enable rebuilding. These area-wide works have been assessed as being uncertain, disruptive, not timely or not cost effective therefore these properties meet the criteria to be zoned red.</p> <ol style="list-style-type: none"> 2. THAT no other changes to zoning in Avondale be recommended. <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all other properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 13 – Wainoni to Aranui</p> | <p>The Group reviewed the key geotechnical issues for Wainoni to Aranui and the summary data (attached in appendix 18) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Avon River as well as major |

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| | <p>lateral ground movements in some areas of more steeply sloping ground at the edge of sand dune deposits. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the riverbank) and significant area wide fill and stabilisation of the steeply sloping sand dune edge would be required to address future risk in these areas before repair and rebuilding of homes would be possible.</p> <ul style="list-style-type: none"> • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>RESOLVED:</p> <ol style="list-style-type: none"> 1. THAT no changes to zoning in Wainoni to Aranui be recommended. <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 14 – South New Brighton</p> | <p>The Group reviewed the key geotechnical issues for South New Brighton and the summary data (attached in appendix 19) which showed that:</p> <ul style="list-style-type: none"> • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. |

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| | <ul style="list-style-type: none"> • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>RESOLVED:</p> <p>1. THAT no changes to zoning in South New Brighton be recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> |
| <p>Area 15 – Southshore to Redcliffs</p> | <p>The Group reviewed the key geotechnical issues for Southshore to Redcliffs and the summary data (attached in appendix 20) which showed that:</p> <ul style="list-style-type: none"> • The current red zone has experienced extensive moderate to severe large-scale lateral spreading towards the Estuary. Large scale deep perimeter works (10 metres deep and 20-40 metres wide along the full length of the estuary) and significant area wide fill would be required to address future risk in these areas before repair and rebuilding of homes would be possible. • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. some waterfront properties in Redcliffs and some properties west of Rocking Horse Rd and Pine Ave in Southshore). In these areas, two types of TC3 |

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| | <p>foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis.</p> <ul style="list-style-type: none"> • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>Other points of note discussed:</p> <ul style="list-style-type: none"> • The sea wall along the front of Beachville Road properties will be repaired by Christchurch City Council (CCC) providing additional stabilisation of the adjacent ground. This will make the process of rebuilding on an individual basis more efficient and effective. <p>RESOLVED:</p> <ol style="list-style-type: none"> 1. THAT no changes to zoning in Southshore to Redcliffs be recommended. <p>Reasons for Decision:</p> <p>The Group agreed that for all properties in the current red zone the geotechnical data shows that area wide works are likely to be required to enable land damage to be remediated. These works have been assessed as being uncertain, disruptive, not timely or cost effective therefore these properties meet red zone criteria.</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 16 – South West Christchurch</p> | <p>The Group reviewed the key geotechnical issues for South West Christchurch and the summary data (attached in appendix 21) which showed that:</p> <ul style="list-style-type: none"> • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction. In these areas, all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties (e.g. some properties close to waterways). In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction |

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| | <p>observed at the ground surface (such as ejected sand or ground cracking) generally ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis.</p> <p>RESOLVED:</p> <p>1. <i>THAT no changes to zoning in South West Christchurch be recommended.</i></p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |
| <p>Area 17 – South East Christchurch</p> | <p>The Group reviewed the key geotechnical issues for South East Christchurch and the summary data (attached in appendix 22) which showed that:</p> <ul style="list-style-type: none"> • In the current green zone TC3 areas, widespread moderate liquefaction has occurred with some properties experiencing severe liquefaction (e.g. parts of Woolston, Waltham and St Martins). In these areas all TC3 foundation solutions (site ground improvement, surface structures or deep piles) are likely to be feasible to address damage on an individual property basis. • In some green zone TC3 areas, moderate local scale lateral ground movements have occurred on some properties close to waterways. In these areas, two types of TC3 foundation solutions (site ground improvement or surface structures) are likely to be feasible to address damage on an individual property basis. • In the current green zone TC2 areas evidence of liquefaction observed at the ground surface (such as ejected sand or ground cracking) generally ranged from none to moderate. In these areas all TC2 type foundation solutions systems (robust raft slabs, deep piles or surface structures with shallow foundations) are likely to be feasible for rebuilding on an individual property basis. <p>RESOLVED:</p> <p>1. <i>THAT no changes to zoning in South East Christchurch be recommended.</i></p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green the geotechnical data shows that they meet green zone criteria as damage to</p> |

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| | these properties can feasibly be addressed on an individual basis. |
| <p>Other areas not mapped</p> | <p>There were 35 applications from property owners outside of the areas considered above (see appendix 2). In these cases EQC area-wide suburb technical fact sheets (see appendix 23) were examined by the Group, and it was agreed that there was no evidence of area-wide geotechnical issues in these locations</p> <p>RESOLVED:</p> <p>1. <i>THAT</i> no changes to zoning in these areas are recommended.</p> <p>Reasons for Decision:</p> <p>The Group agreed that for all properties currently zoned green, the geotechnical data shows that they meet green zone criteria as damage to these properties can feasibly be addressed on an individual basis.</p> |

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