Selwyn District Council

Natural Hazards District Plan Review

Managing Geotechnical Risk - NH003

December 2017

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1. Introduction

Selwyn District Council (SDC) has asked GHD Ltd, as part of the Panel Agreement for Supply of District Plan Review Advisory Services to undertake a review of the management of geotechnical risks across the district.

SDC currently manages geotechnical risk to land development through both the District Plan and section 106 of the Resource Management Act 1991 (RMA). The operative Selwyn District Plan contains some provisions relating to geotechnical risks. The operative district plan does not provide for any Fault Avoidance Zones as recommended in the Ministry for the Environment's guidance document, 'Planning for development of land on or close to active faults: A guideline to assist resource management planners in New Zealand'.

1.1 Scope of Work and Methodology

The project scope provided by SDC states that the Council currently manages geotechnical risk to land development through both the district plan policy and rule framework and s106 RMA. The specific tasks contained within the SDC scope include:

1. Kick-off meeting - to confirm expectations for the depth of analysis and information to be provided in the final written report.
2. Review of SDC operative district plan - targeted familiarisation of the operative Selwyn District Plan in respect to management of geotechnical risk provisions.
3. Review of approaches taken by neighbouring councils - review and summarise the approaches undertaken by Ashburton, Waimakariri, Hurunui District Councils and Christchurch City Council to their management of geotechnical risk.
4. Review the Mahaanui Iwi Management Plan in respect to its approach to the management of geotechnical risk.
5. Review Ministry for the Environment Guidance & other relevant reports/guidance - "Planning for development of land on or close to active faults: A guideline to assist resource management planners in New Zealand".
6. Review SDC earthworks rules in the operative district plan and those contained in the Canterbury Land and Water Regional Plan.
7. Cross-team liaison.
8. Gap Analysis -during review and summarising of the information in tasks 2 to 6, an analysis will be undertaken to determine gaps in the management of geotechnical risk that is not covered by legislation or regulations.
9. Final report.

1.2 Deliverables

The deliverable (this report) provides a review of the operative Selwyn District Plan provisions and comments on their appropriateness and efficiency together with the Council's use of s106 RMA to managing geotechnical risk. This includes discussion on:

- Liquefaction (of which lateral spread is a manifestation)
- Active faults and folds
- Land/slope stability

- Other geotechnical risks

It provides a summary of the approaches undertaken by Ashburton District, Waimakariri District, Hurunui District and Christchurch City to the management of geotechnical risk, with commentary on achievement of best practice approach, conformity with Ministry of Environment guidance and the extent to which consistency across territorial boundaries is achieved.

This report provides recommendations for an approach to management of geotechnical risk in Selwyn District including where additional geotechnical risk information might be needed to inform district plan provisions.

1.3 Definition of Natural Hazards

A hazard can be defined as "a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage" (United Nations International Strategy for Disaster Reduction (UNISDR)[1]).

"Natural hazards are predominantly associated with natural processes and phenomena" (UNISDR)[2]).

A natural hazard is defined in the New Zealand Resource Management Act 1991 (RMA) as *"any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment"***.**

1.4 Definition of Risk

Risk can be defined as *"the likelihood of a hazard multiplied by the consequences".*[3]

1.5 Governing Documents

The following legislation and documents are the governing documents that overarch the Council's approaches to managing natural hazards:

- Resource Management Act 1991
- Building Act 2004
- Building Regulations 2002
- Building Code
- Local Government Act 2002
- Local Government and Official Information and Meetings Act
- Soil Conservation and Rivers Control Act 1941
- Civil Defence Emergency Management Act 2002

District Plans are prepared under the Resource Management Act 1991.

There are a number of New Zealand Standards available and guidance documents, including:

- AS/NZS ISO 31000: 2009 Risk Management – Principles and Guidelines, November 2009

[1] http://www.unisdr.org/we/inform/terminology#letter-h
[2] http://www.unisdr.org/we/inform/terminology#letter-h
[3] *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines, November 2009.*

- SA/SNZ HB 436: Risk Management Guidelines – companion to AS/NZS ISO 31000: 2009
- Planning for development of land on or close to active faults: A guideline to assist resource management planners in New Zealand, Ministry for the Environment July 2003
- Ministry for Business Innovation and Employment Guidelines

Section 3 discusses the relevant legislation and documents in more detail.

2. Selwyn District

2.1 Location

Selwyn District stretches across the Canterbury plains and is bounded by the Rakaia and Waimakariri Rivers with Arthurs Pass National Park in the high Southern Alps to the west and the Pacific Ocean to the east (see Figure 1).

Figure 1 Selwyn District Council boundaries.[4]

2.2 Geological Setting

2.2.1 Geology

Selwyn District runs from the east coast south of Christchurch, northwest through to the Southern Alps, crossing the Canterbury Plains. As such the geology, geological units (numbering approximately 60 units across three different maps 1:250,000 geological maps[5][6][7]), natural hazards, geotechnical hazards are varied.

Yetton and McCahon[8] provide a summary of the geological units in the Selwyn District. Figure 3.6 in their report categorise all of the geological units in the district into seven (7) categories:

- Holocene alluvium (gravel dominated);

[4] https://www.selwyn.govt.nz/__data/assets/image/0006/35637/SelwynBoundaryA4_Web2.png
[5] Forsyth, R.J.; Barrell, D.JA.; Jongens, R. (compilers) 2008. Geology of the Christchurch area, scale 1:250,000. Institute of Geological and Nuclear Sciences geological map 16. 1 sheet + 67p. Lower Hutt, New Zealand: GNS Science
[6] Cox, S.C.; Barrell, D.JA. (compilers) 2007. Geology of the Aoraki area, scale 1:250,000. Institute of Geological and Nuclear Sciences geological map 15. 1 sheet + 71p. Lower Hutt, New Zealand: GNS Science
[7] Nathan, S.; Rattenbury, M.S.; Suggate, R.P. (compilers) 2002. Geology of the Greymouth area, scale 1:250,000. Institute of Geological and Nuclear Sciences geological map 12. 1 sheet + 58p. Lower Hutt, New Zealand: GNS Science
[8] Yetton, M.D.; McCahon, I.F. (2006, August) Selwyn District Engineering Lifelines Project – Earthquake Hazard Assessment, Environment Canterbury Report; U 06/7

- Holocene alluviuum (sand and silt dominated);
- Late Pleistocene alluvium;
- Middle – early Pleistocene alluvium and late Pleistocene moraine;
- Undifferentiated Tertiary sediments including small areas of late Cretaceous coal measures;
- Banks Peninsula volcanics and loess; and,
- Upper Palaezoic and Mesozoic greywacke and argillite with minor chert, volcanics and rate limestone beds (Torlesse Group).

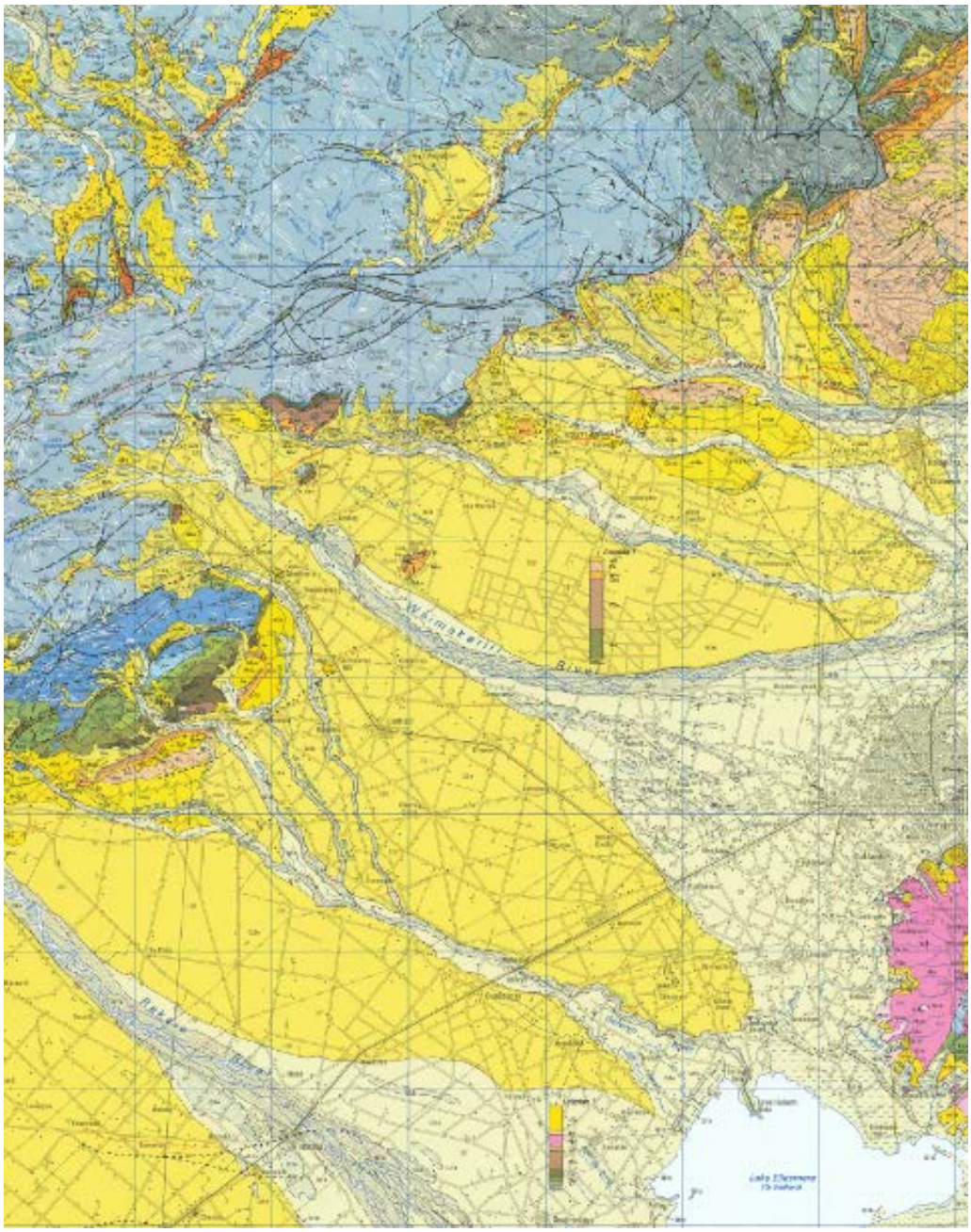


Figure 2 Extract of the Christchurch Geological Map[9]

[9] Forsyth, R.J.; Barrell, D.JA.; Jongens, R. (compilers) 2008. Geology of the Christchurch area, scale 1:250,000. Institute of Geological and Nuclear Sciences geological map 16. 1 sheet + 67p. Lower Hutt, New Zealand: GNS Science.

2.3 Geotechnical Hazards

As with all regions and districts across New Zealand, Selwyn District is vulnerable to a number of geotechnical hazards. The geotechnical hazards that could affect the District are:

- Earthquake induced fault (ground) rupture;
- Earthquake induced ground level changes;
- Earthquake induced ground shaking;
- Liquefaction (sand boils and lateral spreading);
- Slope instability;
- Compression or settlement of poor material; and,
- Compression or settlement of fill material as a result of no or ineffective design and/or construction practices;

2.3.1 Faults and seismicity

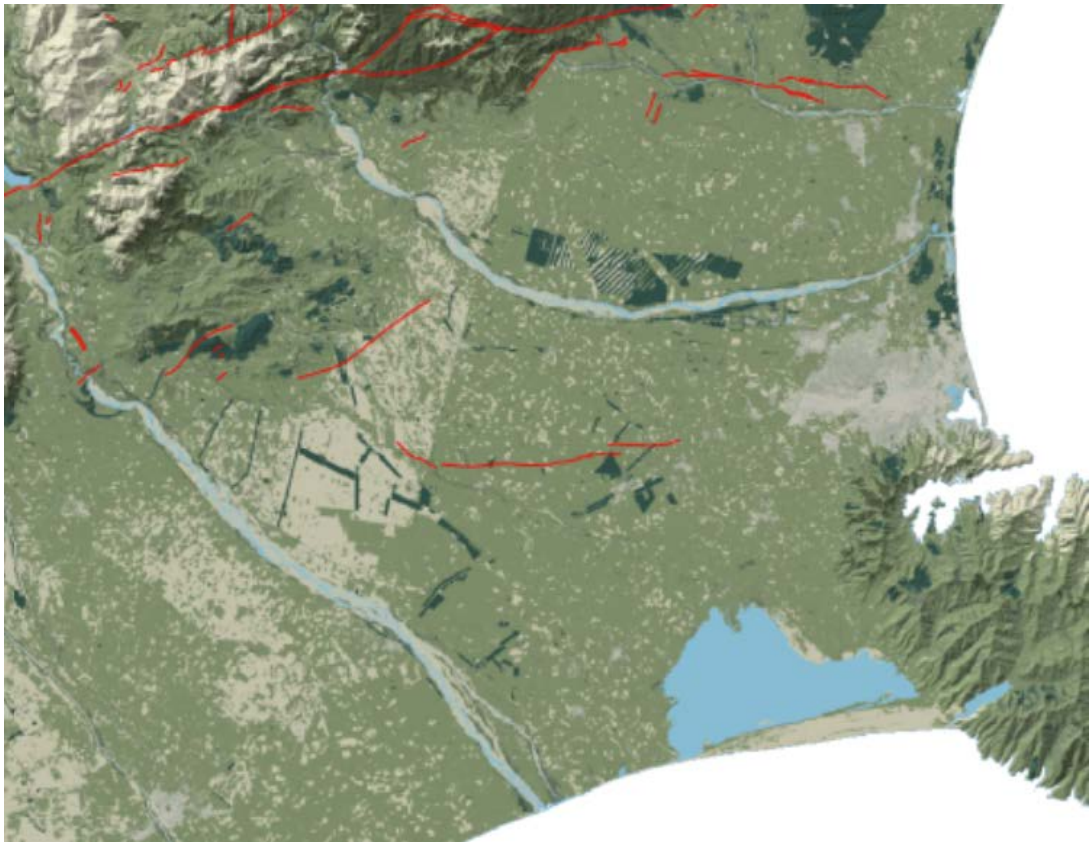


Figure 3 Active faults in the Selwyn District.[10]

The report on 'General distribution and characteristics of active faults and folds in the Selwyn District[11], has identified and mapped the active faults and folds in the District. In total, 24 areas of known or suspected active faults and/or folds are identified. The report also indicates the implied range of recurrence interval (RI) classes (see Table 1).

[10] Source GNS Active Faults Database http://data.gns.cri.nz/af/

[11] Barrell, D.J.A.; (2013, July) General distribution and characteristics of active faults and folds in the Selwyn District, North Canterbury, GNS Science Consultancy Report 2012/325 / Environment Canterbury Report, R13/27

Table 1 Approximate recurrence intervals for faults in the Selwyn District

RI Class Definitions	Number of Faults in Range
I ≤2,000 years to II ≤3,500 years	2
II >2,000 years to V ≤20,000 years	13
IV ≥5,000 years to VI ≤125,000 years	3
I ≤2,000 years to IV ≤10,000 years	2
III >3,000 years to VI ≤125,000 years	1
>VI ≥125,000 years	1
Unknown	2

The main active faults in Selwyn District are Greendale, Porters-Amberley, Torlesse and Esk, and Cheeseman.

In addition, the Alpine Fault is located approximately 15 km beyond the District's boundary (to the northwest). The Alpine Fault is a Class I[12] fault (≤2,000 years RI), with an estimated recurrence interval of approximately 340 years and capable to generating a magnitude 8.1 seismic event[13] which if occurs will negatively impact the Selwyn District region.

Geotechnical hazards as a result of seismic events can include:

- Ground rupture (from surface expression of the fault rupture);
- Ground level changes (large scale uplift or subsidence, or liquefaction induced);
- Ground shaking (can be intensified by soil type or topographical setting, or dampened by rock); and,
- Slope instability.

2.3.2 Ground Level Changes

Ground level changes can occur on a large ("global") scale because of large seismic events. Such changes have occurred in both the Kaikoura Earthquake of 2016 and the Canterbury Earthquake Sequence of 2010-2011.

2.3.3 Ground Shaking

Soft and loose material can amplify ground shaking, whereas denser materials, such as the gravels that cover a large portion of the District will neither amplify nor dampen. Harder basement rocks such as the Banks Peninsula volcanics and Torlesse Group rocks (as described in Section 2.2.1) dampen the ground shaking. However, certain topographical features such as ridgelines and the like can produce an effect known as topographical amplification despite being in hard rock.

[12] Institute of Geological Nuclear Sciences Client Report 2002/124, Planning for Development of Land on or Close to Active Faults – A guideline to assist resource management planners in New Zealand, 2003 June, produced for the Ministry for the Environment.
[13] Stirling, et al.; 2010. "National Seismic Hazard Model for New Zealand", *Bulletin of the Seismological Society of America*, Vol 102, No. 4, pp. 1514-1542

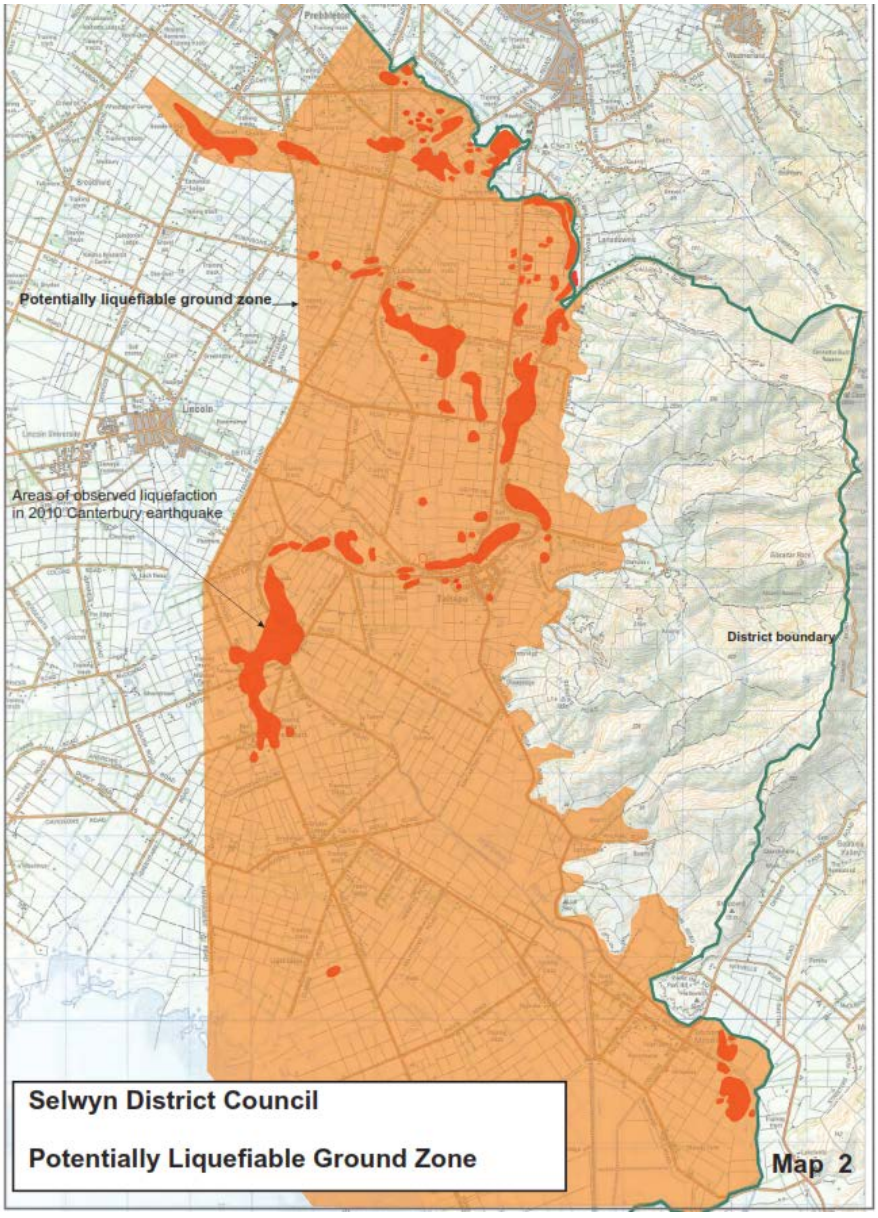
2.3.4 Liquefaction

High-level liquefaction assessments for the Selwyn District was carried out and covered by both Yetton and McCahon (2006)[14] and Yetton *et al*. (2011)[15]. The liquefaction hazard across the district is reliant upon the ground materials, groundwater levels and shaking intensity during earthquakes. There are often discrete areas away from large areas of susceptible ground due to local variances in geological and geomorphological processes.

The Yetton *et al.* 2011 report focuses on the areas that displayed liquefaction because of the Canterbury Earthquake Sequence (see Figure 4 and Figure 5).

The updated results closely correspond to Zone 1a of the 2006 report.

Figure 4 Potentially liquefiable ground in the Selwyn District[16]



[14] Yetton, M.D.; McCahon, I.F. (2006, August) Selwyn District Engineering Lifelines Project – Earthquake Hazard Assessment, Environment Canterbury Report; U 06/7

[15] Yetton, M.D.; Traylen,N.; McCahon, I.F. (2011, February) Selwyn District 2010 Canterbury Earthquake Liquefaction Report, Reference 3680, Version 05.6, Geotech Consulting Ltd

[16] Yetton, M.D.; Traylen,N.; McCahon, I.F. (2011, February) Selwyn District 2010 Canterbury Earthquake Liquefaction Report, Reference 3680, Version 05.6, Geotech Consulting Ltd

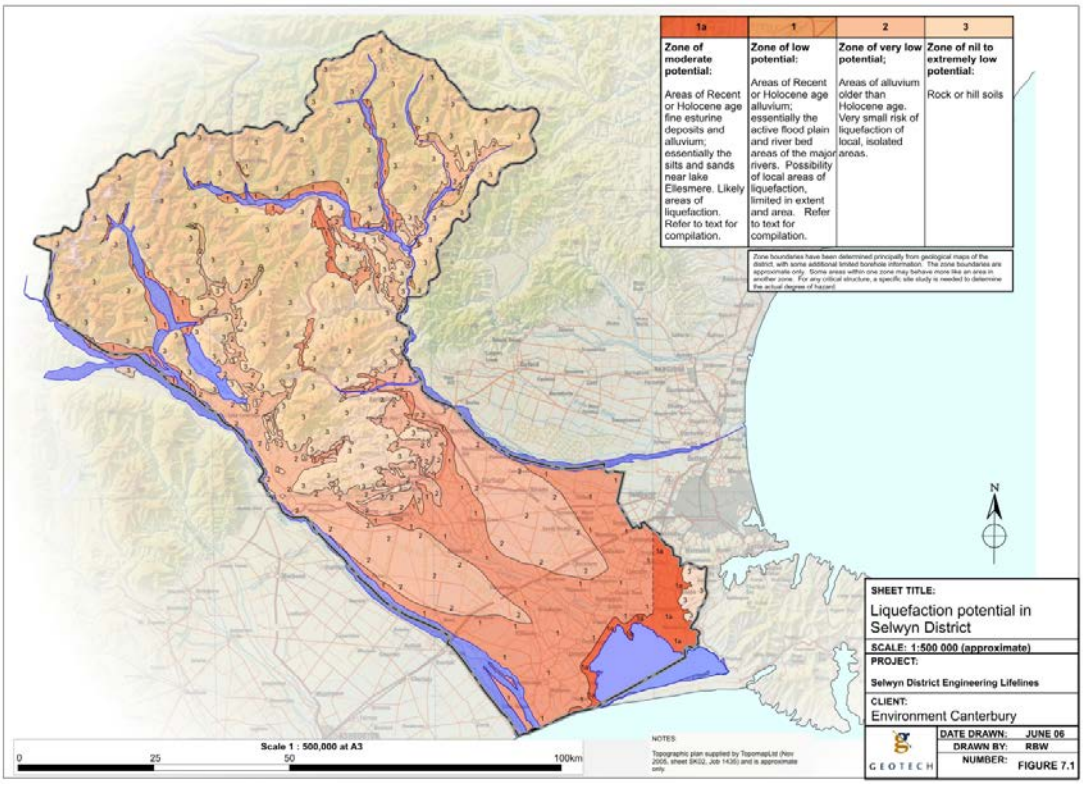


Figure 5 Liquefaction potential in the Selwyn District[17]

A report commissioned by Environment Canterbury in 2012[18] provides the most recent detailed understanding and investigation into liquefiable land in Eastern Canterbury (including the Selwyn District). It reviews existing knowledge regarding liquefaction hazard drawing upon the observed effects from the Canterbury Earthquakes, the resulting engineering and legislative responses, and the state of knowledge of near-surface geological materials that underlie the eastern Canterbury area.

The mapping in the report distinguishes land that may be susceptible to damaging effects of earthquake-induced liquefaction (including lateral spreading) from land where liquefaction damage is unlikely in future earthquakes.

The report states that standard foundation investigations (as specified in NZS3604) will normally be adequate for residential construction in the "damaging liquefaction unlikely" zone[19]. The important conclusion from this is that the overall risk of damage in this zone from liquefaction is considered to be low.

A map is provided which delineates much of the District to be in an area where damage from liquefaction is considered to be "unlikely" and shows the eastern-most part of the District where "liquefaction assessment needed" (Figure 6).

It is noted that the project area covered by this report is only part of Selwyn District. However, to the extent that the lines on the map produced can be translated with accuracy on to the Selwyn District Planning Maps, this information is useful for land use planning purposes and potentially

[17] Yetton, M.D.; McCahon, I.F. (2006, August) Selwyn District Engineering Lifelines Project – Earthquake Hazard Assessment, Environment Canterbury Report; U 06/7

[18] Review of Liquefaction Hazard in Eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts (ECan report R12/83 – December 2012)

[19] Review of Liquefaction Hazard in Eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts (ECan report R12/83 – December 2012) – page 7.

for inclusion in the District Plan Review planning maps (a GIS layer at a higher resolution is available from Environment Canterbury).

Liquefaction potential for the most of the District was classed as nil, very low, or low in an earlier map produced by Yetton and McCahon (2006) and shown in Figure 5 above (2006). Only the low-lying areas around Banks Peninsula and Lake Ellesmere were considered to have moderate liquefaction susceptibility, with the boundaries not being precisely located. The report notes that given the complex sedimentary environment the boundaries between the zones are likely to be more variable than shown on the map with "tongues" of gravel (lower susceptibility) extending into silt-dominated sediments (higher susceptibility). The separation of low-risk from moderate risk is essentially the distinction between lowland and swamp soils, as distinct from the gravelly soils of the Waimakariri fan, and coincides with the western extent of flood ponding in the Tai Tapu/Greenpark area).

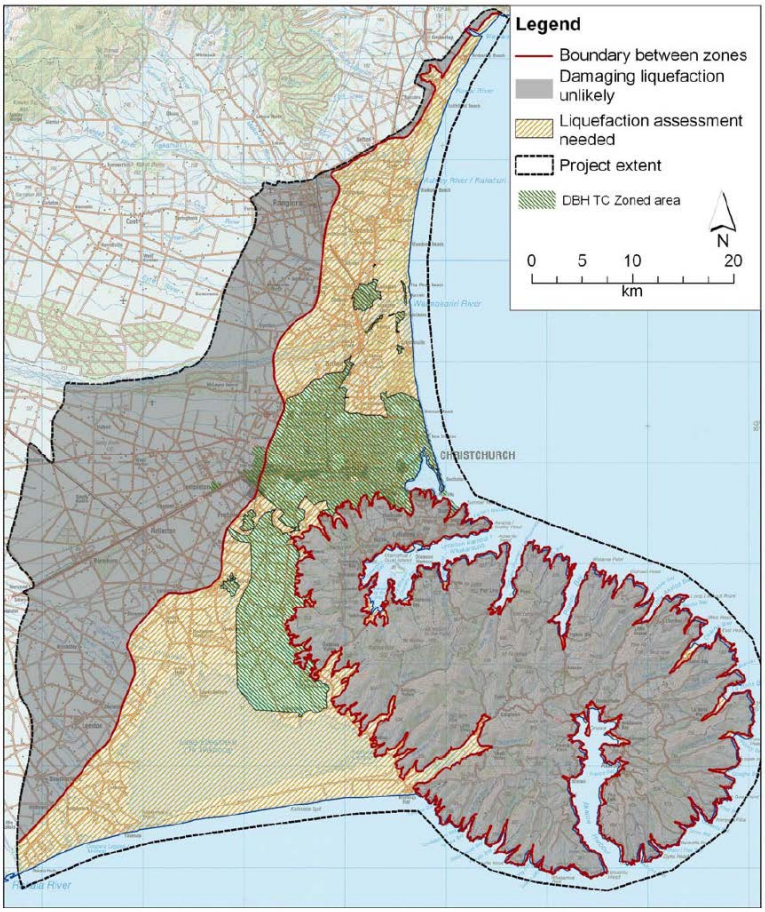


Figure 2.1 Liquefaction assessment area map for the eastern Canterbury project area. Liquefaction susceptibility is categorised in two areas, "damaging liquefaction unlikely" and "liquefaction assessment needed". The area covered by DBH Technical Categories at the time of this report is excluded.

Figure 6 Liquefaction Assessment Area Map for Eastern Canterbury [20]

[20] Review of Liquefaction Hazard in Eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts (ECan report R12/83 – December 2012)

2.3.5 Slope Stability

A large proportion of the District occupies the Canterbury Plains; however, the north-western area of the District occupies the foothills and mountains of the Southern Alps and a small portion of the Port Hills (Banks Peninsula) in the east also lies within the District.

Arthurs Pass Village has recently been assessed by Environment Canterbury in their report dated August 2016 (Arthurs Pass Village Slope Stability Assessment, Golder Associates, August 2016). This concluded that the village is susceptible to slope instability processes.

Yetton and McCahon (2006) provided a high-level district wide map of potential earthquake induced slope stability zones (see Figure 7).

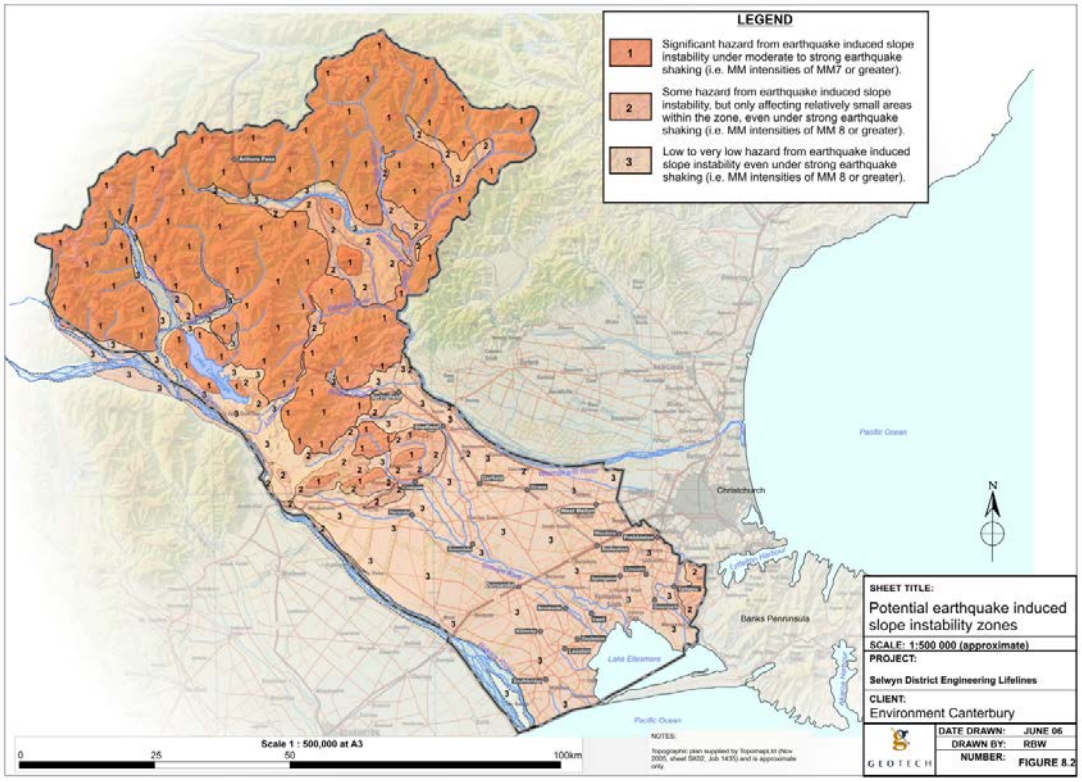


Figure 7 Potential earthquake induced slope stability zones[21]

2.3.6 Fill Material

Numerous areas within the District have been altered by human activity. Most are small local scale changes but some are large enough to be recorded on the geological maps. These areas include material placed for engineering works including reclaimed lands, stopbanks, river diversions, and compacted landfill refuse, areas of material or excavated ground for hydroelectric dams and canals, dredge tailings, sluiced ground, and other deposits of human origin. The likelihood of fill material being present is increased around urban or settled areas. Some fill materials are designed and placed as part of engineering works, and if appropriately designed should have a low or negligible potential to be soft, compressible, or unstable. Some fill materials will have been placed over materials of insufficient bearing which can cause geotechnical issues. Other fill materials will be from either unsuitable materials or unable to meet current increases in code requirements.

[21] Yetton, M.D.; McCahon, I.F. (2006, August) Selwyn District Engineering Lifelines Project – Earthquake Hazard Assessment, Environment Canterbury Report; U 06/7

3. Key Documents

3.1 Resource Management Act (1991)

3.1.1 Overview

The Resource Management Act 1991 (RMA) is one of the key pieces of legislation used to manage natural hazards in New Zealand. Section 2.1 outlined the definition of natural hazards in the RMA. Also of significance is the recent amendment to the RMA which elevated the management of significant risks from natural hazards to a matter of national importance (Section 6h).

3.1.2 Section 106

The relevant section of the RMA specific to subdivision consents and natural hazards is Section 106 and is outlined below.

Section 106 Consent authority may refuse subdivision consent in certain circumstances[22]

(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—

(a) there is a significant risk from natural hazards; or

(b) [Repealed]

(c) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.

(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of—

(a) the likelihood of natural hazards occurring (whether individually or in combination); and

(b) the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and

(c) any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

(2) *Conditions under subsection (1) must be—*

(a) for the purposes of avoiding, remedying, or mitigating the effects referred to in subsection (1); and

(b) of a type that could be imposed under section 108.

3.1.3 Functions of regional and district councils

Section 30 of the RMA lists the functions of regional councils. They include:

(1) Every regional council shall have the following functions for the purpose of giving effect to this Act in its region:

(c) the control of the use of land for the purpose of—

(iv) the avoidance or mitigation of natural hazards:

[22] http://www.legislation.govt.nz/act/public/1991/0069/latest/DLM234389.html includes updates from 18 October 2017

(d) *in respect of any coastal marine area in the region, the control (in conjunction with the Minister of Conservation) of—*

(v) *any actual or potential effects of the use, development, or protection of land, including the avoidance or mitigation of natural hazards:*

(g) *in relation to any bed of a water body, the control of the introduction or planting of any plant in, on, or under that land, for the purpose of—*

(iv) *the avoidance or mitigation of natural hazards:*

Section 31 of the RMA lists the functions of territorial councils. They include:

(1) *Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:*

(b) *the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of*

(i) *the avoidance or mitigation of natural hazards;*

These two functions of regional councils and territorial authorities overlap and the regional councils are required by Section 62 (1) (i) of the RMA to specify the respective roles for the control of the use of land in respect to natural hazards.

A primary means of exercising these functions is through regional policy statements, and regional and district plans (sections 62, 67, and 75). A discussion of the Selwyn District Plan and the district plans of adjoining territorial authorities in respect to managing geotechnical risk is provided in Sections 4 & 5.

3.2 Building Act 2004[23]

The Building Act manages natural hazards in relation to the construction and modification of buildings. The Act governs the building sector and also sets out the rules for the construction, alteration, demolition and maintenance of new and existing buildings in New Zealand. It works alongside other legislation for health, safety, consumer protection and land use. Relevant sections of the Building Act 2004 that relate to natural hazards are discussed below.

3.2.1 Purposes

The Building Act has the following purposes:

Section 3 Purposes

(a) *to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings to ensure that—*

(i) *people who use buildings can do so safely and without endangering their health; and*

(ii) *buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them; and*

(iii) *people who use a building can escape from the building if it is on fire; and*

(iv) *buildings are designed, constructed, and able to be used in ways that promote sustainable development:*

[23] http://www.legislation.govt.nz/act/public/2004/0072/latest/DLM306036.html

(b) to promote the accountability of owners, designers, builders, and building consent authorities who have responsibilities for ensuring that building work complies with the building code.

3.2.2 Building on land subject to natural hazards

Section 71(1) of the Building Act requires the territorial authority to refuse a building consent for building work if the land is subject to one or more natural hazards.[24] The Building Act also stipulates the circumstances when the consent authority must grant a building consent on land subject to natural hazards (Section 72) and make provision for a notice to be placed on the title of the land identifying the natural hazard (Section 73).

Section 71 - Building on land subject to natural hazards

(1) A building consent authority must refuse to grant a building consent for construction of a building, or major alterations to a building, if—

(a) the land on which the building work is to be carried out is subject or is likely to be subject to 1 or more natural hazards; or

(b) the building work is likely to accelerate, worsen, or result in a natural hazard on that land or any other property.

(2) Subsection (1) does not apply if the building consent authority is satisfied that adequate provision has been or will be made to—

(a) protect the land, building work, or other property referred to in that subsection from the natural hazard or hazards; or

(b) restore any damage to that land or other property as a result of the building work.

(3) In this section and sections 72 to 74, natural hazard means any of the following:

(a) erosion (including coastal erosion, bank erosion, and sheet erosion):

(b) falling debris (including soil, rock, snow, and ice):

(c) subsidence:

(d) inundation (including flooding, overland flow, storm surge, tidal effects, and ponding):

(e) slippage.

Section 72 - Building consent for building on land subject to natural hazards must be granted in certain cases

Despite section 71, a building consent authority that is a territorial authority must grant a building consent if the building consent authority considers that—

(a) the building work to which an application for a building consent relates will not accelerate, worsen, or result in a natural hazard on the land on which the building work is to be carried out or any other property; and

(b) the land is subject or is likely to be subject to 1 or more natural hazards; and

(c) it is reasonable to grant a waiver or modification of the building code in respect of the natural hazard concerned.

[24] Managing Natural Hazard Risk in New Zealand – Towards More Resilient Communities – A think piece for local and central government and others with a role in managing natural hazards, October 2014, LGNZ and Regional Councils

Section 73 - Conditions on building consents granted under section 72

(1) A building consent authority that is a territorial authority that grants a building consent under section 72 must include, as a condition of the consent, that the building consent authority will, on issuing the consent, notify the consent to,—

(a) in the case of an application made by, or on behalf of, the Crown, the appropriate Minister and the Surveyor-General; and

(b) in the case of an application made by, or on behalf of, the owners of Māori land, the Registrar of the Maori Land Court; and

(c) in any other case, the Registrar-General of Land.

(2) The notification under subsection (1)(a) or (b) must be accompanied by a copy of any project information memorandum that has been issued and that relates to the building consent in question.

(3) The notification under subsection (1)(c) must identify the natural hazard concerned.

3.3 Building Regulations 1992[25] and Amendments

The Building Code is contained within Schedule 1 of the Building Regulations 1992. It sets the performance standards that all building work must meet, even if it does not need a building consent. This ensures buildings are safe, healthy and durable for everyone who may use them[26].

Plans and specifications are assessed by building consent authorities, usually the council, to ensure the proposed building work will comply with the Building Code. When the building consent authority is satisfied, it will issue a building consent for the work to proceed. If the work is built to the consented plans and receives a code compliance certificate, it confirms the requirements of the Building Code have been met.

3.3.1 The Building Code

The Building Act requires new buildings to meet the performance requirements of the building Code which are designed to protect against certain hazards such as ground shaking.[27]

Section 3 Building code

(1) In accordance with Part 6 of the Act, the building code shall be the building code set out in Schedule 1.

(2) Except as otherwise provided by the Act, each building shall achieve the performance criteria specified in the building code for the classified use of that building, and, if the building has more than 1 classified use, any part of it used for more than 1 classified use shall achieve the performance criteria for each such classified use.

(3) The classified use or uses of a building or part of a building shall be the ones that most closely correspond to the intended use or uses of that building or part of that building

[25] http://www.legislation.govt.nz/regulation/public/1992/0150/latest/DLM162570.html?search=sw_096be8ed815ad9d6_code_25_se&p=1#DLM162576

[26] https://www.building.govt.nz/building-code-compliance/

[27] Managing Natural Hazard Risk in New Zealand – Towards More Resilient Communities – A think piece for local and central government and others with a role in managing natural hazards, October 2014, LGNZ and Regional Councils

These provisions have further relevance in Section 5 when discussing the use of the term "building of importance" use in some provisions in district plans managing seismic and other geotechnical risk.

3.4 The Local Government Act 2002[28]

Section 10 of the Local Government Act 2002 (LGA) outlines its purpose being to enable democratic decision-making for communities and meet the current and future needs of communities for good quality local infrastructure, local public services, and performance of regulatory functions in a cost effective manner. In undertaking this role, local authorities are required to provide for the avoidance or mitigation of natural hazards (Section 11A (d)):

Section 11A Core services to be considered in performing role

In performing its role, a local authority must have particular regard to the contribution that the following core services make to its communities:

(a) network infrastructure:

(b) public transport services:

(c) solid waste collection and disposal:

(d) the avoidance or mitigation of natural hazards:

(e) libraries, museums, reserves, and other recreational facilities and community amenities.

In addition, a key requirement of the LGA is to prepare long term plans. Section 101A of the LGA states that as part of their LTP local authorities must prepare financial strategies including a requirement for asset management planning (i.e. what the expected capital expenditure for network infrastructure, flood protection and flood control works is to maintain existing levels of service). Through the LTP and asset management planning process, local authorities must make decisions about what level of natural hazard protection their assets are to provide (in the case of flood protection works) or what level of event they are to withstand (in the case of network infrastructure).

A local authority must, as part of its long-term plan, prepare and adopt an infrastructure strategy for a period of at least 30 consecutive financial years.

Section 101B (3)(e) requires the Infrastructure Strategy specifically to provide for the resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.

An amendment to the LGA 2002 (passed in August 2014) requires a separate infrastructure strategy for a period of at least 30 consecutive financial years. It also requires explicit consideration of the resilience of infrastructure in the event of natural disasters and the identification and management of risks relating to such disasters, and the making of appropriate financial provision for those risks.[29]

3.5 Civil Defence Emergency Management Act 2002[30]

The purpose of this Act is outlined below:

Section 3 Purpose

[28] http://www.legislation.govt.nz/act/public/2002/0084/167.0/DLM170873.html

[29] Managing Natural Hazard Risk in New Zealand – Towards More Resilient Communities – A think piece for local and central government and others with a role in managing natural hazards, October 2014, LGNZ and Regional Councils

[30] http://www.legislation.govt.nz/act/public/2002/0033/latest/DLM149789.html?search=ta_act_C_ac%40ainf%40anif_an%40bn%40rn_25_a&p=4#DLM149794

(a) *improve and promote the sustainable management of hazards (as that term is defined in this Act) in a way that contributes to the social, economic, cultural, and environmental well-being and safety of the public and also to the protection of property; and*

(b) *encourage and enable communities to achieve acceptable levels of risk (as that term is defined in this Act), including, without limitation,—*

(i) *identifying, assessing, and managing risks; and*

(ii) *consulting and communicating about risks; and*

(iii) *identifying and implementing cost-effective risk reduction; and*

(iv) *monitoring and reviewing the process; and*

(c) *provide for planning and preparation for emergencies and for response and recovery in the event of an emergency; and*

(d) *require local authorities to co-ordinate, through regional groups, planning, programmes, and activities related to civil defence emergency management across the areas of reduction, readiness, response, and recovery, and encourage co-operation and joint action within those regional groups; and*

(e) *provide a basis for the integration of national and local civil defence emergency management planning and activity through the alignment of local planning with a national strategy and national plan; and*

(f) *encourage the co-ordination of emergency management, planning, and activities related to civil defence emergency management across the wide range of agencies and organisations preventing or managing emergencies under this Act and the Acts listed in section 17(3).*

The Civil Defence Emergency Management Act is framed around the "four R's" being:

- reduction of risk;
- readiness for an event;
- response when an event occurs and;
- recovery post event.

The Civil Defence Emergency Management Act works alongside the RMA, the Building Act, and the LGA to reduce risk, decrease vulnerability and increase resilience in respect to life-line infrastructure, community facilities and individual preparedness.

3.6 Guidance from Ministry for Environment (Planning for development of land on or close to active faults)[31]

This guidance is concerned with the avoidance and mitigation of risk arising from active fault rupture. It emphasises the need for a risk-based approach to planning for land use on and near active faults. It recommends that councils:

1. Identify active faults in their district, with maps that are at the right scale for the purpose.
2. Create fault hazard avoidance zones on their district planning maps.

[31]Institute of Geological Nuclear Sciences Client Report 2002/124, Planning for Development of Land on or Close to Active Faults – A guideline to assist resource management planners in New Zealand, 2003 June, produced for the Ministry for the Environment.

3. Evaluate the fault rupture hazard risk within each fault avoidance zone.
4. Avoid building within fault hazard avoidance zones where possible.
5. Mitigate the fault rupture hazard when building has taken place or will take place within a Fault hazard avoidance zone.

The main elements of the risk-based approach are:

1. The fault recurrence interval, which is an indicator of the likelihood of a fault rupturing in the near future
2. The fault complexity, which establishes the distribution and deformation of land around a fault line
3. The Building Importance Category (from NZS 1170), which indicates the acceptable level of risk of different types of buildings within a fault avoidance zone.

If there are faults and there are no specific provisions in the District Plan regarding the use and development of land on or close to an active faults then this guidance assists planners and decision-makers to take a risk-based approach to establishing fault avoidance zones and developing new provisions.

3.7 Mahaanui Iwi Management Plan

The Mahaanui Iwi Management Plan (2013) (MIMP) provides policy framework for the protection and enhancement of Ngāi Tahu values and for achieving outcomes that provide for the relationship of Ngāi Tahu with natural resources across mid Canterbury.

The MIMP is the culmination of 3 years of collaborative work by the six Rūnanga for the area between Hurunui River and Hakatere being:

- Ngāi Tūāhuriri Rūnanga
- Te Hapū o Ngāti Wheke (Rāpaki)
- Te Rūnanga o Koukourārata
- Ōnuku Rūnanga
- Wairewa Rūnanga
- Te Taumutu Rūnanga

The relevant Runanga for Selwyn District are:

- Te Taumutu Rūnanga
- Ngāi Tūāhuriri Rūnanga

The MIMP is endorsed by Ngāi Tahu as the Iwi Authority and as such, is a relevant policy document under the RMA and includes a range of relevant objectives and policies that should be considered in the development of provisions within Selwyn.

The relevant policy guidance or outcomes anticipated in the Mahaanui Iwi Management Plan (2013) in respect to managing geotechnical risk (including climate change) specific to Selwyn District matters are outlined in Table 2:

Table 2 Geotechnical Hazard Risk Provisions of the Mahaanui Iwi Management Plan 2013

Coastal Erosion		
Objectives	Policy	Commentary
5.6(8) Coastal cultural landscapes and seascapes are protected from inappropriate use and development	TAN6.4 To require that Ngāi Tahu cultural and historic heritage sites are protected from: • Inappropriate coastal land use, subdivision and development; • Inappropriate structures and activities in the coastal marine area; • Inappropriate activities in the marine environment, including discharges; and • Coastal erosion.	Effects of coastal erosion on cultural sites of significance is identified in this policy would also relate to the Cultural Landscapes/Sites of Significance and coastal environment chapters of the plan.
	TAN7.3 To require a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown or poorly understood.	
	TW10.1 To encourage research on the nature, extent and effects of coastal erosion on the Te Waihora and Taumutu coastline, in particular: (a) An analysis of historical data, including maps, aerial photos and Ngāi Tahu oral history, to improve understandings of changes to the Taumutu coastline over time, including Te Koru; (b) Relationship between changes to the volume and size of sediment being transported down the Rakaia River, due to low flows, and erosion of the Taumutu coastline; (c) Relationship between coastal erosion and lake opening activities: are lake opening activities affecting erosion rates and will erosion rates necessitate a change in the location of the opening; and	Particular focus on coastal erosion in relation to Te Waihora and Taumutu. Coastal erosion is identified in the IMP in regards to the effects on ancestral sites.

	(d) The potential risk to sites of significance, including the Hone Wetere Church and urupā as a consequence of coastal erosion processes.	
Climate Change and Sea level Rise		
Objectives	Policy	Commentary
5.6(2) The role of tangata whenua as kaitiaki of the coastal environment and sea is recognised and provided for in coastal and marine management.	R3.3 To require that local authorities recognise and provide for the potential effects of climate change on resources and values of importance to Ngāi Tahu, for example: (a) Effects of sea level rise on coastal marae and coastal wāhi tapu, including urupā;	Recognises that sea level rise may impact on coastal sites of cultural significance.
	TW4.3 To work with local authorities and the Department of Conservation to address the effects of lake margin land use and settlement on the cultural health of Te Waihora by: (e) Prohibiting activities such as creation and use of offal pits, establishment of lifestyle block developments, and permanent settlement on lake margin land below 1.8 m above sea level.	Relates to Te Waihora but also relates to area of Selwyn coastline.

Consultation with Mahaanui Kurataiao Limited will be required through-out the plan drafting process to further this discussion to interpret/apply these provisions.

4. The Approach to Managing Geotechnical Risk in Selwyn District

4.1 Overview

The Selwyn District Council's current approach to managing geotechnical risk is based on a combination of provisions in the Selwyn District Plan, use of Section 106 of the RMA for assessing subdivision applications and requiring geotechnical assessments at that point, and use of the Building Act 2004 once subdivision has occurred. It is understood that this approach has been relatively successful in the district to date, with few issues of concern raised. The approach is described in more detail below.

4.2 The Operative Selwyn District Plan

The following section briefly outlines the operative Selwyn District Plan provisions. The operative Selwyn District Plan (SDP) is divided into two volumes, the Township Volume and the Rural Volume. Both volumes are relevant to the management of geotechnical risk in the District.

4.2.1 Township Issues, Objectives and Policies

B1.1 Land and Soil Issues

The main issues identified in the plan in respect to land and soil relevant to geotechnical risk are:

- activities that create unstable land, and
- loss of soil through soil erosion (dealt with in the Rural Volume)

The land and soil strategy of the Selwyn District Plan with respect to *unstable land* states that:

- Avoid creating unstable land in the first place by controlling large scale earthworks or earthworks on slopes.
- Keep and update a register of potentially unstable sites, and record that information on LIMs.
- Use powers under the Building Act 2004 to control erecting buildings and structures on unstable land.

'Unstable Land' is defined in the Selwyn District Plan as

"land which is susceptible to erosion, slipping, subsidence, liquefaction or other forms of movement or settling. Unstable land may occur naturally – due to the composition of materials or slope of the land; or artificially – by people digging holes or removing material and not stabilising or filling the area properly. Unstable slopes may also be created by removing or changing vegetation cover."

Areas in or adjoining townships which are known to be prone to naturally occurring slips or erosion are addressed in Sections B3.1, Natural Hazards, and B4.3, Residential and Business Development.

The Selwyn District Plan's natural hazards strategy includes minimising loss of life and property damage through Civil Defence for district-wide natural hazards, and or avoidance and mitigation of natural hazards on a local level.

The district plan provides for engineering solutions to reduce the effects of natural hazards including, providing for the operation and maintenance of structures and for the mitigation of adverse effects on the environment from establishing and operating mitigation structures/works.

The three natural hazards objectives are:

- *Objective B3.1.1 - Ensure activities do not lead to or intensify the effects of natural hazards.*
- *Objective B3.1.2 - Ensure potential loss of life or damage to property from natural hazards is mitigated.*
- *Objective B3.1.3 - Ensure methods to mitigate natural hazards do not create or exacerbate adverse effects on other people or the environment.*

The four natural hazards policies are:

- *Policy B3.1.1*

  Promote awareness among residents in Selwyn District of the potential for a district-wide natural hazard, and how to respond to minimise loss of life and damage to property.

- *Policy B3.1.2 –*

  Avoid allowing new residential or business development in areas known to be vulnerable to a natural hazard, unless any potential risk of loss of life or damage to property is adequately mitigated.

- *Policy B3.1.6*

  Ensure any measures proposed to mitigate a potential natural hazard:

  - *Do not lead to or intensify a potential natural hazard elsewhere; and*
  - *That any other adverse effects on the environment are avoided, remedied or mitigated.*

- *Policy B3.1.8*

  Continue to develop the information base on the location and characteristics of natural hazards in Selwyn District.

The Council uses these objectives and policies to assess plan changes to rezone new residential and business development within townships and as a framework for rules.

4.2.2 Township Rules

There are few rules in the Township Volume specifically addressing geotechnical natural hazards. The rules focus largely on subdivision and to a lesser extent the earthworks rules to manage geotechnical hazard. However, it is noted that the waterway setbacks (Rule 4.15) have a role in safeguarding bank stability adjacent to waterbodies.

There are no specific natural hazard rules relating to geotechnical matters in the subdivision section. However, given all subdivisions (except boundary adjustments and access/reserve/utility lots) require a resource consent (as a restricted discretionary activity as a minimum) Rule 12.1.4.12 and 12.1.4.13 in the matters the Council will exercise its discretion over apply:

Geotechnical Assessment

12.1.4.12 The outcome of a comprehensive geotechnical investigation and assessment to assess the risk of liquefaction and lateral spread undertaken in accordance with the most recent NZ Geotechnical Society Guidelines or New Zealand Standard; or an

equivalent guideline/standard adopted by the District Council or the New Zealand Government. Where such a hazard is identified, the development shall be designed and constructed to ensure that the magnitude of any liquefaction ground damage and/or lateral spread is reduced to below acceptable levels for both SLS(serviceability limit state) and ULS (ultimate limit state) seismic events. This shall take into consideration potential impacts on land, properties, utility services, roading, buildings and houses.

12.1.4.13 The method(s) by which prospective purchasers of allotments are to be informed of any fiscal obligations or geotechnical constraints arising from the geotechnical assessment.

This would imply that the Council will require a geotechnical investigation and assessment for every subdivision. However, it is noted that, in practice, not all subdivisions are required to provide a geotechnical assessment as indicated in the analysis of other methods outlined below.

4.2.3 Rural Volume Issues, objectives and policies

Like the Township Volume, unstable land and soil erosion are recognised as important issues in the Land and Soil section (B1.1). However, there is also recognition that the Port Hills are susceptible to accelerated erosion because of steep slopes, the loess soils and removal of bush and forest cover. The objectives and policies defer to the Natural Hazards Section, where the key objectives are:

- *Objective B3.1.1 - Activities do not cause or exacerbate natural hazards*.
- *Objective B3.1.2 - Measures to mitigate natural hazards do not cause or exacerbate adverse effects on the environment*

The policies relevant to geotechnical risk include:

- *Policy B3.1.6*

  Avoid multi-storey buildings and critical facilities in the Malvern Hills or High Country

- *Policy B3.1.7*

  Ensure the risk of damage from avalanche, earthquakes or slips is minor when locating buildings, other structures or recreational facilities at high altitudes or on steep slopes.

- *Policy B3.1.8*

  Ensure any measures proposed to mitigate a potential natural hazard:

  - *Do not lead to or intensify a potential natural hazard elsewhere; and*
  - *Any other adverse effects on the environment being avoided, remedied or mitigated.*

- *Policy B3.1.9*

  Continue to develop the information base on the location and characteristics of potential natural hazards in Selwyn District.

4.2.4 Rural Volume Rules

The rule framework for managing geotechnical risk is similar in approach to the Township Volume, relying heavily on the subdivision rules and to a lesser extent on the earthworks rules. However, there are additional provisions that require a geotechnical assessment which have been included in the rules for building in Outstanding Landscape Areas and Visual Amenity Landscapes.

Under Rule 3.2 Buildings and Outstanding Landscape Areas, the erection, addition, alteration or modification of a dwelling shown on the planning maps as a Visual Amenity Landscape (VAL – lower Port Hills slopes) are a controlled activity. The matters of control include:

3.2.3.2 The appropriateness of the building site and its access having regard to geotechnical conditions and site stability;

Buildings over 40m^2, and exceeding a height of 4m, in the Outstanding Landscape Areas (upper Port Hills, Malvern Hills and High Country) are a restricted discretionary activity. Similar to the VAL lower Port Hills, matters of discretion include consideration of the appropriateness of the building site and its access having regard to geotechnical conditions and site stability (3.2.5.2).

It is further noted that there are specific controls within the Porters Ski and Recreation Area (Appendix E25 including Rules 25.12.1 and 25.12.2), where extensive consideration of geotechnical matters (avalanche, slope instability, fault lines) where the subject of a substantial Plan Change application to upgrade ski facilities and develop a village at Porters Ski Field. The provisions are now incorporated into the district plan.

In terms of subdivision, like the Township Section, there are no specific natural hazard rules relating to geotechnical matters. In addition, the matters the Council will exercise its control over does not include any reference to geotechnical issues as per Rules 12.1.4.12 and 12.1.4.13 above for the Township Section. Greater reliance is placed on the provisions of section 106 of the RMA for the rural area of the District and is discussed further under "other methods" below.

4.2.5 Earthworks Rules

Earthworks are generally managed by way of location and quantity (volume and area) rules, a breach of which typically require restricted discretionary or discretionary consent (the rules are found within C1 in Rural Volume, C2 and C14 in Township Volume).

In summary, in the Living zone earthworks are not permitted within 20m from listed waterbodies and 10m from any other water body; the maximum volume threshold before a consent is required is 2,000m^3. No more than 5% of the total cut face is permitted to be over 2m. For the business zones the rules are similar to the Living zone rules but the volume threshold for permitted activity status is increased to 5,000m^3.

In the Rural Zone the setback of earthworks from water bodies is set at 20m (Rule 1.7.1.1). However there is a reduction in the setback to 5m for rivers where the earthworks:

- are small scale (being less than 100m2 and a volume of less than 40m^3); or
- already have a discretionary/non-complying resource consent from Environment; or Canterbury; or
- are for the maintenance of existing fence lines, existing vehicle tracks and existing crossings.

Volumes are restricted to 5000m^3, and a have no more than 5% of the cut face over 2m (as for the Business Zones).

An assessment of the earthworks rules against the earthworks provisions of the Land and Water Regional Plan (LWRP) is provided in Appendix B. It is noted that there is considerable complexity in the earthworks rules in both the LWRP and the district plan, with very little alignment. In terms of duplication, it is noted that there is no situation under the setback from waterbodies and earthwork volume rules where a consent is required by Environment Canterbury but not from Selwyn District Council. Areas that could be examined in terms of the District Plan Review include:

1. whether consistency in the setback distances from waterways is desirable;

2. whether the differing maximum volumes thresholds that are permitted is appropriate;

3. whether there is a need for agreement with respect to specific locations where a more (or less) restrictive earthworks requirement is justifiable (for example: High Country, rivers such as Rakaia or Waimakariri, Wāhi Taonga Management Areas, areas adjacent to flood control structures etc.).

It is noted, however, that the focus of these rules for Environment Canterbury is on discharge of sediment or sediment-laden water, in circumstances where it will enter surface water and effects on water quality and ecology. The focus for Selwyn District is related to other matters such as amenity (dust, visual impact). In terms of management of geotechnical risk earthworks rules have a role, but to date do not focus significantly on that (although soil erosion and slope failure is briefly mentioned in the explanation in the district plan). Development of the connection between earthworks and geotechnical related natural hazards in the provisions for the District Plan Review is recommended as well as exploring the areas where duplication with the LWRP could be removed.

4.2.6 Planning maps

Fault lines are currently mapped on the electronic planning maps, based on 1:250,000 scale source mapping; this includes the Greendale Fault. There are no rules associated with these fault lines, and no fault avoidance zones as per the Ministry for Environment guidelines discussed earlier. Mapping the faults on the planning maps assists, however, in implementing policy provisions through resource consent applications and plan changes (for example: Policy B3.1.2 Township Volume). The other natural hazards identified on the planning maps are flood hazard areas and the Regional Council's coastal hazard lines. It is noted that some rules in the SDP limit development seaward of the coastal hazard lines, but generally defer to the rules in the Regional Coastal Environment Plan.

4.3 Other methods

4.3.1 Section 106

Section 106 of the Act restricts the subdivision of land subject where 'natural hazards' may result, even if it complies with rules in the District Plan. The Council therefore has an obligation under Section 106 to decline subdivision consent where natural hazards cannot be adequately mitigated.

To assist in Section 106 subdivision assessments Selwyn District Council has identified and mapped, at a high level, geotechnical investigation areas within the district based on advice sought after the Canterbury Earthquake Sequences in relation to managing geotechnical risk, including liquefaction. Geotech Consulting Limited produced a letter/report for the Council on the 12 July 2013[32], supported by mapping at a scale of 1:250,000. Much of the advice provided was founded on the reports and investigations previously discussed in Section 3.3.

The letter/report from Geotech Consulting Limited provided advice in respect to subdivision where geotechnical stability including liquefaction issues may arise. In particular it emphasised that west of the line in the Liquefaction Map in Figure 6 above ("damaging liquefaction unlikely") the land is underlain with predominantly deep gravel soils and for much of it, also deep ground water levels, and the possibility of liquefaction over much of this area is extremely low.

[32] Letter to Selwyn District Council re Geotechnical reporting for subdivision applications – Geotech Consulting Limited, 12 July 2013.

Consequently, the letter/report identifies that in the area identified as being “Area of low to very low geotechnical hazard” (see Figure 5) ground conditions are competent for building foundations (which includes the liquefaction unlikely area). The letter/report recommended that in this low to very low risk area:

- small subdivisions up to 15 lots need not have geotechnical investigations at subdivision consent stage and can be delayed until building consent stage.
- larger subdivisions of 15 lots or more, geotechnical investigations should be done at subdivision stage.

The report identifies that on some properties there remains a low risk that geotechnical issues may be undiscovered, but will be picked up at building consent stage.

On the areas outside the low to very low risk investigation area (areas of higher geotechnical risk) subdivisions creating one or more vacant lot were recommended to include geotechnical investigations. This includes areas containing Prebbleton and Lincoln and the rest of Selwyn District west of the high terraces. Subdivision in these areas are therefore required by the Council to be supported by a geotechnical report which follows MBIE guidelines and includes subsurface testing.

The mapping and report is held outside of the Selwyn District Plan and is used to guide the use of s106 RMA by subdivision resource consent staff and has developed as a key approach by Selwyn District Council to manage geotechnical risk in the District.

The report/letter by Geotech Consulting further recommended that all plan changes be required to provide a geotechnical assessment regardless of their location in the District. This forms a standard request for information by the Council in respect to all plan changes.

4.3.2 Building Act 2004

Section 71 of the Building Act deals with building on hazard prone land. Under this section, the Council may be obliged to refuse a building consent application on land subject to such hazard events as erosion, falling debris, subsidence, inundation or slippage (see Section 3.2).

The Building Code contains standards to ensure that any structure is designed to remain standing in a certain magnitude earthquake.

4.3.3 LIMS

The Council advises any person requesting Land Information Memoranda (LIM) of any known natural hazard affecting land (Local Government and Official Information and Meetings Act). Accordingly in Whitecliffs, Hororata and Tai Tapu, where there is known to be hazards from stormwater run off, landslip, erosion or inundation, information on these natural hazards is recorded on any LIM requested for land in these townships affected by a hazard.

5. Neighbouring Councils Approaches to Managing Geotechnical risk

5.1 Overview

The approach taken by neighbouring councils to managing geotechnical risk has been investigated and reviewed. This is discussed below and is summarised in Appendix A.

5.2 Ashburton District Council

5.2.1 Ashburton District Plan

The Ashburton District Plan (ADP) was made operative in August 2014. The ADP does not have a specific natural hazards chapter. However, there are references to natural hazards in Rural Zones (Chapter 3), Residential Zones (Chapter 4), Subdivision (Chapter 9), and Utilities, Energy and Designations (Chapter 14). A summary of the provisions relating to managing geotechnical risk in the Ashburton District is provided in Appendix A.

The ADP acknowledges that the main natural hazards facing the district are flooding, coastal erosion and earthquakes. The focus with respect to natural hazards is largely on flooding. Geotechnical risk is not comprehensively considered in the ADP.

Sea level rise is recognised as an issue that will contribute to coastal erosion, but like Selwyn District, there is little development in the coastal area and the main risk to be managed is loss of farmland. There are numerous fault lines running through the district making it vulnerable to earthquakes. Some consideration is given to this particularly in respect to potential impact on dam failure and residential activity.

The objectives and policies relating to natural hazards relate to protection (of life and infrastructure) from natural hazards, through avoidance or mitigation of adverse effects.

Rules to achieve this are primarily through controlling subdivision; the activity status of subdivision varies based on zone.

The controlled activity rule, includes as a matter of control avoidance and mitigation of natural hazards. Assessment matters for discretionary resource consent applications provide consideration of subsidence and the likelihood of development being threatened by natural hazards.

Control of coastal erosion is achieved through the hazard lines in the Regional Coastal Plan. Through limiting the range of coastal activities, it is considered that this will reduce the need for coastal protection works. It is also recognised that some assets rely on coastal protection works and limited provision is made for their maintenance where it is impractical to remove them. The ADP supports natural features as part of the strategy to mitigate against natural hazards. It is further acknowledged that small settlements (huts) at Rakaia, Hakatere, and Rangitata are located within the hazard lines.

In respect to residential growth areas, the ADP acknowledges that effort has been made to locate in areas that avoid risk from natural hazards where possible, but that the risk associated with residential development near areas subject to flooding, earthquakes, coastal erosion and severe climatic extremes should be considered.

The Subdivision Chapter contains the most useful provisions in relation to natural hazards, including taking of esplanade reserves and strips during the subdivision process for natural hazard mitigation on the margins of water bodies and the coast.

The ADP identifies that its steeper upland areas are likely to be subject to a range of hazards such as erosion and subsidence but is not subject to much development pressure. The main subdivision policies are Policy 9.1P and Policy 9.1Q

- *Policy 9.1P*

Minimise the likelihood of damage to future properties and infrastructure by ensuring that subdivision is either subject to mitigation measures, or avoided, in areas subject to risk from flooding (including inundation from the sea), subsidence or slippage.

- *Policy 9.1Q*

Ensure that any measures taken in relation to the mitigation of natural hazards do not adversely affect the character and amenity values of an area, and do not cause in themselves further remediation works to be undertaken.

The ADP acknowledges that subdivision can increase the risks associated with potential exposure to natural hazards and states that the Council is obliged through Section 106 of the RMA to decline consents for subdivision where the risks from natural hazards cannot be avoided or mitigated (this is discussed further below).

Overall, the ADP takes a light-handed approach to geotechnical risk and manages it largely through the subdivision process, developments requiring resource consent or the plan change process, where specific conditions, consent notices (in the case of subdivision) and standards (incorporated into plan changes) can be applied. Provision of suitability certificates under NZS 4431 are also used in some cases in respect to subsidence.

It is noted that the word “liquefaction” does not feature in the ADP, though it may be considered as a form of land subsidence. While the Lake Heron Fault is identified on the maps it is done so for the purposes of identifying a geo-conservation site. There are no fault avoidance zones mapped in the ADP.

Specific policies and information requirements for resource consents require natural hazards to be identified and either avoided or mitigation measures proposed. There is a specific preference for natural features to provide defence to risk from natural hazards rather than natural hazard mitigation/protection works. This is expressed in terms of avoiding activities on the coastal cliffs/margins.

Correspondence with ADC planners indicate that they recognise that the rules are “pretty silent” on managing geotechnical risk.

5.2.2 Other methods

As per above the Ashburton District Council (ADC) acknowledges its obligation under Section 106 of the RMA to decline subdivision consents. However, in practice discussions with ADC indicate that no subdivisions have been declined under Section 106 of the RMA for geotechnical reasons, but have declined one due to flood risk. ADC consider that part of the reason for this is that generally the District has “quite good ground” and is much less likely to be affected by liquefaction that other areas.

Some larger subdivision consent applications are now requiring greater geotechnical input and ADC is aware that consent notices have been required specifying the location of building platforms to manage geotechnical risk.

The ADC has adopted New Zealand Standard 4404:2004 Land Development and Subdivision Engineering, with some variations. While they do not form rules in the Plan, its requirements and recommended practices can form conditions of resource consent.

As with the other plans other methods recognised in the ADP include co-ordination with the Regional Council to obtain information and consultation with Civil Defence

5.3 Waimakariri District Council

5.3.1 Waimakariri District Plan

The Waimakariri District Plan (WDP) was made operative on 3 November 2005. However, there have been a large number of plan changes over the years including Plan Change 27 in respect to natural hazards management. The Waimakariri District Council is currently reviewing its entire District Plan. A summary of the provisions relating to managing geotechnical risk in the WDP is provided in Appendix A.

The WDP has a slightly more comprehensive approach to managing geotechnical risk than some other districts, in that specific risks are identified within the plan framework. This is possible because they have a reasonable base of information[33].

Within the WDP, for seismic hazard, it notes that '*It has been agreed with the Canterbury Regional Council that the information currently available is too general to support land use controls. The fault lines are not accurately known and the extent and nature of liquefaction requires further study …. there is still the potential for an earthquake hazard to occur and damage in the urban areas is a likely outcome from consequent ground shaking*'.

Nevertheless, the WDP has specific chapters dealing with natural hazards and subdivision chapters which contain specific geotechnical considerations:

Chapter 8 – Natural hazards - Objectives and policies

Chapter 27 – Natural hazards - Rules

Chapter 18- Constrains on Development and Subdivision - Objectives and policies

Chapter 32 – Subdivision - Rules

The objectives and policies in Chapter 8 (Natural Hazards) seek to minimise potential damage and disruption to existing communities. Other objectives and policies are consistent with avoiding or mitigating risk associated with natural hazards and increasing the Council's and community understanding of earthquake risk and associated natural hazard. Policy 8.3.1.1 specifically states:

- ***Policy 8.3.1.1***

  Identify areas which are at risk from liquefaction, associated ground damage effects, and amplified ground shaking.

In the Subdivisions Chapter, Policy 18.1.1.1 is particularly relevant in identifying the types of constraints including geotechnical risks on new development:

[33] As is noted in the Plan: *"The Council has completed stage one of an Earthquake Hazard Analysis which focused on identifying historical seismicity and active faults (November 1995). This study identified liquefaction and its associated ground damage effects as a potential significant threat to the areas in the east of the District. Stage two of the Analysis is intended to:*

- *assess the distribution of sediment susceptible to liquefaction;*
- *identify earthquake intensities likely to promote liquefaction;*
- *identify areas with the potential to liquefy under different intensity earthquakes; and*
- *help assess the risks of liquefaction to key lifelines such as water, sewerage, power, telephone, roads and bridges. Lateral spreading affects areas next to streams, rivers, ponds and the coast where there is low lateral ground support."*

- **Policy 18.1.1.1**

Growth and development proposals should provide an assessment of how:

In particular, proposals should not be inconsistent with other objectives and policies in the District Plan, and show how and the extent to which they will:

c. avoid or mitigate natural hazards including:

1. *seismic conditions including the potential for liquefaction and amplification effects,*
2. *damage from the sea, including erosion, storm and tsunami, and*
3. *land instability;*

While this policy does contain many other considerations such as reverse sensitivity, historic heritage, noise, transport, efficiency in energy use, provision of services etc., it is stated in the WDP to be the basis for determining the effects of any plan change proposal. Additional specific policies dealing with geotechnical risk include policies 18.1.1.6-8 which seek to avoid or limit urban growth at Waikuku Beach, Woodend Beach, and Pines/Kairaki Beach settlements because *"they are all constrained by their coastal setting, and low-lying land that is subject to flooding. Some areas are potentially at a risk from tsunami and earthquake induced ground liquefaction"*[34].

Liquefaction risk is considered through a liquefaction performance standard in both the natural hazard and subdivision rule chapters and has an associated Liquefaction Mitigation Design Standard (Table 27.2, and Table 32.2) of District Plan). It should be noted that these rules only apply to Residential 6, 6A and Business 1 zones at Pegasus.

The Subdivision Rules Chapter (Chapter 32) also contains specific geotechnical matters to be addressed for controlled activity subdivisions. These include matters for control found in many district plans such as consideration of erosion, rockfall, land slip, subsidence, and liquefaction.

Restricted discretionary activity consent is required for subdivision of land within the West Kaipoi Outline Development Plan Area:

Rule 32.2.11 states:

any subdivision of land within the West Kaiapoi Outline Development Plan area shown on District Plan Map 164 that results in any geotechnical investigation revealing ground deformation in an SLS seismic event to be less than 15mm and in a ULS event to be less than 25mm (Technical Category TC1) shall be a discretionary activity (restricted).

The Council in considering an application under this rule requires:

ii the outcome of a comprehensive geotechnical investigation and assessment undertaken by a suitably qualified Geotechnical Engineer (CPEng) to include assessment of all aspects of the risk of liquefaction and lateral spread undertaken in accordance with the most recent NZ Geotechnical Society Guidelines or an equivalent guideline/standard adopted by the District Council or the Canterbury Earthquake Recovery Authority. The geotechnical investigations shall be carried out to a minimum depth of 15m and at a minimum density of 0.25 per lot. This shall take into consideration potential impacts on land, properties, utility services, roading, buildings and houses.

Similar rules are provided for areas in East Kaiapoi Outline Residential 2 Development Plan area.

For the Kaiapoi Business 5 Zone there is a specific liquefaction performance standard in the Land and Water Margins Chapter (Rule 23.3.9) in respect to earthworks and building. The rule requires assessment as a restricted discretionary activity unless comprehensive geotechnical

[34] Waimakariri District Plan, Chapter 18, explanation and reasons, page 7.

assessment has already taken place in conjunction with an approved subdivision consent. The assessment matter associated with an application under this rule requires consideration of:

> *i the potential impacts of liquefaction, lateral spread and uncertified fill on land, properties, utility services, roading and buildings, as determined by a comprehensive geotechnical investigation and assessment undertaken in accordance with the most recent NZ Geotechnical Society Guidelines or equivalent guideline/standard applicable to commercial development by a suitably qualified Geotechnical Engineer who is a Chartered professional Engineer.*

This rule is repeated in Rule 32.2.15 in respect to subdivision development.

Section 36.1.4 Information for resource consents, requires that all plans show as a minimum:

> *f. Hazards: all hazards should be identified and the means of avoiding, remedying or mitigating adverse effects of the activity specified.*

Natural hazards are also included in the list of assessments to be included in an assessment of effects.

This is a typical of many district plans.

The planning maps do not show the location of any geotechnical hazards in the district, with the discrete areas where liquefaction performance standards apply being identified through the zone and outline development plans. However, there is a subdivision constraint area identified on the planning maps which includes consideration of liquefaction at Waikuku Beach. No fault lines or fault avoidance zone are identified, or steep areas subject to rockfall or land-slides. No coastal hazard lines are included. The WDP defers to the Regional Coastal Plan as per Ashburton District.

Current work is being undertaken in respect to Plan Change 27 – Management of Hazards in Waimakariri District including an interactive mapping system, showing fault lines, fault line awareness areas and liquefaction areas.

5.3.2 Other methods

Discussions with planners at the Waimakariri District Council indicate that other methods used to manage geotechnical risk include the provision of information on properties through LIMs. This includes information on geotechnical hazards present and specific foundation requirements.

Discussions with WDC indicate that Section 106 is the primary way in which geotechnical hazards are managed by the Council and is used to require geotechnical reports to support building in liquefaction areas or areas prone to other geotechnical hazards. The Council's engineering team (Subdivision) use their database to look at liquefaction, land stability, and provide recommendations to the planning team. Approximately 40% of applications go on to require a geotechnical assessment.

No subdivision applications appear to have been declined as a result of geotechnical hazards. Applicants have, however, been asked to assess geotechnical hazards where the data base indicates they are likely and this has often resulted in an amended application being submitted.

Advice is also provided through the building consent process. Information is provided on the Council's website in respect to sections 71-73 of the Building Act (see Section 3).

As with the other plans other methods recognised in the WDP include co-ordination with the Regional Council to obtain information and consultation with Civil Defence.

5.4 Hurunui District Council

5.4.1 Hurunui District Plan

The Hurunui District Plan (HDP) was made operative in August 2003. A proposed plan was notified on 02 May 2015 and decisions were released in October 2016. Six appeals were received on the Decisions version of the Proposed Plan, including chapters affected by natural hazard provisions. Five of those appeals are now fully resolved and the last is partially resolved. No natural hazard or geotechnical risk matters remain to be resolved. A summary of the provisions relating to managing geotechnical risk in the HDP, Revised Version is provided in Appendix A.

The HDP recognises that New Zealand is geologically active and that the Hurunui District sits in the middle of the zone of geological activity. The district is affected by a number of active faults including the Alpine Fault running parallel to the districts western boundary and the Hope Fault (and its subsidiary the Hanmer Fault) which is recognised as New Zealand's second most active fault. These two faults run through the settlements of Hanmer Springs and Mount Lyford. There are also numerous other active faults in the district. Fault movement during earthquakes is therefore recognised as a significant geotechnical risk in this district.

Geotechnical risk is managed in the Hurunui District Plan Revised Version (HDP) through objectives, policies and rules, contained in a specific natural hazards chapter (Chapter 15).

The approach includes a number of specific geotechnical risk overlays including Fault Avoidance Zone, Fault Awareness Zone, Liquefaction Assessment Zone and Hamner Springs Hazard Zones (slope instability). These overlays are shown on the planning maps.

Key policies with respect to the Fault Avoidance Zones and Fault Awareness Zones are Policies 15.3, 15.4 and 15.5:

- *Policy 15.3*

To avoid the subdivision, use or development of land within the Fault Avoidance Zone unless the adverse effects of fault rupture can be mitigated so as to ensure that there is no greater risk to health and safety during and after an earthquake.

- *Policy 15.4*

To avoid the development of land within any Fault Awareness Zones for post emergency infrastructure or infrastructure which large numbers of people congregate in, unless that infrastructure has been appropriately designed and sited in relation to the fault hazard.

- *Policy 15.5*

To avoid the subdivision of land in a Liquefaction Awareness Zone unless a geotechnical investigation is undertaken, the risk of liquefaction is determined, and if necessary appropriate mitigation, including foundation design and land stability engineering is undertaken.

The explanation to Policies 15.3 and 15.4 is useful in explaining the approach:

The framework in the District Plan recognises the difference in knowledge. Where detailed fault mapping has been undertaken the District Plan identifies these faults and a buffer zone around these faults as being a 'Fault Avoidance Zone'. Subdivision, use and development within these fault avoidance zones are restricted. It is expected that geotechnical analysis to identify the exact location of the fault trace would be required and any built infrastructure is designed and situated to ensure that it can withstand the damaging effects of earth shaking.

For other faults identified within the District Plan, where detailed geotechnical analysis has not been undertaken, a Fault Awareness Zone has been included within the District Plan. Because the knowledge of these faults is not as comprehensive, and the exact location of the fault or fold

is unknown, a larger buffer zone has been applied. Building within the Fault Awareness Zone is a permitted activity. However, geotechnical analysis is expected at the time of subdivision or plan change[35].

As with the other district plans reviewed, the HDP takes a risk assessment approach to managing all geotechnical risks by requiring a full assessment of natural hazard risks before zoning land for urban purposes. Such studies are required to provide details of any mitigation works required prior to the construction of any built infrastructure such as dwellings.

Within the Fault Avoidance Zone (Hope Fault and Hanmer Fault) principal buildings and habitable accessory buildings are only permitted where the location, design and construction complies with the recommendations of an organisation or individual authorised by the Chief Executive as being appropriately qualified and experienced. A building of importance is a non-complying activity.

The term "building of importance" has its origins in the Building Code[36] and NZS 1170. In the HDP the definition is as follows:

Building of importance means:

- *buildings where more than 250 people can congregate in one area*
- *education activities*
- *health care facilities with a capacity of 50 or greater residents*
- *medical and emergency facilities*
- *emergency service facilities such as fire, police stations and emergency vehicle garages.*
- *designated emergency shelters, emergency centres and ancillary facilities.*

Within the Fault Awareness Zones (there are thirty listed in the HDP) buildings are a permitted activity if they meet the above requirement and provided the building is not a Building of Importance. Note that the Fault Awareness zones include an area 250m wide on either side of the fault lines identified on the panning maps.

The HDP also contains a Liquefaction Awareness Zone based on updated information on areas susceptible to liquefaction hazard within the district. This information is based on the same report available to Selwyn District[37]. Within this zone a liquefaction assessment in required at the time of subdivision. This would require the developer to assess the risk and develop foundation designs and building platforms appropriate to that risk.

Overall, the purpose of introducing avoidance and awareness zones in areas subject to fault lines and liquefaction is to be able to require an appropriate level of investigation into the relevant hazard prior to subdivision, development and use of the land.[38]

Land Instability Areas have also been identified as Natural Hazard Areas and are mapped on the planning maps (See Appendix C). These slope hazard areas are located at Hanmer Springs and the rules restrict the siting, erection, replacement or extensions to buildings and the trimming or removal of trees. A discretionary activity consent is required.

[35]Hurunui district Plan, Revised Version December 2017, Explanation to Policies 15.3 and 15.4.
[36]Building Regulations, 1992: Building Code, Clause A3 Schedule 1
[37]Institute of Geological Nuclear Sciences Client Report 2002/124, Planning for Development of Land on or Close to Active Faults – A guideline to assist resource management planners in New Zealand, 2003 June, produced for the Ministry for the Environment.

[38] Section 32 Report – Natural Hazards Chapter 15

5.4.2 Other methods

Discussions with Hurunui District planners indicate that most of the natural hazards are managed through Chapter 15 of the Revised Proposed District Plan. However, measures outside the Plan are similar to the other councils discussed above including use of Section 106, the Building Act, and placing relevant hazard information on LIMs for properties in the District affected by geotechnical hazards. For instance, information on a property's susceptibility to liquefaction is shown on its Land Information Memorandum (LIM).

As Hurunui District has recently experienced severe earthquakes, section 124 of the Building Act has been used to place notices on properties damaged in the earthquakes.

Other methods recognised in the HDP include co-ordination with the Regional Council to obtain information and consultation with Civil Defence. The Council has also sought Environment Canterbury assistance to review the geotechnical assessments it has received from applicants.

It is understood that the Council rarely turns down a subdivision application because of geotechnical risk. Rather, the Council seeks to place appropriate conditions on the consent to mitigate the risk.

The Council has also established and development a natural hazards database on the Council's geographic information system.

5.5 Christchurch City Council

5.5.1 Christchurch District Plan

The Christchurch District Plan (CDP) was made operative in July 2017, and has a specific natural hazards chapter, Chapter 5. A summary of the provisions relating to managing geotechnical risk in the CDP is provided in Appendix A.

The Christchurch City Council in its CDP take a 'risk-based' approach and states:

*Risk is expressed in a number of ways. For example, in areas at risk from slope instability such as cliff collapse, rockfall, or mass movement, it is the degree of risk to people's lives that is of primary concern. In most areas at risk from flooding, the primary concern relates to damage to property and how often this may occur (*5.1 g*)*

In areas of slope instability, risk is expressed as an "Annual Individual Fatality Risk" (AIFR).

In areas where there is likely to be a liquefaction risk to property, no specific measure of risk is applied. The CDP states:

'The level of control over activities in the District Plan is related to the consequence of the various natural hazards and whether such risks are considered to be acceptable or not. There is also a category in between where following proper assessment risk may be able to be managed such that the risk is reduced to acceptable levels' (5.1 k)

In locations where the risk from natural hazards is considered to be unacceptable and such risks cannot practically be reduced to acceptable levels, new activities in those areas are generally to be avoided. This includes areas such as Cliff Collapse Management Area 1, Cliff Collapse Management Area 2 and Rockfall Management Area 1, but also includes adjacent areas where risk cannot be adequately remedied or mitigated (5.1 l).

The Natural Hazard objectives (3.3.6) requires new subdivision, use and development to be avoided in areas where the risks from natural hazards to people, property and infrastructure are assessed as being unacceptable; and in all other areas, in to be undertaken in a manner that ensures risks are mitigated. There are specific objectives and policies relating to critical infrastructure. Further objectives relate to increasing public awareness of the range and scale of

natural hazards that can affect the District, and that repair of earthquake damaged land is facilitated.

The specific policies in respect to geotechnical risk include Policy 5.2.2.4 which requires the Liquefaction Management Area to be mapped based on a district wide assessment where damaging liquefaction is more likely to occur, and to also provide for rezoning, subdivision and use where liquefaction risk has been appropriately identified and assessed and can be adequately remediated or mitigated.

The district wide assessment discussed above where damaging liquefaction is likely to occur is available in a report and includes a large part of Selwyn District.[39]

There is a suite of polices relating to slope instability. Policy 5.2.2.4.1 b. in particular adopts a risk-based approach and states:

b. In slope instability hazard management areas in the Port Hills and across Banks Peninsula:

- *avoid subdivision, use and development where the activity will result in an unacceptable risk to life safety (AIFR ≥10^{-4} using the GNS Science method and parameters for establishing life safety risk), taking into account all relevant site-specific information and any hazard mitigation works proposed; and*
- *otherwise, manage subdivision, use and development so that risk of damage to property and infrastructure is mitigated to an acceptable extent.*

Of interest to Selwyn District is Policy 5.2.2.4.3 in the CDP for all other sloping areas on the Port Hills and Banks Peninsula which recognises that the area of potential hazard is extensive and detailed information is not readily available:

Policy 5.2.2.4.3a.

a In areas not already identified in Policy 5.2.2.4.1a as being subject to cliff collapse, rockfall or mass movement, but where the land may be subject to slope instability:

- *to the extent appropriate, require proposals for subdivision, use and development to be assessed by a geotechnical specialist to evaluate the presence of hazards and level of risk to people and property (including infrastructure) from slope instability hazards; and*
- *only allow subdivision, use and development where risk can be reduced to an acceptable level.*

There is also a suite of policies in respect to hazard mitigation works, avoiding such works in cliff collapse areas where the works could experience significant damage and create safety issues, and generally in relation to avoiding transferring risk to other people or property.

The CDP implements these policies through a number of overlays or "natural hazard management areas" dealing with geotechnical risk as follows:

A Liquefaction Management area

Slope Instability Management areas:

1. Rockfall Management Area
2. Cliff Collapse Management Area
3. Mass Movement Management Area
4. Reminder of Port Hills and Banks Peninsula Slope Instability Management area

Developments or subdivisions in these areas require detailed geotechnical investigations where resource consent applications for activities are required. In many cases, for example in cliff

[39]Review of liquefaction hazard in Eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts (ECan report R12/83 – December 2012).

collapse areas, the range of activities provided for as permitted activities, is very limited. A detailed table of activities and the corresponding activity status for each is provided in Table 5.6.1.1 of the CDP.

For subdivision in the Liquefaction Management Area detailed liquefaction susceptibility assessment and reporting is required with reference to the MBIE (December 2012): Part D "Guidance Repairing and Rebuilding Houses Affected by the Canterbury Earthquakes" Document.

In summary, the CDP has a comprehensive approach to managing geotechnical risk based on the provision of substantial detailed technical information updated since the Canterbury Earthquake Sequence.

5.5.2 Other methods

Although the District Plan has robust provisions, the Council utilises section 106 through the subdivision consent process and the Building Act for building consents to ensure geotechnical risks are appropriately assessed. In particular it is noted that rockfall risk and rockfall hazard mitigation structures are assessed through the building consent process and a technical expert panel has been established who peer review all building consent applications in areas subject to rock fall, mass movement and cliff collapse and any other geotechnical hazards. It is considered that the Christchurch City Council's approach is best practice.

Discussions with resource consent planners indicated that they knew of only one subdivision application that had been refused on Section 106 grounds. All subdivisions with a geotechnical risk require a statement of professional opinion regarding the suitability of the site for subdivision.

6. Discussion, Gap Identification, and Recommendations

6.1 Discussion and Gap Identification

It is considered that the approach to managing geotechnical risk in Selwyn District is reasonably light handed and is most similar to the approach taken by Ashburton District Council. Considerable emphasis is placed on the provision of geotechnical assessments at the subdivision and Plan Change stage. This is a practical approach given the wide geographical nature of Selwyn District. However, it is not as robust (or "best practice") compared with some of the neighbouring districts such as Hurunui District with similar geographical spread who have implemented the Ministry for the Environment's Fault Line Guidance, more robust liquefaction polices and rules and greater consideration of slope instability within its new and now essentially operative District Plan.

Many land development projects do not involve subdivision and the majority of the other districts reviewed in the investigation capture this through requiring land use resource consents in location where geotechnical risks have been identified.

In addition, the Selwyn District Plan provisions do not have much depth in terms of assessment matters for geotechnical risk, with the exception of Rule 12.14.12 and 12.1.4.13 discussed in Section 4. This is an area of improvement easily able to incorporated as part of the District Plan Review.

Work on identifying and assessing fault lines and fault line awareness areas is being undertaken in both Waimakariri District and in Hurunui District using the methods recommended by the Ministry for the Environment[40]. Liquefaction awareness or susceptible areas are also being included in many District Plan Maps. As identified in Section 2, Selwyn District has active fault lines, areas of known liquefaction susceptibility and areas of slope instability, but little recognition in the District Plan of these areas. Christchurch City has no active fault traces, but identifies liquefaction hazard areas and slope instability hazards in its District Plan and has robust objectives, polices and rules in relation to them.

While the Building Act, the Building Code and section 106 of the RMA are all used to manage geotechnical risk, the councils place different reliance on the District Plan in terms of its ability to manage geotechnical risks comprehensively under the RMA. Selwyn District Council and Ashburton District Council rely on these other methods more than they do their district plans and consequently do not have an overarching strategy to manage geotechnical risks and natural hazards general in the district. While much is made of the ability to decline subdivision consent under section 106, it would appear from this investigation that it is rarely used.

Most of the District Plans reviewed make it clear that subdivision is the foundation of much of the development that occurs within the district as it provides for the establishment of new activities. The pattern of subdivision influences the future use of the land area. So while section 106 is important, it is likely that support in the district plan with robust policies, and rules in respect to managing geotechnical risk under a comprehensive natural hazards framework will result in better outcomes for both subdivision and other land development in the District.

[40] Institute of Geological Nuclear Sciences Client Report 2002/124, Planning for Development of Land on or Close to Active Faults – A guideline to assist resource management planners in New Zealand, 2003 June, produced for the Ministry for the Environment.

Section 106 of the RMA only applies to subdivision of land. Development also occurs on land that does not require subdivision to achieve its owner's wants and needs. This land may still be subject to natural hazards that could put the structure/development or lives at risk in the future.

Section 6h of the RMA is a recent amendment and brings with it an obligation of local authorities to manage significant risk from natural hazards as a matter of national importance and this includes geotechnical risks. It will be important for district councils to manage significant risks from natural hazards at the local level as a matter of national importance, and goes hand in hand with the council's responsibilities to control the use of land for the avoidance or mitigation of natural hazards (s31, RMA). This requires a review of the current objectives, policies and rules in the District Plan in respect to natural hazards to take this elevated status into account.

A selected number of development categories that occur in terms of resource management are:

- Greenfield site subdivision
- Brownfield site subdivision
- Development within a Lot that does not require subdivision
- Roading – Highways and local roads
- Dams
- Services
- Bulk earthworks (cuts, fills and slopes)
- Walls and Mechanically stabilised embankments.

It is considered that the key documents outlined in Section 3, particularly the RMA, the Building Act 2004, the Building Regulations/Code and the LGA and the Civil Defence Emergency Management Act provide adequate legislation needed to manage geotechnical risk associated with the development categories identified above. There is also legislation specifically related to utilities which require consideration of natural hazard avoidance or mitigation (the Electricity Act and the Telecommunications Act).

Overall, there is opportunity to use the district plan to identify geotechnical risk for development occurring on land already subdivided. Not all natural hazard risk is picked up in the Building Consents process, and sometimes the risk is a wider consideration outside the specific site.

The main gap in the Selwyn District Council approach to managing geotechnical risk does not lie with legislation or regulatory deficiencies, but rather the extent to which the district plan can and is used to manage geotechnical risk holistically with other natural hazard risk in the District and for all types of land uses. Selwyn District does not appear to do this as well as some of its neighbours, bearing in mind that some of those districts have had the recent opportunity to review their district plans ahead of Selwyn District and to upskill their staff on geotechnical processes.

6.2 Recommendations and Conclusions

The RMA, Building Act and Civil Defence Emergency Management Act provide coverage of identifying, addressing and dealing with natural hazards; the LGA also provides some control over provision of resilient infrastructure. Other legislation exists which provides scope to manage the risks from geotechnical hazards.

In terms of Selwyn District Council's approach it is not so much that there are gaps, but that the approach could be more comprehensive and integrated with the management of other natural hazards in the District. It could also involve more comprehensive provisions dealing with land development where no subdivision is triggered. Currently the approach is piecemeal with little

guidance in terms of assessment matters for resource consent planners and users of the Plan. The approach to managing geotechnical risk could be improved by providing clearer provisions in the District Plan.

Recommendations:

1. Follow guidance and advice provided in the Planning for Development of Land on or Close to Active Faults: A guideline to assist resource management planners in New Zealand, MfE. The document provides for both non-regulatory and regulatory methods for fault avoidance.[41]. It is considered that the Hurunui Districts approach to fault avoidance and fault awareness provisions should be investigated further to test the suitability of that approach for Selwyn District and to determine the level of information that would be required to implement a similar approach.
2. Development a clearer connection between earthworks and geotechnical related natural hazards in the provisions for the District Plan Review as well as exploring the areas where duplication with the LWRP could be removed. In particular with respect to the LWRP and SDP earthwork provisions explore:
    i. whether consistency in the setback distances from waterways triggering resource consent is desirable;
    ii. whether the differing maximum volumes thresholds that are permitted between the two plans is appropriate;
    iii. whether there is a need for agreement with respect to specific locations where a more (or less) restrictive earthworks requirement is justifiable (for example: High Country, rivers such as Rakaia or Waimakariri, Wāhi Taonga Management Areas, areas adjacent to flood control structures etc.).
3. Consider setting up a panel of suitably qualified and experienced geotechnical professionals to assist in reviewing resource consents and building consents, and potentially plan changes. These professionals could be sought to review the most complex or geo-technically challenging of situations / designs – such as large heavy buildings or structures to assess whether the appropriate geotechnical factors have been taken in to account and if so used appropriately given the geological setting and geotechnical complexities of the particular project area.
4. Continue to manage the geotechnical risk through the subdivision consent process using the updated section 106 of the RMA, but include clearer provisions in the district plan relating to liquefaction, faults, and slope instability areas to support assessment processes. The Living Zones in the Township Volume contain more robust assessment matters for subdivision where liquefaction and lateral spread occur, than the Rural Volume and this inconsistency could be easily addressed in the review of the District Plan.
5. Investigate the 15 lot cut off for requiring geotechnical assessment for subdivisions in the low to very low geotechnical risk area, discussed in Section 4.3.1, to determine whether this is appropriate and update the district plan provisions to be consistent with what will happen in practice (see section 4.2.2).
6. Develop district plan provisions for all other land developments (where a land use consent is triggered, but not necessarily a subdivision consent) in terms of geotechnical risks, where a wider perspective is needed, e.g. rockfall needs an area wide response

[41] Noting that the Greendale Fault has been downgraded to Category 5 in a recent updated PHD study.

rather than assessed site by site by an individual building consenting processes. Ensure that the provisions are clearly related to the risk from natural hazards and, in particular, geotechnical risks, rather than being associated with rules relating to landscape.

In terms of liquefaction investigate the suitability of the Hurunui District Plan approach of identifying liquefaction awareness zones, or adopt an approach similar to Christchurch City (acknowledging that the areas of liquefaction prone land is much smaller in Selwyn District and is less populous than Christchurch City). In terms of slope instability, further investigation of areas on the Port Hills where rock fall and mass movement may occur, rather than relying on the Outstanding Landscape Area and Visual Amenity Landscape provisions to trigger this consideration as discussed in section 4.2.4.

Include additional assessment matters to guide resource consent planners, developers and others using the Plan, for liquefaction, slope instability, fault awareness and any other geotechnical risks identified.

A statement in the Reviewed Plan similar to that of Hurunui District Plan recognising the seismically active nature of the district and its potential exposure to a number of geotechnical risks would be helpful and set the scene for more robust provisions.

7. Section 6(h) of the RMA now specifically includes 'the management of risk from significant natural hazards' as a matter of national importance. As a recent amendment to the Act, and in recognition of natural hazard risk in New Zealand, there is an increased obligation to manage that risk. It is recommended that the district plan review process be used to re-focus and strengthen natural hazards provisions overall, including those relating to geotechnical risk. Section 2 of this report describes the geological setting and the types of hazards that the district experiences. There is nothing in that description that would indicate that Selwyn is less exposed to geotechnical risks than its surrounding neighbours. Greater cross boundary consistency with the approaches taken by Waimakariri District, Christchurch City and Hurunui District is required.

7. Limitations

This report: has been prepared by GHD for Selwyn District Council and *may only be used and relied on by Selwyn District Council for the purpose agreed between GHD and the Selwyn District Council as set out in section 1 of this report.*

GHD otherwise disclaims responsibility to any person other than Selwyn District Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Selwyn District Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report, which were caused by errors, or omissions in that information.

Appendices

Appendix A – Neighbouring Council's District Plan Review Summary

Comparison of the approach to managing natural hazard (geotechnical) risk

NB: *Italics are direct quotes*

RMA Context

Section 2 (Interpretation) of the RMA defines that natural hazard: means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

Section 31 Functions of territorial authorities under this Act*. (1)(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—(i) the avoidance or mitigation of natural hazards*

Section 106 Consent authority may refuse subdivision consent in certain circumstances. *If …(1)(a) the land in respect of which a consent is sought, or any structure on the land is likely to be subject to material damage by erosion, falling debris, subsidence, slippage or inundation from any source; or 1(b) any subsequent use that is likely to be made of the land is likely to accelerate, worsen or result in material damage to the land, or structure by erosion, falling debris, subsidence, slippage or inundation from any source.*

These plans are also influenced by the **Canterbury Regional Policy Statement** (Chapter 16 – Natural hazards) e.g. *Policy 11.3.5*

Comparison between the management approach of the Selwyn's neighbouring districts.

	Ashburton	Waimakariri	Hurunui - Operative	Hurunui – Proposed	Christchurch
Plan status	The Second Generation Ashburton District Plan was made operative on 7 August 2014. Plan change 1 was adopted on 6 April 2017. This incorporated into the Plan text however does not appear relevant to the management of natural hazards.	The Waimakariri District Plan was made operative on 3 November 2005. The Waimakariri District Council is reviewing its District Plan; this process will build on the previous 'rolling review' of the Plan.	The operative Hurunui District Plan was made operative on 7th August 2003.	The proposed Hurunui Operative Plan as amended by Decisions on Submissions (October 2016) was publicly notified on 15 October 2016. The Council has received six appeals on the Decisions Version of the Proposed Plan. The chapters directly affected are 3, 4, 5, 7, 11, 12, 13, 15, 17 and 20. There are no natural hazard issues that remain to be resolved.	The Christchurch District Plan includes all planning maps, provisions, features and zoning made operative up to and including 7 July 2017.
Overview of approach	The focus with regard to natural hazards is largely on flooding, geotechnical risk is not considered as comprehensively. The objectives and policies relating to natural hazards relate to protection (of life and infrastructure) from natural hazards, through avoidance or mitigation of adverse effects. Rules to achieve this are primarily through controlling subdivision; the activity status of subdivision varies based on zone. The controlled activity rule, includes as a matter of control avoidance and mitigation of natural hazards. The discretionary and non-complying rules include as assessment matters consideration of subsidence and the likelihood of development being threatened by natural hazards.	The Waimakariri District Plan also has quite a developed and comprehensive approach to managing geotechnical risk, in that specific risks and identified within the plan framework. This is possible because they have a reasonable base of information[42]. Within the Plan, it is noted that '*It has been agreed with the Canterbury Regional Council that the information currently available is too general to support land use controls. The fault lines are not accurately known and the extent and nature of liquefaction requires further study …. there is still the potential for an earthquake hazard to occur and damage in the urban areas is a likely outcome from consequent ground shaking*'. The objectives and policy in Chapter 8 (Natural Hazards) seek to minimise potential damage and disruption to existing communities. Other objectives and policies are consistent with avoiding or mitigating risk associated with natural hazards. The rules of the Plan controlling subdivision are one of the means of managing risk.	As with the other plans, rules are a key method of managing geotechnical risk. Non-regulatory methods include co-ordination with the Regional Council to obtain information, consultation with Civil Defence Information gathering and assessments of natural hazards and development of a natural hazards database on the Council's geographic information system. The Plan notes: *The aim is to minimise the risks from natural hazards and hazardous substances to levels acceptable to the community.' (p.089)*	The approach is similar to this in the operative Plan, however it appears to build on information that has been gained since that plan was developed to refine the approach. Within the Plan is a useful overview: *The framework in the District Plan recognises the difference in knowledge. Where detailed fault mapping has been undertaken the District Plan identifies these faults and a buffer zone around these faults as being a 'Fault Avoidance Zone'. Subdivision, use and development within these fault avoidance zones are restricted. It is expected that geotechnical analysis to identify the exact location of the fault trace would be required and any built infrastructure is designed and situated to ensure that it can withstand the damaging effects of earth shaking.* *For other faults identified within the District Plan, where detailed geotechnical analysis has not been undertaken, a Fault Awareness Zone has been included within the District Plan. Because the knowledge of these faults is not as comprehensive, and the exact location of the fault or fold is unknown, a larger buffer zone has been applied. Building within the*	The introduction to this chapter provides a useful summary of their approach (**5.1 Introduction**). The key points being that CCC take a risk-based" approach within their district plan: *Risk is expressed in a number of ways. For example, in areas at risk from slope instability such as cliff collapse, rockfall, or mass movement, it is the degree of risk to people's lives that is of primary concern. In most areas at risk from flooding, the primary concern relates to damage to property and how often this may occur (***5.1 g***)* In areas of slope instability, risk is expressed as an "Annual Individual Fatality Risk" or AIFR. In areas where there is likely to be a liquefaction risk to property, no specific measure of risk is applied. *'The level of control over activities in the District Plan is related to the consequence of the various natural hazards and whether such risks are considered to be acceptable or not. There is also a category in between where following proper assessment risk may be able*

[42] As is noted in the Plan: "*The Council has completed stage one of an Earthquake Hazard Analysis which focused on identifying historical seismicity and active faults (November 1995). This study identified liquefaction and its associated ground damage effects as a potential significant threat to the areas in the east of the District. Stage two of the Analysis is intended to:*

- *assess the distribution of sediment susceptible to liquefaction;*
- *identify earthquake intensities likely to promote liquefaction;*
- *identify areas with the potential to liquefy under different intensity earthquakes; and*
- *help assess the risks of liquefaction to key lifelines such as water, sewerage, power, telephone, roads and bridges. Lateral spreading affects areas next to streams, rivers, ponds and the coast where there is low lateral ground support."*

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		There is a liquefaction performance standard, in both the natural hazard and subdivision chapters and an associated Liquefaction Mitigation Design Standards (**Table 27.2, and Table 32.2**).		*Fault Awareness Zone is a permitted activity. However, geotechnical analysis is expected at the time of subdivision or plan change.* (**Explanation to Policy 5.4**)	*to be managed such that the risk is reduced to acceptable levels' (5.1 k)* *In locations where the risk from natural hazards is considered to be unacceptable and such risks cannot practically be reduced to acceptable levels, new activities in those areas are generally to be avoided. This includes areas such as Cliff Collapse Management Area 1, Cliff Collapse Management Area 2 and Rockfall Management Area 1, but also includes adjacent areas where risk cannot be adequately remedied or mitigated. (5.1 l).* In summary, the Plan has a very comprehensive approach to managing geotechnical risk that appears to be based on technical information.
Specific natural hazards chapter?	No – However,there are references to natural hazards in **Rural Zones** (Chapter 3), **Residential Zones** (Chapter 4), **Subdivision** (Chapter 9) and **Utilities, Energy and Designations** (Chapter 14).	Yes - **Chapter 8** contains objectives and policies and **Chapter 27** contains rules.	Yes – the chapter titled **Hazards Mitigation**	Yes - **Chapter 15** which includes both objectives and policies and rules	Yes - **Chapter 5** which includes both objectives and policies and rules.
Specific overlays?	No.	No.	**Definite Active Fault, Trace Definite Fault Trace, Possible Minor or Propagating Fault Trace, Hanmer Ground Hazard Zone** Also note: further details are in **Appendix A9.1 Schedule of Natural Hazard Areas**	**Faults and Folds Fault Avoidance Zone Fault Awareness Zone Liquefaction Assessment Zone, Hanmer Springs Hazard Zones** Also note: further details are in **Appendix 15.1 – Schedule of Natural Hazard Areas**	**Liquefaction Management Area (LMA), Slope Instability Management Area, Rockfall Management Area, Cliff Collapse Management Area, Mass Movement Management Area**
Provisions requiring geotech assessment ?	No.	A matter of discretion (for subdivision that is Restricted Discretionary) includes the the outcomes of a comprehensive geotechnical investigation (**e.g. for Rules 32.2.11, 32.2.13, 32.2.15**).	In some situations reports may be commissioned (C1.1.5) Assessment criteria (C1.2.3) includes any recommendations from a qualified professional such as a specialist engineering geologist or geotechnical engineer.	Assessment criteria (15.5) for consents that fall under the natural hazards rules include any recommendations from specialist engineering geologist or geotechnical engineer.	Applicants will be required to supply the results of a detailed geotechnical investigation and interpretation for resource consent applications in Liquefaction Management Area and Slope Instability Management Areas**.**
Context of natural hazards in the region	*Fault lines run through the Ashburton District and their existence means that the District is vulnerable to earthquakes. Potentially an earthquake could cause devastation from the High Country to the coastline. (**3.25 Natural Hazards, p.3-15**)* *In Ashburton District the main natural hazards relate to …However other hazards can also occur in relation to landslip, rockfall, alluvion, avulsion, unconsolidated fill, subsidence and contamination (**9.2.4**).*		**Chapter – Hazards Mitigation** There are a range of natural occurrences which impact, or have the potential to impact, on the Hurunui District, including …slope failure ….and earthquakes. (p.089) (b) Specific local issues which need addressing include: – *Active faulting within the Cheviot and Hanmer Basins – Slope hazard around Hanmer Springs – …, Leithfield Beach and Gore Bay – Cliff erosion at Motunau – …* (p.089)	**15.1 Introduction** … *The primary events that give rise to natural hazards within the district are events such as storms and the resulting … earthquakes and the associated damage from ground deformation, liquefaction, subsidence and earth shaking;.*	
Relevant Definitions	**Altitudinal Land Use Line** *relates to land defined on the Planning Maps. This definition is generally only used in the High Country/Rural C Zone.* There are also references to natural hazards in the definitions for: **Utility**	**Increased Liquefaction Vulnerability** *means an area identified by The Earthquake Commission where the ground surface has subsided due to the 2010/11 Canterbury Earthquakes resulting in the ground surface being closer to the groundwater table than prior to the earthquakes, and where there is*	**Natural hazard** has the same meaning as given in section 2 of the Act (see Appendix E6 below) **Natural Hazard Area** *means an identified area in which the risks from a specified natural hazard have been determined to be unacceptable because of the frequency and*	***Natural hazard*** *- means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property or other aspects of the environment.*	***Annual individual facility risk*** *- means the probability or likelihood that an individual will be killed at their place of residence in any one year as a result of cliff collapse, rock fall/boulder roll or mass movement.*

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		consequently an increased future vulnerability to liquefaction hazard **Liquefaction** *means the temporary transformation of soil from a solid state to a liquefied state as a result of ground shaking.* **Natural Hazard** Same as Section 2 RMA definition. There are also references to natural hazards in the definitions for: ***Utility, Net Residential Density***	*magnitude of the hazard in relation to the adverse effects that the use and development of the affected land may have on community safety, changes in the level of risks in other areas or impacts on the environment in general*	***Natural hazard area -*** *means an area identified as being subject to natural hazards on the planning maps.*	
Information required for resource consents	**Section 1: Introduction** *The following information shall be submitted with any application for resource consent:* • *A description of the site including … natural hazards.* • *…where natural hazards are identified, the proposed methods to avoid, remedy or mitigate the hazard.*	**36.1.4** *All plans shall show as a minimum:* *f. Hazards: All hazards should be identified and the means of avoiding, remedying or mitigating adverse effects of the activity specified.* **36.3 Assessment of Effects** **36.3.2 ….** *In addition to those matters specified in the Fourth Schedule, assessments should include, where appropriate, an assessment of effects on:* *g. natural hazards;*	**<u>Chapter – C1 – Resource consent procedures</u>** **C1.1.5 Supplementary information –** *… b) Commissioned reports* Where the Council is of the opinion that any significant adverse environmental effect may result from a proposed activity, the Council may also commission a report on any matters raised in relation to an application, including a review of any information provided in that application. The purpose of any review would be to: … (*iii) Identify and assess any natural hazard or the use or storage of any hazardous substance pertaining to the proposed activity, including reasonable measures to mitigate any potential adverse environmental effect* (p.006) **C1.1.6 Specific information accompanying subdivision consent applications** (e) Plan(s) drawn to an identified scale, preferably on either A3 or A4 sized paper, containing sufficient information to adequately define:… *areas of land that may be subject to frequent… landslip or subsidence, or are within an identified natural hazard high risk area*		**Additional information required for resource consent applications in the Liquefaction Management Area where a geotechnical report is required (5.7.1)** Liquefaction potential *Applicants will be required to supply the results of a detailed geotechnical investigation and interpretation. The level of investigation should correspond with the scale and significance of the liquefaction hazard* (including the information detailed under (i.-iii))… *All geotechnical reports in respect of liquefaction potential are to be prepared by a Chartered Professional Engineer with experience in geotechnical engineering or a Professional Engineering Geologist (IPENZ registered), and should contain all relevant geotechnical information, presented in both a factual and interpretive manner.* **Additional information requirements for resource consent applications within Slope Instability Management Areas (5.7.2) -** Similar to above. **Additional information requirements for all resource consent applications for subdivision (5.7.3)** Information required regarding liquefaction potential in 'Liquefaction Management Area'. *a. At subdivision consent application stage, detailed liquefaction susceptibility assessment and reporting … specified in Ministry of Business, Innovation and Employment (December 2012): Part D of "Guidance: Repairing and rebuilding houses affected by the Canterbury Earthquakes": Guidelines for the geotechnical investigation and assessment of subdivisions in the Canterbury region: Minimum requirements for geotechnical assessment*

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					for land development ('flatland 'areas' of the Canterbury region). *b. Subdivision consent applications will be required to include sufficient information and proposed measures to satisfy the Council that liquefaction risk (if present) can be adequately avoided, remedied or mitigated, including the potential effects of lateral spread within 200 metres of the edges of rivers, streams, lakes, wetlands, stormwater detention areas, swales or other areas with a sharp change in ground elevation.* *c. Subdivision plans shall show:* *i. any areas which require particular ground strengthening or other mitigation measures, and recommendations for such mitigation;* *ii. any areas which should be excluded from built development due to geotechnical constraints, or which require geotechnical setbacks; and* *iii. any features of subdivision layout recommended by the geotechnical engineer, for example any recommended locations for proposed land uses, transport features and other infrastructure as a result of geotechnical constraints.* *d. All geotechnical reports with respect to liquefaction potential are to be prepared by a Chartered Professional Engineer with experience in geotechnical engineering, or a Professional Engineering Geologist (IPENZ registered), and should contain all relevant geotechnical information, presented in both a factual and interpretive manner*
Objectives and polices	**Chapter 3 - Rural** **Objective 3.7 Natural Hazards in Rural Areas** *Minimise loss of life or serious injury, damage to assets or infrastructure, or disruption to the community from natural hazards.* **Policies 3.7A to Policy 3.7D** relate to the above objective, addressing … natural hazard mitigation activities. *In addition to the protection of life and assets from natural hazards, Policy 3.7D[43] acknowledges that activities and structures*	**Chapter 8 - Natural Hazards** *Issue 8.1 and its associated provisions, recognise the important role of people's own actions as individuals in exacerbating, and in avoiding or mitigating, a natural hazard.* *Issue 8.3 specifically addresses the seismic hazard. It has been agreed with the Canterbury Regional Council that the information currently available is too general to support land use controls…Non-regulatory methods are proposed to increase understanding of seismic hazards.*	**Chapter - Efficient Resource Use** In the explanation for objective 12 and related policies (12.1 – 12.3), is reference to - *'The pattern of subdivision influences the future use of the land area. For example, the size and shape of lots often have a direct correlation with the range of uses to which the land can be put. Such uses can impact upon ecosystems and thus raise many issues of potential concern such as environmental values and natural hazards mitigation. Efficient subdivision will help to minimise adverse*	**Chapter 4 - Settlements** **(General) Objective 4** - Adaptive, vibrant and healthy settlements that meet the economic, social and cultural needs of the district and North Canterbury; while retaining their own character, environmental quality and sense of community. **(General) Policy 4.1** - *To identify areas for residential, business and industrial development which provide for the present and future urban development needs of the district, provided that: … (vi) Any potential*	**Chapter 3 – Natural Hazards** This chapter refers to **Objective 3.3.6** which reads: *a. New subdivision, use and development (other than new critical infrastructure or strategic infrastructure to which paragraph b. applies):* *i. is to be avoided in areas where the risks from natural hazards to people, property and infrastructure are assessed as being unacceptable; and*

[43] ***Policy 3.7D*** *Avoid adverse effects from natural hazard mitigation activities on the natural character and values of the environment and any cultural values.*

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	used to minimise the effects of a natural hazard may also create adverse effects on the environment themselves. The anticipated environmental result (3.5) includes '*protection from natural hazards*'. **Chapter 4 - Residential** In assessing the future residential needs of the District for growth of urban environments, the Council will have regard to: … avoidance of significant risk from natural hazards (**Explanation and Reasons to Objective 4.2, Policies 4.2A – 4.2D**). **Objective 4.3 Natural Hazards** *To avoid or mitigate potential effects of natural hazards on residential areas and development.* **Policy 4.3A** *Consideration of risk from natural hazards when managing growth and development of residential areas, including avoidance of residential development in areas of high natural hazard risk.* **Explanation and Reasons** … Policy 4.3A addresses this matter (potential to be at risk from natural hazards) by ensuring that the potential risks including earthquakes … are considered in all areas. *…It is anticipated that, where possible, residential development will avoid natural hazard risk and provisions are included to ensure this e.g. setbacks from water bodies or the coast and minimum floor heights for new development and extensions to existing buildings.* The anticipated environmental results (4.5) includes '*protection of property and lives from the effects of natural hazards'.* **Chapter 9 - Subdivision** [Subdivision] *can also increase the risks associated with the potential exposure to natural hazards, and can affect wider environmental values associated with landscape, vegetation, and other significant natural and cultural features.* **9.2.3 Servicing** **Lifelines**	**Objective 8.3.1** *Increase Council and community understanding of the earthquake risk and associated natural hazard.* **Policy 8.3.1.1** *Identify areas which are at risk from liquefaction, associated ground damage effects, and amplified ground shaking.* **Methods** include research/information collection, liaison (with ECan) and information. **Anticipated Environmental Results** include: '*Increased awareness of potential natural events, including seismic' and 'Natural hazards are mitigated by the precautions taken by and on behalf of the community and appropriate actions during and after an event'.* **Other Chapters** ***Chapter 13: Resource Management Framework*** ***Policy 13.1.1.2*** *Avoid, remedy or mitigate the adverse effects of the development of Residential 4A and 4B Zones by limiting the establishment of new zones to locations where the subdivision and development will not:* *a. adversely affect significant natural and physical resources;* *b. exacerbate damage from natural hazards (including flood damage); and* *c. create conflict with neighbouring land uses.* ***Explanation*** *…The effect on natural hazards is potentially two fold: the susceptibility of development within the zone to damage and secondly the effect that the development has on the frequency and magnitude of the hazard off the site. An example is, those damages arising from flooding (Policy 8.2.1.3).* **Policy 15.1.4.1 Urban Development – Comprehensive Residential Development** *Integrate new development, subdivision and activities in a way that maintains and enhances form, function and amenity values through:* (a.– h.) *Whilst recognising the need to mitigate the adverse effects of natural hazards and how this will influence development design and layout .* **Chapter 17: Residential zones** **Policy 17.1.2.2 Offsite Amenity – Comprehensive Residential Development.**	*effects and maximise the potential to which land can be used.'* **Chapter - Hazards Mitigation** **Objective 14/Policies 14.1 - 14.6** – each policy is also associated with a list of methods to implement the policy and an explanation. **Objective 14** - *The avoidance or mitigation of the adverse effects of natural hazards on the environment, with priority on community protection.* (p.090) **Policy 14.1** relates to taking an integrates approach to management, **Policy 4.2** is to maintain a database on the susceptibility of certain areas in the District, **Policy 14.6** is to encourage people to be prepared for hazardous events. **Policy 14.3** is to '*ensure that new subdivision and development takes into account any risks from natural hazards*'. The **methods** to implement this include: district plan rules , including '*environmental standards relating to natural hazards, subdivision and land use (refer to Rules A3.3(m), A3.5(b), A4.3.2(b)–(c), Section A9 – Natural Hazards, in particular Rules A9.2 and A4.2.2(f), C1.2.4(h) and C1.2.5(b), (c) and (e))*'. The **explanation** states that ' *a significant factor in the avoidance or mitigation of natural hazards is the degree to which subdivision is allowed to occur in areas which may be susceptible to natural hazards … standards, along with the subdivision consent process, are necessary to prevent such subdivision and development occurring within high risk areas.*' **Policy 4.4** is to '*establish special standards for land use activities proposing to locate in areas of high potential risk*.' **Policy 4.5** is to '*promote risk reduction measures where existing activities are located in areas of high existing or potential risk'.* The **methods** to implement both of these policies are: District Plan Rules including '*including environmental standards relating to natural hazards (refer to Rules A3.3(m), A3.5(b), A9 – Natural Hazards, particularly Rules A9.2, C1.2.4(h) and C1.2.5(b), (c) and (e))*' and the provision of information and advice. The explanation states that '*Risk assessment is an important aspect of natural hazards management. It concerns identifying the probability of an outcome and estimating the magnitude (the severity and likely impact) of the event. As there is always some uncertainty in assessing such risk, District Plan rules will*	*effects of natural hazards are avoided or mitigated.* **(General) Policy 4.5** - *To recognise that some settlements have been developed in locations subject to natural hazards, especially flooding and coastal erosion, which may be exacerbated by climate change, and to discourage further development or investment of public resources in these areas, particularly seaward of coastal hazard lines.* **(Hanmer Spring) Policy 4.25** - *To enable subdivision, land development and other activities on the rural land bounded by Argelins Road, Queen Mary Centre grounds and the St James Estate residential area that maintains or enhances the area's landscape, conservation, amenity values while recognizing the fault hazard present on the site.* **(Mt Lyford) Objective 4.3** *An environmentally sensitive development that avoids natural hazards and protects the natural values of Mount Lyford.* **(Mt Lyford) Policy 4.42** *To establish standards to manage activities that will create natural hazards or other risks.* **Chapter 15 - Natural Hazards** **Objective 15.1** *Subdivision, use and development of land is enabled while avoiding or mitigating the adverse effects of natural hazards.* **Policy 15.1** is to *'avoid new subdivision, use and development of land in areas identified as subject to natural hazards: 1. If the he risk from the natural hazard is unacceptable, having taken into account the likelihood of the natural hazard event and the potential consequences for people, property, infrastructure and the environment, including the level of uncertainty about the likelihood or consequences; and 2. For high hazard areas, if the matters in Policy 11.3.1 of the Canterbury Regional Policy Statement 2013 are not met.* **Explanation** - *… in many situations, particularly in the rural environment, it is preferable to avoid subdivision, use or development in areas subject to natural hazards. In some cases mitigation works are a viable alternative to avoidance, particularly where the development is within a settlement (as defined in the Planning Maps) or where the natural hazard is not likely to have significant effects on built infrastructure or people and communities' health and safety. In these cases it may be appropriate to provide for additional*	*ii. in all other areas, is undertaken in a manner that ensures the risks of natural hazards to people, property and infrastructure are appropriately mitigated.* *b. New critical infrastructure or strategic infrastructure may be located in areas where the risks of natural hazards to people, property and infrastructure are otherwise assessed as being unacceptable, but only where:* *iii. there is no reasonable alternative; and* *iv. the strategic infrastructure or critical infrastructure has been designed to maintain, as far as practicable, its integrity and form during natural hazard events; and* *v. the natural hazard risks to people, property and infrastructure are appropriately mitigated.* *c. There is increased public awareness of the range and scale of natural hazard events that can affect Christchurch District.* *d. The repair of earthquake damaged land is facilitated as part of the recovery.* Of relevance are the **General natural hazards policies** (**5.2.2.1**) which relate to: avoiding new development where is unacceptable risk (**Policy 5.2.2.1.1**), managing the activities subject to natural hazards '*in a manner that is commensurate with the likelihood and consequences of a natural hazard event on life and property*' (**Policy 5.2.2.1.2**), avoiding *'locating new critical infrastructure where it is at risk of being significantly affected by a natural hazard unless, considering functional and operational requirements, there is no reasonable alternative location or method.'* (**Policy 5.2.2.1.3**) and ensuring that subdivision, use and development does not transfer or create unacceptable natural hazard risk (**Policy 5.2.2.1.4**). **Policy 5.2.2.1.6** relates to awareness of natural hazards. **Policy 5.2.2.1.8** relates to ensuring that the level of assessment undertaken reflects the 'potential scale and significance of the hazard' – this includes in regard to plan changing, rezoning etc. as well as subdivision and development.

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	While the location of a subdivision in areas least likely to be affected by natural hazards is of prime importance, infrastructure installed at the time of subdivision needs to avoid or reduce the risk of exposure to natural hazards that would interrupt the service. **9.2.4 Hazards** *Land that is or could potentially be affected by hazards may not always be suitable for subdivision…* **Chapter 14 - Utilities, Energy and Designations** Related to Objective 14.3 (Efficiency) is **Policy 14.3E** *Protect utilities, and minimise the potential for damage, from natural hazards.* The 'Explanation and Reasons' include - *Reticulation may signal development in areas which is unsustainable in terms of energy use, soil protection, groundwater qualities, visual and landscape amenity, natural hazards or for other reasons. However, servicing of areas may also be unavoidable and necessary to protect groundwater qualities, supply and public health … The Plan therefore seeks to avoid utilities infrastructure being placed at undue risk of damage or disruption as a consequence of the impacts of natural hazards.*	*Residential amenity for adjoining sites and areas will be maintained or enhanced through: a. ensuring the amenity and safety of adjoining sites, streets, open spaces and other areas are not adversely affected by development, in particular by: ii. significant loss of privacy whilst recognising any need to provide for raised floor levels, foundation and building designs and ground preparation that mitigate the adverse effects of natural hazards;* **Chapter 18: Constraints on Development and Subdivision** **Policy 18.1.1.1** *Growth and development proposals should provide an assessment of how: ….* *In particular, proposals should not be inconsistent with other objectives and policies in the District Plan, and show how and the extent to which they will:* *c. avoid or mitigate natural hazards including:* - *…* - *seismic conditions including the potential for liquefaction and amplification effects,* - *…* - *land instability;* **Policy 18.1.1.5** *Avoid urban subdivision and development within the area adjacent to Kaiapoi shown on District Plan Maps 59, 68, 69, 104, 105, 106 and 107.* **Explanation** (to Policy 18.1.1.5) *Further, consideration is also needed of the ability of any urban subdivision and development to avoid, remedy or mitigate adverse effects of natural hazards on the future uses of this land.* *CROSS REFERENCE: Rule 32.4.2* (a non-complying rule for subdivision in identified areas). **Policies 18.1.1.6 – 8** intend to limit subdivision in Waikuku Beach including the Allin Drive area, Woodend Beach and Pines/Kairaki Beach settlements, *which have limited potential for further urban development. … Some areas are potentially at a risk from t… earthquake induced ground liquefaction…* CROSS REFERENCE: Rules 32.1.1.6, 32.1.1.7, 32.4.2 and Policy 7.1.1.2.	*apply conservative controls where the estimated magnitude of an event would be great… For existing activities, Council will encourage risk reduction measures so that any adverse effects from natural hazards can be minimised. Areas of existing or potential high risk are identified in the Schedule of Natural Hazard Areas in Appendix A9.'* **Anticipated environmental results** of this policy framework is: the mitigation of adverse environmental effects of natural hazards; prevention of development increasing the levels of risk; and informed communities. **Environments of special concern** **Chapter - Issue 16 – Urban Areas - Urban boundaries** - *In determining appropriate boundaries to the District's townships, the following matters have been taken into account: … Other relevant matters, such as natural hazards, special physical features and barriers, and protected features or landscapes* (p.004) **Chapter – Issue 20 – Mount Lyford** **Issue 2 '***The increased risk of natural hazards from development.*' The Mount Lyford area is a sensitive mountain environment that is characterised by areas prone to erosion, land slippage and subsidence. Subdivision, buildings and activities, especially activities incorporating active recreation, have the potential to create risks or exacerbate existing natural hazards. **Explanation** to Policy 20.1 (*To make provision for a range of compatible activities that are contained within defined areas in accordance with the structure plan developed for Mount Lyford*) includes '*The structure plan by identifying character areas provides for the different components of the development in areas that are appropriate to each according to the environmental conditions and natural character of the area, including sensitivity to natural hazards and conservation values*' (p.049). **Policy 20.4** is '*To establish standards to manage activities that will create natural hazards or other risks*' (p.050). To be implemented through '*District Plan criteria for identifying and assessing risks from natural hazards in each character area (refer to the rules in Sections A9 – Natural Hazards including Appendix A9, and Procedures C1.2.5(e))'.* **Explanation** – '*The mountain environment is prone to land slips, subsidence and*	*subdivision use or development as long as the negative effects can be managed so that the risks from the natural hazard.* *Policy 15.1 of this section provides an overarching policy to guide the subdivision, use and development of land. This Policy is very similar to Policy 11.3.5 within the Canterbury Regional Policy Statement and applies across all natural hazards. In any natural hazard areas that meet the definition of a 'high hazard area', the specific direction in the Policy Statement for these areas must be followed. While Policy 15.1 provides general direction, more specific policy guidance is provided for specific natural hazards below.* **Policy 15.4** *To avoid the development of land within any Fault Awareness Zones for post emergency infrastructure or infrastructure which large numbers of people congregate in, unless that infrastructure has been appropriately designed and sited in relation to the fault hazard.* **Explanation** *There are numerous other active faults and folds (a fold is where a fault does not reach the ground surface) which have been identified within the district, which have a longer recurrence interval and it is expected that there are other active faults within the district which are present but are as yet unidentified because their surface expression is masked by more recent geological activity…. The Hope Fault and its subsidiary, the Hanmer Fault, have been modelled and mapping has been carried out on them within the Hanmer Springs and Mt Lyford villages. Other faults have been identified through a range of other studies, but the knowledge of the location and return interval of these faults is much less than that of the Hope and Hanmer Faults in Hanmer Springs and Mt Lyford.* **Policy 15.6** *Mitigation works to minimise the effects of natural hazards shall be undertaken in a way which avoids, remedies or mitigates adverse effects on cultural, social and environmental values and the health and safety of communities* **Policy 15.8** *To recognise that climate change could alter the frequency and duration of some natural hazard events. Any mitigation works should take into consideration the need to be precautionary given the uncertainties as to the magnitude of effects from climate change.*	The **policy for managing risk from Liquefaction** (**Policy 5.2.2.4**) – *a. Map the Liquefaction Management Area based on a district-wide assessment of where damaging liquefaction is more likely to occur*; and *b. Provide for rezoning, subdivision, use and development on flat land where liquefaction risk has been appropriately identified and assessed, and can be adequately remedied or mitigated.* And **Policies for managing risk from slope instability** (**5.2.2.4**) relating to: Slope instability (**Policy 5.2.2.4.1**), Site-specific risk assessment for AIFR Certificates4 in certain areas potentially affected by rockfall and/or cliff collapse (**Policy 5.2.2.4.2**) and Slope instability for all of the Port Hills and Banks Peninsula (**Policy 5.2.2.4.3**)

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			avalanches. Activities proposed in Mount Lyford can exacerbate existing hazards or introduce significant new risks. No activity proposed should be allowed to cause, or increase the risks from, erosion, landslip or any other natural hazard. The most effective method to implement this policy is to integrate consideration of natural hazard issues as part of the resource consent process, and to impose such conditions as are appropriate to avoid, remedy or mitigate any potential adverse effects from natural hazards.' **Anticipated Environmental Results** include '*Development of activities that do not exacerbate or create new natural hazards'*. **Chapter – Issue 22 – Buxton Valley** **Issue 6** is '*Increased risk of natural hazards arising from development.' …. Overall, Buxton Valley has been assessed as stable with an absence of any significant areas of instability due to slippage or subsidence. Flooding and seismic events are not anticipated to be significant natural hazards in relation to this site.*	*New subdivision, use and development should consider the consequences of a mean sea-level rise of at least 0.8m relative to the 1980-1999 average.* ***Explanation*** *The majority of the international science community now agrees that global climate change is occurring. However, there is still uncertainty as to the magnitude of the future effects of this climate change and the extent to which human activities are causing this change in the global climate system. Despite this uncertainty the Council recognises that climate change can exacerbate some natural hazards like flooding and sea water inundation, therefore mitigation measures that are developed are constructed in such a way that they take into account the likely effects of this change.* **Policy 15.9** *To assess the risks of natural hazards prior to land being rezoned and to avoid or mitigate those risks.* **Explanation** *The Council's knowledge of the natural hazards that may affect the district is not perfect. It is recognised that the most in-depth studies have occurred within the area's which are already zoned for urban purposes. Prior to any new land being rezoned a full assessment of natural hazard risks should be undertaken and any mitigation works which are required are included within the District Plan. It is generally expected that any mitigation required will be constructed prior to the construction of any other built infrastructure, particularly dwellings.*	
Rules and/or Assessment matters	**Chapter 3 - Rural** Relate to flood risk (3.10.4 and site standard 3.9.9), geoconservation sites (3.9.13, 3.10.14, 3.19.15), the Altitudinal Land Use Line (3.9.14). In regard to 'Tree Planting, Earthworks, Deposition of Clean fill and Buildings' an assessment matter is *'Effects on …natural hazards…' (3.11.11 v).* **Chapter 4 - Residential** Rules relate to hut settlements (development is limited). Reasons for these rules are in 4.7.1 and 4.7.16. **Chapter 9 - Subdivision**	**Chapter 27 - Natural Hazards** A land use is permitted if it is not specifically identified elsewhere; complies with the conditions under Rule 27.1.1; and all other conditions in other chapters (**27.1**). **Conditions – Rule 27.1.1** 27.1.1.1 - 14 and 27.1.1.17-31 relate to setbacks from water bodies and floor level in identified areas (27.1.1.14 also notes a building platform) **27.1.1.16** *Within the Residential 6, 6A and Business 1 Zones at Pegasus any dwellinghouse shall be located, designed and constructed in a manner which achieves the standards set out in Table 27.2 below, having regard to the potential for earthquake induced*	**Chapter - A3 – Subdivision** - *Rules A3.3(m), A3.5(b)* **A3.3 Matter relating to controlled activities** - The matters over which the Council reserves control for the purpose of assessment in relation to an application for subdivision consent as a controlled activity are: … *(m) Whether the allotment would lead to the exacerbation of the risks from natural hazards and the mitigation of such effects, including whether the allotment has an adequate building platform to allow a complying building to be constructed that will not be subject to unacceptable risks from natural hazards or will significantly exacerbate the risks to other properties and people.*	**Chapter 4 - Settlements** **4.7 Discretionary Activities (restricted)** – 4. *Any earthworks or erecting any building on land which is legally described as Lot 10 DP 4736, provided that the activity complies with all other relevant rules in this District Plan.* **The Council will restrict its discretion to the following matters**: (*a) Whether the land is or is likely to be subject to seawater inundation or run-up, and whether, as a result, the land use shall create or exacerbate any potential natural hazard, and any conditions which may be imposed to avoid, or mitigate any potential natural hazard.* **Chapter 5 – Subdivision** **5.4.1 Controlled Activities.** *Unless specified as a restricted discretionary activity or a*	**5.5 Rules – Liquefaction hazard** has a Permitted, Controlled and Restricted Discretionary framework. Reference the '*Liquefaction Management Area*'. **5.6 Rules – Slope instability.** Table 5.6.1.1a determines the activity status for '*Slope Instability Management Areas*'. **Matters of control for C1 to C6 activities (5.6.1.4)** include iii. The mitigation of effects as they impact slope instability hazards. These Controlled activities will be assessed against: *i. Whether proposed earthworks could trigger slope instability or exacerbate risk posed by natural hazard(s) to people or property, and any measures required to avoid or mitigate that risk; ii. Measures proposed to reinstate*

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	Rule 9.7.3.a Any subdivision in the Open Space Zones, Business Zones or for utilities is a Controlled Activity. Matters of control includes '*natural hazards avoidance or mitigation*'. **Rule 9.7.5.b** Any Subdivision in the Rural C Zone is Discretionary. **Rule 9.7.6.c** Any subdivision within Barrhill or Lauriston is Non-Complying **Rule 9.7.6.d** Any subdivision in the Residential B Zone at Lake Clearwater, or the Hakatere, Rakaia, and Rangitata Hut Settlements is Non-Complying. NB: No general standards(9.8)or critical standards(9.9) relate to natural hazards (other than flooding, there is a standard relating to a 1 in 200 year flood event) The reasons for rules relating to allotment sizes and boundary adjustments (9.6.6) notes that *further subdivision of the hut settlements is currently not feasible as a result of a combination of factors at each of these settlements; including significant risks from natural hazards, sewage disposal limitations, lack of space within the areas zoned for residential activities, and a need to protect the natural character of their coastal or lakeside settings.* Assessment matters in regard to 'Natural Hazards and Flooding and Overland Flow of Water' (**9.10.6**) include: *d) in relation to erosion, falling debris, subsidence or slippage, the need for ongoing conditions* *aimed at avoiding, remedying or mitigating future potential adverse effects, and any need for registration of consent notices on the allotment's Title (Computer Registers).* *e) In relation to subsidence, the provision of suitability certificates, such as NZS 4431, or if not appropriate, the setting of ongoing conditions, with consent notices registered on the Title (Computer Registers).* *g. The likelihood of the proposed subdivision, including the establishment of potential assets such as residential units, being threatened by natural hazards including inundation or coastal erosion.*	*liquefaction of the ground on which the dwellinghouse is to be located, and the potential effects of associated ground settlement and lateral spreading of the ground*. Table 27.2: Liquefaction Mitigation Design Standards Maximum Permanent Ground Movement Design Earthquake Return Period: 150 years; Settlement: 100mm; Lateral Movement: 250mm There are some exemptions to these (27.1.2). **Matters of discretion** for restricted discretionary activities include mitigation measures (27.2.4). "NOTE: Within the Residential 6, 6A and Business 1 Zones at Pegasus any structure other than a dwellinghouse, will be required to comply with the provisions of the Building Act 2004 in respect of the effects of the liquefaction." There are also discretionary (**27.3**) and non-complying (**27.4**) rules. **Other Chapters** **Chapter 23: Land and Water Margins** **23.1.1.9** relates to earthworks associated with the repair of land damaged by the 2010/11 Canterbury Earthquakes, reference Increased Liquefaction Vulnerability (ILV). **Restricted Discretionary** **23.3.9** *Any land use involving earthworks and building within the Kaiapoi Business 5 Zone shown on District Plan Map 170 shall be a discretionary activity (restricted), except where a comprehensive geotechnical investigation and assessment has been undertaken and authorised pursuant to a subdivision consent under Rule 32.2.15.* Matters to which discretion is restricted includes i. *the potential impacts of liquefaction, lateral spread and uncertified fill on land, properties, utility services, roading and buildings, as determined by a comprehensive geotechnical investigation …* **Discretionary. Activities** **32.3.2** *Except as provided for by Rules 32.2.11 or 32.4 any subdivision of land within the West Kaiapoi Outline Development Plan area shown on District Plan Map 164 that results in any*	**A3.5 Discretionary Activities (unrestricted)** *(b) Subdivision of land: … (ii)within a natural hazard area …. (iv)within the Buxton Valley Management Area, subdivision where the road layout is not in accordance with the Outline Development Plan for the Buxton Valley… p*rovided that the subdivision complies with the standards and terms for subdivision as a controlled activity. (i) Subdivision in the Mount Lyford Management Area which is not listed as a controlled or non complying activity **Chapter – A4 – Esplanade reserves and strips** -Rules *A4.3.2(b)–(c), A4.2.2(f)* ***A4.3.2*** *The width of an esplanade reserve or esplanade strip required under A4.1 and A4.2 may be varied in the following circumstances: … (f) The land is within a Natural Hazard Area or where there is an identified risk from one or more natural hazards (such as coastal erosion); or …* **Chapter - A9 - Natural Hazards** - *Rules A9.2 and A9.3* **A9.2 Conditions for permitted activities** *(a) In areas listed in Appendix A9.1 Schedule of Natural Hazard Areas, there is to be no siting, erection, replacement of, or extension to, any building or structure except for: community amenity structures, fencing, farm accessory buildings, normal maintenance which does not alter the character, intensity or scale of the existing building or structure* **A9.3 Discretionary activities** - *Any activity that does not meet any one or more of the conditions for permitted activities under Rule A9.2.* *In assessing applications for resource consent, Council will consider the relevant criteria in Section C1.2, in addition to any other relevant matters.* **Chapter - B1 – Urban areas** B1.3 Discretionary Activities (restricted) - B1.3.1 Comprehensive Development Zone – Claverley *Any earthworks or erecting any building on land which is legally described as Lot 10 DP 4736.* **Restriction on discretion** *(a) Whether the land is or is likely to be subject to seawater inundation or run-up, and whether, as a result,*	*discretionary activity, any subdivision that complies with the standards for controlled activities in Rule 5.4.2 is a controlled activity.* **Matters of control** The matters over which the Council reserves control for the purpose of assessment in relation to an application for subdivision consent as a controlled activity are*: … 12. Whether the allotment would lead to the exacerbation of the risks from natural hazards and the mitigation of such effects, including whether the allotment has an adequate building platform to allow a complying building to be constructed that will not be subject to unacceptable risks from natural hazards or will significantly exacerbate the risks to other properties and people.* Subdivision in Rural Zones (Part A) **5.4.5 Discretionary Activities** 1. The following activities are discretionary activities, provided they meet the relevant standards… *(b) Subdivision of land within a Natural Hazard Area (refer to Appendix A15.1) or Natural Hazard Assessment and Awareness Area (refer to Appendix A15.2) that complies with the standards for controlled activities of Rule 5.4.2.* **5.4.6 Non complying Activities** *1. Subdivision which is not a … discretionary activity under Rule 5.4.5 is a non-complying activity* *2. Subdivision of land within a Natural Hazard Area* In other zones (Part b) - Similar framework to above. **5.7 Assessment Matters** *1(l) The following matters will be considered for any subdivision, where relevant: … Whether each lot has an adequate building platform to allow a complying building to be constructed that will not be subject to unacceptable risks from natural hazards or will significantly exacerbate the risks to other properties and people, including the provision of a report on natural hazard risks by an appropriately qualified and experienced person, in the event that a natural hazard is shown on the Planning Maps.* *2(m) For the assessment of multiple-lot or rural subdivision creating one or more undersized allotments, the following matters will also be considered where relevant: …. If the design and the location of lots and building sites avoids any natural hazards,*	*the excavated or filled area on completion of the earthworks to reduce the natural hazard risk(s) and ensure long-term land stability.* **Matters of control for C7 to C28 activities (5.6.1.5)** include i. – ix. which all relate to natural hazard risk, mitigation or earthworks method. These Controlled activities will be assessed against: *evaluation by a Chartered Professional Engineer with experience in geotechnical engineering, using best practice methods …including the extent to which an Annual Individual Fatality Risk of 10^{-4} (1 in 10,000) or better can be achieved), and whether appropriate monitoring procedures will be applied*. As well as other criteria (which relate to geotechnical risk) listed in ii. – ix. **Matters of discretion (5.6.1.6) and what will be assessed against is similar to what is listed above.**

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	Chapter 17 - Utilities, Energy and Designations *17.7.4 Discretionary Activities* The following activities shall be Discretionary Activities throughout the District, other than as specified in Permitted Activities: *e) Any activity listed as a Permitted Activity above, which: …* • *within the areas identified on the Planning Maps as being of significant nature conservation value, geoconservation value or subject to a natural hazard risk.* NB: No rules are included in relation to coastal hazard areas, with the rules in the Regional Coastal Environment Plan (Canterbury Regional Council) applying to these areas.	*geotechnical investigation revealing ground deformation in an SLS seismic event to be less than 50mm and in a ULS event to be less than 100mm (Technical Category TC2) shall be a discretionary activity.* **Chapter 32: Subdivision** Standards and Terms includes reference to a standard on Liquefaction (**32.1.1.78**) which includes a Liquefaction Design Mitigation Standards (**Table 32.3**) **Matters over which control** is exercised includes *vi. Hazards* and includes reference to erosion, flooding and inundation, landslip, rockfall, alluvion, avulsion, unconsolidated fill, defensible space for fire safety, soil contamination, subsidence and liquefaction. Where activities require consent based on their location (**Rules 32.2.11, 32.2.13, 32.2.15**) the **matters to which discretion is restricted** includes the '*outcome of a comprehensive geotechnical investigation and assessment undertaken by a suitably qualified Geotechnical Engineer (CPEng) to include assessment of all aspects of the risk of liquefaction and lateral spread undertaken in accordance with the most recent NZ Geotechnical Society Guidelines or an equivalent guideline/standard adopted by the District Council or the Canterbury Earthquake Recovery Authority.'*	*the land use shall create or exacerbate any potential natural hazard, and any conditions which may be imposed to avoid, or mitigate any potential natural hazard*. (p.015). **Chapter – C1 – Resource consent procedures** **C1.2 Criteria for assessing resource consent applications** – C1.2.1 Assessment for land use consents - the Council shall apply the assessment matters, where relevant … *(o) Whether features about the site make compliance difficult, including its size, shape, access, topography, geotechnical constraints, or the presence of a natural hazard or vegetation* **C1.2.3 Specific criteria for assessing subdivision consent applications –** a) The following matters will be considered, where relevant: … *(xii) Whether the lot has an adequate building platform to allow a complying building to be constructed that will not be subject to unacceptable risks from natural hazards or will significantly exacerbate the risks to other properties and people.* c) For the assessment of multiple-lot subdivision, the following matters will also be considered where relevant: … *(xvii) If the design and the location of lots and building sites avoids any natural hazards, and if not, then the nature of the activity and the degree to which it may increase the potential risk to human life, property and/or the environment.* e) Approval of discretionary activities: … *(iii) For subdivision of land within areas of outstanding landscape value, Natural Hazard Areas, or land contaminated by hazardous substances, consent may not be granted if the proposed allotment is likely to be contrary to objectives, policies and other provisions relating to the management of the areas.* h) natural hazards – *The probability and possible magnitude of an event; – The type, scale and distribution of any potential effects from the hazard(s); – The nature of the activity and the degree to which it may increase the potential risk to human life, property and/or the environment; – Any recommendations from a qualified professional such as a specialist engineering geologist or geotechnical engineer; – The outcome of any consultation undertaken with the Regional Council and any recommendations resulting from that consultation; – The extent to which a proposed development meets the objective,*	*and if not, then the nature of the activity and the degree to which it may increase the potential risk to human life, property and/or the environment.* *4(f) For a variation of width, or a waiver of an esplanade reserve or strip, the following matters will be considered …. The land is within a Natural Hazard Area or where there is an identified risk from one or more natural hazards.* **Chapter 11 – Landscape** **11.5 Assessment Criteria** When considering an application within areas identified on the Planning Maps as an Outstanding Natural Feature or Landscape and whether or not it can be granted pursuant to Part 2 of the RMA, the Council will have regard to the relevant assessment criteria: … *7. Whether it is unreasonable to require compliance with the standard, or features about the site make compliance difficult, including its size, shape, access, topography, geotechnical constraints, or the presence of a natural hazard or vegetation* **Chapter 15 - Natural Hazards** **15.4.2 Permitted activities –** *a) Any activity within a Natural Hazard Area or a Natural Hazard Assessment and Awareness Area that complies with the standards in Rule 15.4.3.* **15.4.3 Standards for permitted activities -** Various, all of which seem quite relevant. **15.4.4 Discretionary activities** - *Any activity that does not meet any one or more of the standards for permitted activities in Rule 15.4.3 and is not classified as a non-complying activity under Rule 15.4.5* **15.4.5 Non-complying activities** - *A Building of Importance located within a Fault Avoidance Zone.* **15.5 Assessment Criteria** include: 1. The probability and possible magnitude of the event; 2. The type, scale and distribution of any potential effects of the hazards; 3. The nature of the activity and the degree to which it may increase the potential risk to human life, property or the environment; 4. Any recommendations from a qualified professional such as a specialist engineering geologist or geotechnical engineer; 5. The outcome of any consultation with the Canterbury Regional Council and	

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			functional requirement and performance provisions of the New Zealand Building Code; and – Anticipated natural hazard damage and costs and the estimated benefits to the community of the proposed development. (Costs and benefits to take into account both monetary and non-monetary costs and benefits **C1.2.6 Assessment criteria for discretionary and non-complying activities**. The assessment of a restricted discretionary activity, discretionary activity or non-complying activity shall include an assessment of the following factors. Whether: *… (d) Features about the site make compliance difficult, including its size, shape, access, topography, geotechnical constraints, or the presence of a natural hazard or vegetation.*	any recommendations resulting from that consultation; 6. The extent to which a proposed development meets the objective, functional requirement and performance provisions of the New Zealand Building Code; and 7. Anticipated natural hazard damage and costs and the estimated benefits to the community of the proposed development. (Costs and benefits to take into account both monetary and non-monetary costs and benefits).	
Additional methods and approaches commentary	**<u>Ian Hyde (Building Manager via email 19/12/17)</u>** • ADC have not declined any subdivisions under Section 106 of the Act for geotechnical reasons. However, they have declined one due to flood risk in the event of the breach of a nearby stopbank. This was not necessarily geotechnical related but did turn on natural hazards. • The Council have had plenty of subdivisions which have required geotechnical input, often when combined with earthworks or where close to riverbeds, however the Council's Building Team have noted that generally, (with a few exceptions) Ashburton has quite good ground and is less likely to be affected by matters such as liquefaction than other areas. • Geotechnical hazards are also assessed at the Building Consent stage. **<u>Peter York (Resource Consents Senior Planner) (13/12/17) and via email 19/12/17</u>** • Recognised that the rules in Ashburton are pretty silent on geotechnical hazards. More recently, geotechnical assessments have been required for larger subdivision applications. However, often there is little information on file. ADC has minimal	**<u>Information from conversation with Bev (WDC) (12/12/17)</u>** **LIMS:** All LIMS include natural hazard information, including information on geotechnical hazards and any foundation requirements. • **Subdivision consents:** Housing platforms are often required as conditions of consent for those looking to build in a liquefaction area/area prone to geotechnical hazards. • Advice is provided through the building consent process- no specific details provided however. • **Website:** Current work going on with natural hazard management including erosion, earthquakes and liquefaction. There is the draft proposed Plan Change 27- Management of Natural Hazards in the Waimakariri District. Consultation including an interactive mapping system. The mapping system shows the fault lines, fault line awareness areas, and liquefaction areas. • Council has a range of functions in relation to natural hazards that include civil defence preparation and response, rural fire, provision of information through Project Information Memoranda (PIMs) and Land Information Memoranda (LIMs), building consents and infrastructure planning to promote resilience and preparation for natural hazard events.	**<u>Monique Eade (14/12/17- answers via email)</u>** • Most of the Council's natural hazards are controlled through Chapter 15 of the Proposed District Plan. E.g. Fault Awareness and Fault Avoidance Zones, Hanmer Springs Hazard zones etc. • **Measures outside of the District Plan:** Under the Building Act- Council uses Section 124 notices on properties due to earthquake damage. Some geotechnical work is being undertaken to support the landowners. • Council is supporting some restoration works in coastal communities- i.e bunds to prevent overtopping. • Community engagement sessions (especially post-earthquake). • Sea level line on hall. • Tsunami evacuation plans. **Section 106:** • Regarding subdivision applications- relative to the nature of the hazard but Council leans towards using suitable conditions to manage risk. Council usually get geotechnical assessments from the applicant reviewed by Environment Canterbury. • Council doesn't turn down applications for subdivision because of geotechnical hazards. Rather, they use suitable conditions. **Building Act** • Building Act is used- fault lines are mapped through the District Plan, however, only controls building of Category 1 and 2		**<u>Conversation with Glenda Dixon (13/12/17)</u>** • Talked about the Section 32 evaluation behind the Section 106 requirements. • Geotechnical hazards are addressed through the building consent and subdivision process. • Rock fall: Assessed through the building consent process. There is a technical expert panel who are used to peer review building consent applications for geotechnical hazards. • **Section 106:** Technical guidance is provided on the CCC website. CCC is not trying to duplicate s.106 through the District Plan, however, wanted to add additional value through the District Plan. Stated there was some opposition from MBIE to this. • Particular focus on liquefaction: where building platforms are often changed (at subdivision/consent stage) so that they avoid geotechnical hazards- similar to moving utilities so that they do not run across hazardous areas. • Stated that there are specific fault lines in the Selwyn District which would need to be covered by very specific rules. **<u>Response via email from Sean Ward (Resource Consents Team) 19/12/2017</u>** • From the resource consent team perspective the team are really only using the District Plan to manage geotechnical hazards. • Usually geotechnical hazards on sites are managed in the subdivision stage through

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	information on geotechnical hazards in the district. • The rules in the District Plan are lacking around geotechnical requirements. Larger resource consent applications (subdivisions) are now requiring geotechnical input, and ADC is aware there have been consent notices put on building platforms for specifying location due to geotechnical hazards. • ADC is working with Environment Canterbury but this has mostly been around flooding as opposed to geotechnical hazards. Under Section 9.2.4 of the District Plan there is reference to the provisions of Section 106 of the Resource Management Act 1991. Policy 9.1P and Q are of relevance. There are areas within the District, which because of the risk of natural hazards including flooding, erosion, subsidence or slippage, are unsuitable for development, or require specific measures to be undertaken to overcome these hazards.	• Information provided on their website for natural hazards mentions the Building Act and in particular Sections 71-73. **Information from Matt Bacon (Acting Planning Implementation Manager) (13/12/2017)** • Recognised the use of Section 106 as the primary way in which geotechnical hazards are managed by the Council. When CERA existed there were more specific geotechnical requirements that the Council used, Since CERA was dissolved there hasn't been a requirement for geotechnical reports from the Council. The Council relies on a Section 106 assessment (where a geotechnical report **may**be required, estimated that approximately 40% of applications have a geotechnical assessment). • The Council's engineering (Subdivision) team use their database to look at liquefaction, stability etc. databases and provide their recommendation to the planning team. • Matt does not believe that any applications have been turned down as a result of geotechnical hazards, rather they ask the applicant to assess the hazards which often results in an amended application (building location etc.). • **Building Act:** Is used (as legally required), however, for subdivisions the resource consent process has usually covered the geotechnical hazards anyway- and resulted in amended applications (building locations etc.). **Mean Sea Level:** Localised flood hazard modelling is used (Lyttleton datum). The Mean Sea Level references are old/out of date and the Council now uses flood hazard modelling when looking at filling etc.	hazards in the zone. Council reverts back to the Building Act for residential builds. • Wendy Saunders from GNS did a lot of this work a few years ago at a national scale. She was looking at how different councils manage hazards and went through all the DPs.		conditions. He only knew of one application that had been refused on Section 106 grounds. The onus is on the applicant and their geotechnical specialist to report on hazards and suggest mitigation. The Council also require a statement of professional opinion regarding suitability of the site for subdivision (as part of geotechnical report and 106 assessment by applicant's experts). • Where subdivision follows the issue of a/multiple building consent/s and the construction of dwellings (unit title subdivision applications) then it is accepted that the building consent process has dealt with the issues of future use and protected against geotechnical hazards through foundation design etc. • Noted that for the construction of assets to be vested (roads, pipe networks etc.), the assets need to constructed to withstand the liquefaction potential identified in geotechnical reports for the application.

APPENDIX B – Summary SDC and LWRP earthworks rules comparison

LWRP Rule	Comments		SDP Rule	Alignment/duplication
5.168 Use of land for earthworks outside bed of lake or river or adjacent to wetland boundary.	Focus is on distance of 5m/10m from bed of lake or river or wetland boundary. Further focus on associated discharge of sediment or sediment –laden water, in circumstances where it will enter surface water. Allows for recovery activities as an exception, and an exception for maintenance or repair of network utilities or fencing. Area threshold is lesser of max. 500m^2 or 10% of the area, unless High Country where threshold is only 10m^3. The activity is not adjacent to salmon spawning area listed in schedule 17 or inanga spawning habitat 1 January -1st June. Is not within 5m of a flood control structure. From 5 September 2015 in specified areas (incl. Waimakariri and Rakaia Rivers) do not result in the reduction of diversity of existing riparian vegetation, unless authorized by land use consent and threshold conditions above met (including in relation to salmon and inanga spawning and flood protection structures (note: infrastructure upgrade or repair exempt)).	C2 LZ - Earthworks and C14 BZ - Earthworks Rural Zone C1 - Earthworks	Living Zone Rules – Earthworks Earthworks not permitted within 20m from listed waterbodies and 10m from any other waterbody. Volume threshold is: 2,000m^3 Living 5,000m^3 – Business No more than 5% of total cut face is over 2m Provisions for rehabilitation. <u>Rule 2.1.1.5</u> Within the Living 1A or 2A Zones at Tai Tapu earthworks are restricted to forming accessways to a site and building platforms provided land drainage is not altered/ impeded. <u>Rule 2.1.1.9</u> Wahi Taonga Management Areas C39(b)– earthworks limited to disturbance of soil previously disturbed by cultivation etc and limited to 20cm depth. <u>Rule 2.1.1.10</u> Wahi Taonga Management Area C48 earthworks that do not involve disturbance, damage to, removal etc. of any object, artefact… Business Zone Rules – Earthworks Similar to above except threshold is 5,000m^2. Rule 1 Rural Zone Rules - Earthworks Rule 1.1.1 Earthworks for roads to be part of an approved subdivision otherwise discretionary activity. Rule 1.2.1 Earthworks – removal of contaminated land not permitted activity. Rule 1.3.1 Provision for minor land disturbance on sites of significance to Tangata Whenua as a permitted activity. Rule 1.4.1 Earthworks and natural hazards – Provision for earthworks for vehicular access and building platforms in areas mapped as flood areas. Other	There is very little alignment between these rules. An area of duplication is, in the general case (and excluding the exceptions in note 1 of the SDP), within 5m of a waterbody any earthworks greater than 500m^2 will require consent under both Plans. SDC for being less than 10m from a waterway, and in the ECan case being both within 5m of a waterway and earthworks exceeding 500m^2. Between 5m and 10m from a waterbody in the general case, consent will only be required under the SDP. Where the earthworks are greater than 10m from a waterbody, in the general case, consent will only be required from SDC if the 2000m^3 (Living) /5,000m^3 (Business) or vertical cut face thresholds cannot be met. There is no situation where a consent is required by ECan but not from SDC under these earthwork rules. Earthworks can be permitted under both plans, in the general case, when the earthworks are located greater than 10m from a waterbody and are less than the 2000m^3 (Living) /5,000m^3 (Business) thresholds.

LWRP Rule	Comments		SDP Rule	Alignment/duplication
			earthworks permitted if they do not raise the mean average level of the land or reduce flood storage capacity. Rule 1.5.1 Provision for limited earthworks in areas of outstanding landscapes: Malvern Hills for tracks and postholes, or are not greater than 150m^3 per project. Port Hills For farm vehicle road tracks, fence lines, small ponds etc, otherwise are not greater than 100m^3 and a maximum cut of 1m per project. Rule 1.6.1 Specific limited permitted activity provisions for limited earthworks and protected trees. Rule 1.7.1 – Thresholds volumes and setbacks Setback of 20 m from waterbodies unless within a road reserve for a network utility infrastructure. Exception for small scale earthworks less than 100m^2 in area and less than 40m^3 volume, setback reduced to 5m from a waterbody. Exceptions provided • if a discretionary or non-complying activity resource consent has been granted by ECan and • for existing fence lines, existing vehicle tracks and crossings. Earthworks not to exceed cut face of 2m for more than 5% and - a maximum volume of 5,000m^3, and - requirement for site to be filled and re-contoured and replanted. Provisions limiting earthworks within 300m of SH73 (Porters to Arthurs Pass) and midland railway to maintenance of tracks/roads, post holes, telecom lines, etc or no greater than 150m^3 per project.	

LWRP Rule	Comments		SDP Rule	Alignment/duplication
5.169 Use of land for earthworks outside bed of lake or river or adjacent to wetland boundary.	Provides for RDA if the conditions above are not met for earthworks within 5/10m of a river, lake or wetland boundary. Issues being managed: quality of water, natural character, outstanding natural features and landscapes, areas of significant indigenous fauna, mahinga kai, and Tangata whenua; flood carrying capacity, transport networks, neighbouring properties and structures.		Non-compliance with the rules is RDA. Issues being managed: dust, slope failure/ erosion, siltation, bank erosion, sedimentation in waterbodies, visual (residential and business area amenity). For 2.1.1.5: flooding, land instability, site suitability due to flooding, displacement of waters, flood mitigation (Tai Tapu). For 2.1.1.9 and 2.1.1.10 and controlled activities 2.1.2 and 2.1.3 - sites of significance to Tangata Whenua. Rural Zone - RDA provided for earthworks where sites are contaminated, there is more than minor disturbance of sites of significance to Tangata Whenua, and in terms of flood areas where they do not meet the permitted conditions (are not for vehicular access or building platforms and raise the mean average level of land and reduce the storage capacity for flood waters) and within 300m of SH73 and midland Railway (Porters to Arthurs Pass) do not meet the conditions for minor earthworks. Earthworks that do not meet the thresholds for setbacks and volumes in rules 1.7.1 are a discretionary activity.	
5.170 Within High Risk Erosion Area and outside riparian margin – earthworks etc.	Focus is on use of land for earthworks and must be less than; • $10m^3$ per site or per hectare (whichever is greatest), and • Max depth of cut or fill is 0.5m for permitted activity status. Includes associated discharges of sediment and sediment laden water where sediment may enter surface water. Exemptions for cultivation and spraying on slopes greater than 25 degrees if area is less than $200m^2$; for hand cultivation and spot		See rules C1, provisions particularly relating to Malvern Hills and Port Hills.	No alignment, LWRP more restrictive. But comparison relevant only for those areas that overlap High Risk Erosion Area and Malvern and Port Hills. Rules are for different purposes.

LWRP Rule	Comments		SDP Rule	Alignment/duplication
	spraying, earthworks within production forest; maintenance of fire breaks, roads and tracks, construction of fences; walking tracks less than or equal to 1.5m; maintenance of existing transport networks; establishment and repair of pipelines Exclusion for when a building consent has been granted. Conditions require reinstatement, cultivation to be across the contour of land, and place limits on concentration of suspended solids in associated discharge. Issues managed: Soil quality, water quality, slope stability; natural character, outstanding natural features and landscapes, indigenous biodiversity, areas of significant indigenous fauna, mahinga kai, and Tangata whenua; flood carrying capacity, transport networks, neighbouring properties and structures; and in relation to forestry, harvesting, location of haulage and log handling areas, access tracks and sediment control.			
5.171 Within High Risk Erosion Area and outside riparian margin – earthworks etc.	Provides for RDA where above conditions cannot be met for any activities not exempted.		Full discretionary activity for non-compliance with Port Hills and Malvern Hills requirements.	No alignment
5.175 Earthworks over aquifers.	Focus is on use of land to excavate material over the coastal confined aquifer system or over unconfined or semi-confined aquifer. 100m^3 is the threshold for confined aquifer systems unless the excavation is greater than 50 m from a surface water body and must have re than 1m		No similar rule.	SDP leaves this area of earthworks control to ECan, but note that some overlap exists for activities involving extensive earthworks, such as quarrying where that quarrying is over an aquifer.

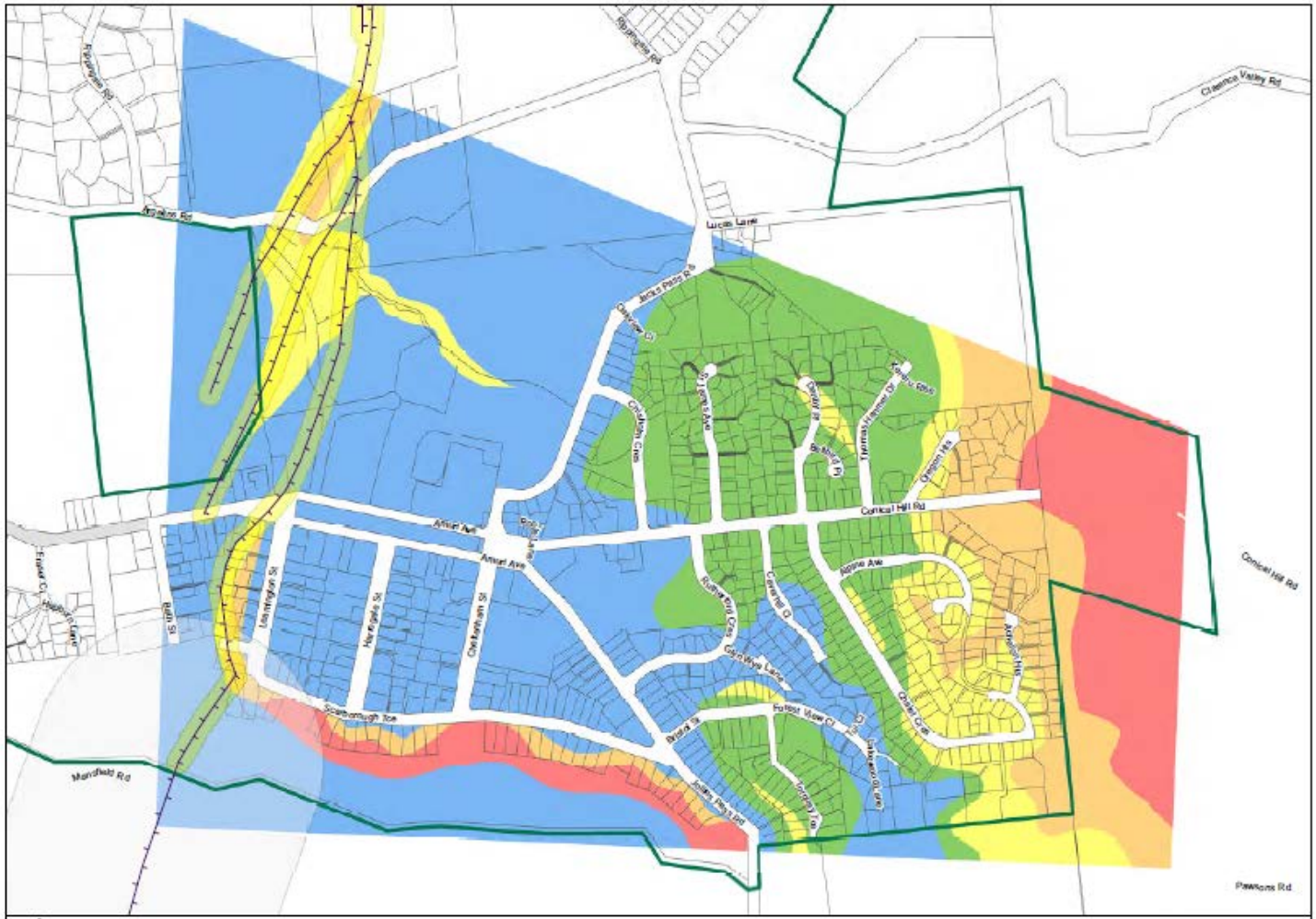
LWRP Rule	Comments		SDP Rule	Alignment/duplication
	of undisturbed material between the deepest part of the excavation and Aquifer 1. 100m^3 is also the threshold for excavation over semi and unconfined aquifers. If more than 100m^3 is excavated there ust be 1 of undisturbed material between the deepest part of the excavation and the seasonal high water table, and is not located within 50m of a surface water body. Issues managed: The emphasis is on the quality of water and avoiding contamination, but also maintaining aquifer pressure where it is confined.			
5.176 Earthworks over aquifers.	Provides for RDA where above conditions cannot be met.		No similar rule	SDP leaves this area of earthworks control to ECan
5.177 Deposition of material into excavations.	Provides for deposition of more than 50m^3 of material into excavations deeper than 5m below natural land surface and where located over a semi or unconfined aquifer, where there is less than 5m to the seasonal high water table as a controlled activity. Material must be cleanfill, with vegetative matter less than 3% by volume and not deposited directly into groundwater. Issues managed: Water quality, contamination.			SDP leaves this area of earthworks control to ECan
5.178 Deposition of material into excavations.	Provides for RDA where above conditions cannot be met.			As above
5.185 Contaminated land	This rule is specifically focused on permitted activity requirements for site investigations for concentrations of hazardous substances.		SDP Rule does not allow removal of any contaminated land – RDA.	Presumably these rules are aligned as site investigations do not usually result in removal of contaminated land.

LWRP Rule	Comments		SDP Rule	Alignment/duplication
	Issues managed: avoiding contaminant dispersal; and effects of current and future land use.			
5.186 Contaminated land	Provides for RDA where above conditions cannot be met.			As above
5.187 Contaminated land – passive discharge	This rule provides for passive discharge of contaminants from contaminated land as a permitted activity subject to conditions			
5.188 Contaminated land – passive discharges	Provides for full discretionary activity where above conditions cannot be met.			
Section 11 Selwyn Te Waihora	This section focuses on freshwater objectives of Selwyn Te Waihora and does not specifically control earthworks in this sub region, except land repair for earthquake recovery (see rules below).			SDC leave this area of control to ECan
Section 9 Christchurch-West Melton sub region 9.5.7 (and 11.5.48) Earthquake recovery – [prevails over the above earthworks rules in Section 5].	Provides until 31 December 2018 for the repair of earthquake damaged land located outside the High Soil Erosion Risk Areas, on individual sites used for residential activities as a permitted activity subject to conditions intended to ensure effects of the activity are minor and of short duration while land is being repaired.			SDC leave this area of control to ECan
9.5.8 (and 11.5.49)	Provides for RDA where above conditions cannot be met.			

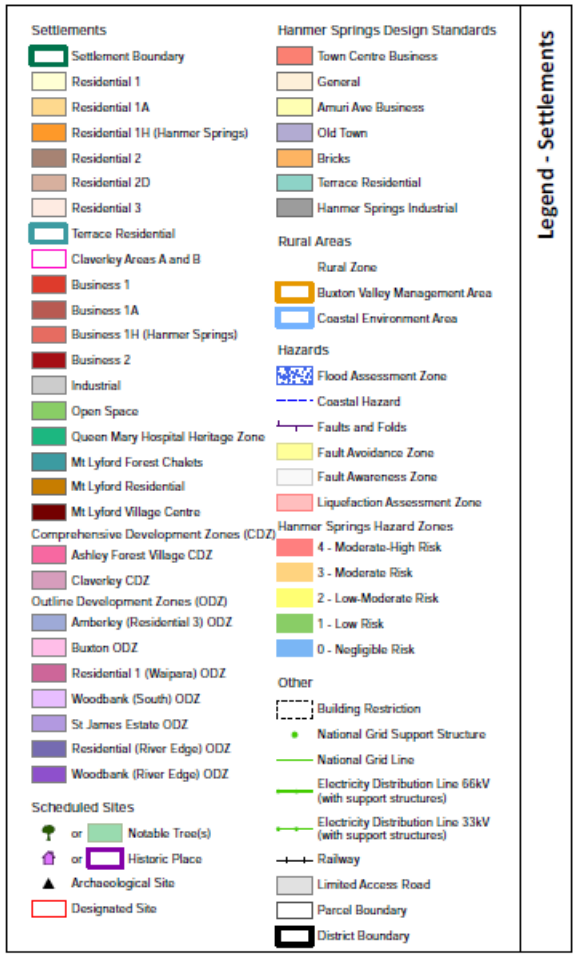
LWRP Rule	Comments		SDP Rule	Alignment/duplication
Earthquake recovery				
9.5.9 (and 11.5.50) Earthquake recovery	Similar rule to 9.5.7 but particular provisions for non-residential activities			
9.5.10 (and 11.5.51) Earthquake recovery	Provides for RDA where above conditions cannot be met.			
9.5.11 (and 11.5.52) Earthquake recovery	Provides until 31 December 2018 exemptions to Rule 5.170k for earthworks related to land repair and as a result of the earthworks for locations within the High Soil Erosion Risk Areas, subject to conditions.			SDC leave this area of control to ECan
9.5.12 (and 11.5.53) Earthquake Recovery	Provides for RDA where above conditions cannot be met.			
Earthworks definition -	means the excavation of, and/or filling with topsoil, subsoil, sediments, rock and/or other underlying materials on which the soil is formed. Earthworks include, but are not limited to, the construction and maintenance of roads, tracks, firebreaks and landings, and ground shaping (recontouring), root raking and blading. Earthworks excludes: (a)cultivation of the soil for the establishment of, or harvesting of, crops or pasture; or (b)digging of postholes for the construction of fences; (c)works for research and monitoring such as coring, water bores and the use of piezometers;		EARTHWORKS include any disturbance to, or excavation, removal or deposition of, soil, earth, or any other mineral derived from the ground. Notes to C2 Rule 2, 14 and C1 Rule 1 Rule 2 and Rule 14 do not apply to any of the following activities: –Landscaping or maintenance of gardens, lawns or public spaces; –Sowing, tending or cultivating crops, grazing or planting trees; –Digging post holes; –Burying pets;	Both definitions make it clear that it is both filling and excavation that is relevant to earthworks. Some different exemptions apply. For Rules 2 and 14 SDC Burying pets, trenching compost, planting trees (except domestic and amenity planting), digging soak holes, foundations, maintaining and clearing rivers, water races and drains, maintenance of flood protection works are not exempted from ECan definition of earthworks but are exempt from SDP Rules. Rule 1

LWRP Rule	Comments		SDP Rule	Alignment/duplication
	(d)ripping in of water pipes or cables; (e)establishment, maintenance and/or enhancement of wetlands, domestic gardens or amenity planting; (f)harvesting of horticultural crops.		–Trenching compost; –Digging soak holes, building foundations and related activities, except in Wāhi Taonga Management Area C39(b), ; –Maintaining and clearing rivers, water races or drains except in Wāhi Taonga Management Area C39(b); –Maintaining or repairing existing flood protection works except in Wāhi Taonga Management Area C39(b); or –Earthworks required to duct cables except in Wāhi Taonga Management Area C39(b). Rule 1 does not apply to –Tending or landscaping of gardens, lawns or public spaces; –Digging post holes; –Drilling bores, except in Wāhi Taonga Management Area C39(a); –Planting trees or removing dead or diseased trees; Cultivation; –Burying Pets; Trenching compost; –Earthworks required to duct cables except in Wāhi Taonga Management Area C39(a).	As above except digging soak holes, clearing rivers, water races and drains, maintenance of flood protection works not exempt in either plan.

APPENDIX C – Hanmer Springs – Hazard Zones and Fault Lines



Proposed Hurunui District Plan as Amended by Decisions 15 October 2016. Cadastral and topographic data sourced from LINZ. Crown Copyright Reserved.


Legend - Settlements
Settlements
Settlement Boundary
Residential 1
Residential 1A
Residential 1H (Hanmer Springs)
Residential 2
Residential 2D
Residential 3
Terrace Residential
Claverley Areas A and B
Business 1
Business 1A
Business 1H (Hanmer Springs)
Business 2
Industrial
Open Space
Queen Mary Hospital Heritage Zone
Mt Lyford Forest Chalets
Mt Lyford Residential
Mt Lyford Village Centre
Comprehensive Development Zones (CDZ)
Ashley Forest Village CDZ
Claverley CDZ
Outline Development Zones (ODZ)
Amberley (Residential 3) ODZ
Buxton ODZ
Residential 1 (Waipara) ODZ
Woodbank (South) ODZ
St James Estate ODZ
Residential (River Edge) ODZ
Woodbank (River Edge) ODZ
Scheduled Sites
or Notable Tree(s)
or Historic Place
Archaeological Site
Designated Site
Hanmer Springs Design Standards
Town Centre Business
General
Amuri Ave Business
Old Town
Bricks
Terrace Residential
Hanmer Springs Industrial
Rural Areas
Rural Zone
Buxton Valley Management Area
Coastal Environment Area
Hazards
Flood Assessment Zone
Coastal Hazard
Faults and Folds
Fault Avoidance Zone
Fault Awareness Zone
Liquefaction Assessment Zone
Hanmer Springs Hazard Zones
4 - Moderate-High Risk
3 - Moderate Risk
2 - Low-Moderate Risk
1 - Low Risk
0 - Negligible Risk
Other
Building Restriction
National Grid Support Structure
National Grid Line
Electricity Distribution Line 66kV (with support structures)
Electricity Distribution Line 33kV (with support structures)
Railway
Limited Access Road
Parcel Boundary
District Boundary

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Document Status

Revision	Author	Reviewer		Approved for Issue		
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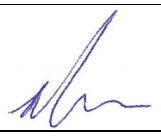
Final	Beverley Curley/ Janice Carter	Bruce Simms (Geotechnical)/ Kim Hardy (Planning)		Maurice Hoban		22/12/17