PREFERRED OPTION REPORT TO DISTRICT PLAN COMMITTEE

DATE: **19 June 2018**

TOPIC NAME: **Natural Hazards District Plan Review**

SCOPE DESCRIPTION: **Preferred Options Report for Managing Geotechnical Risk under the Selwyn District Plan**

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EXECUTIVE SUMMARY

Issue(s)	*How to best manage geotechnical risk in Selwyn District through the District Plan provisions.*
Preferred Option	*Option 2: That Option 2 (adopting the recommendations of the baseline report) for Managing Geotechnical Risk is endorsed for further development (targeted stakeholder engagement, Section 32 and Drafting Phase).*
DPC Decision	*"That the Committee endorses the Preferred Option for 'Managing Geotechnical Risk' for further development and engagement."*

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1.0 Introduction

Selwyn District is vulnerable to a number of geotechnical hazards including earthquake induced fault (ground) rupture, ground level changes and ground shaking, liquefaction, slope instability, subsidence and erosion (including coastal erosion).

This preferred options report is preceded by a baseline report that was prepared by GHD in December 2017, and a revised version which was updated with additional information in May 2018. A copy of the revised baseline report (Baseline Report) is included in Appendix 1.

The Baseline Report did not evaluate a number of options that could be undertaken by the Council in terms of the District Plan Review (DPR) but provided an overview of the issues in respect to geotechnical risk management. It included an assessment of the existing Selwyn District Council (SDC) approach to managing geotechnical risk, identifying any gaps in the approach, reviewing how other councils are approaching the issue (Ashburton District, Waimakariri District, Hurunui District and Christchurch City), and made recommendations in terms of best practice.

The purpose of the report was to verify whether or not SDC's current approach to managing geotechnical risk was appropriate, and in terms of cross boundary consistency, aligned with other districts who are required to give effect to the same statutory requirements and higher order planning documents as SDC (such as the Canterbury Regional Policy Statement (CRPS) and the New Zealand Coastal Policy Statement (NZCPS)).

In terms of determining best practice the Baseline Report also evaluated:

- the Ministry for the Environments Guidance "Planning for development on and on or close to active faults: A guideline to assist resource management planners in New Zealand";
- Mahaanui Iwi Management Plan (IMP): objectives and policies relating to geotechnical risk and climate change;
- Earthworks rules in the Selwyn District Plan and the Canterbury Land and Water Regional Plan (LWRP) in respect to potential duplication;
- The Baseline Earthworks Report (DW 011);
- Overlaps between High Erosion Risk areas in the LWRP and Outstanding Landscapes and Visual Amenity Landscapes identified in the Baseline Landscape Reports.

Direct consultation was undertaken with planners in each of the councils listed above, with planners at Environment Canterbury (ECan), and with Selwyn Districts Council's resource consent and building consent departments.

Recommendations were made in respect to:

- Active Faults;
- Earthworks;
- Liquefaction;
- Slope instability, including rockfall;
- General matters in respect to managing risk from natural hazards.

The Baseline Report for managing geotechnical risk did not assess best practice recommendations against higher order planning documents such as the Canterbury Regional Policy Statement (CRPS) or the NZCPS, and this will be undertaken as part of this report. It is noted that an earlier baseline report (NH001) on advice on risk based-planning for natural hazard management investigates the requirements of the higher order documents (CRPS and NZCPS) in respect to risk-based natural hazard planning for Selwyn District.

2.0 Summary of Issues

The baseline report illustrated that while SDC's current approach to managing geotechnical hazards is adequate, it is not robust or up to date with current expectations of natural hazard management in district plans. Currently, empahsis in the operative Selwyn District Plan (SDP) is placed on the provision of geotechnical assessments at the subdivision and plan change stages. While this is a common theme in the district plans of surrounding district councils, the council's with more recently reviewed district plans (Christchurch City and Hurunui) and noting Waimakariri District's Plan Change 27), take a more thorough and considered approach to managing geotechnical risk. These councils have had their natural hazard provisions driven by a desire to give effect to the NZCPS and the CRPS as well as the introduction of section 6(h) of the Resource Management Act (RMA), which now requires councils to recognise and provide for the following matter of national importance:

Section 6
…
(h) – the management of significant risks from natural hazards

There is no doubt that the Canterbury Earthquake Sequence 2010-2011 has also had an important impact on the attention natural hazards is now given in the CRPS and the district plans reviewed, or partially reviewed through plan changes, since then and nationally.

The SDP natural hazard provisions predate the NZCPS (2010), the CRPS (2013) and the amendment to the RMA introducing the management of significant risks from natural hazards. Updating the plan provisions pursuant to the requirements of these higher order documents and the amendment to the RMA is required.

The primary gap in SDC's approach relates to the absence of a clear objective and policy based framework which demonstrates a comprehensive risk-based approach to natural hazard management. This applies across the board for flooding and coastal hazards as well as geotechnical hazard types.

There are also gaps in how slope instability and liquefaction risk areas are mapped, and few rules which specifically deal with geotechnical risk.

Prior to undertaking the Baseline Report a preconception existed that there were considerable overlaps in the functions between ECan particularly in relation to earthworks rules and geotechnical matters. The Baseline Report demonstrated that the overlapping areas are minimal, with the respective Councils addressing different issues and consent matters.

The natural hazards topics appear to be artificially divided into two areas:

- flooding and coastal erosion and inundation; and
- geotechnical risks.

However, they need to be treated together in an overall risk based framework in DPR.

A further misconception that appeared to prevail was that Selwyn District had "good ground" and therefore did not have to do much to change the way it currently addresses geotechnical risk. The Baseline Report demonstrates that the geology of Selwyn is not unlike other districts in Canterbury such as Waimakariri and Hurunui, both of which have more robust natural hazard provisions.

3.0 Statement of Operative District Plan Approach

The Operative 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. Natural hazards identified in the SDP for the district include flooding, earthquakes (including liquefaction from ground shaking), unstable land e.g. rockfall and landslips (Arthurs Pass, Malvern Hills, Port Hills and skifields), drought, fire, snow and wind storms and coastal erosion. The focus of this report is on geotechnical risks, and includes active faults, liquefaction, slope instability and earthworks related geotechnical risk.

3.1 Township Volume

The township volume identifies several issues relevant to geotechnical risk. These are:

- Activities that create unstable land, such as vegetation removal, and earthworks; and
- Loss of soil through soil erosion (dealt with in the Rural Volume).

The township volume also includes objectives and policies relating to natural hazards generally. 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.

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.

A number of polices for specific townships address natural hazards in respect to rezoning land for residential or business purposes in the Rural Zone. Some examples are outlined below:

Policy B4.3.13 (Arthurs Pass)

Ensure that any land in the Rural Zone used for residential or business development is not:

- *Unstable or subject to flooding; or*
- *contaminated*

There are a number of specific policies for Coalgate (Policy B4.3.21), Sheffield (Policy B4.3.82) and Whitecliffs (B4.3.104) aimed at ensuring new residential l or business development does not create or exacerbate natural hazards.

In terms of unstable land the following objectives and policies are relevant:

Objective B1.1.1 – Adverse effects on people, and their activities, ecosystems and land and soil resources from contaminated soil or unstable land are minimised.

Policy B1.1.5

Ensure activities do not create unstable land.

Policy B1.1.6

Carry out all legal requirements to record information about sites which may have unstable land, on land information memoranda.

Policy B1.1.7

Avoid adverse effects from erecting buildings and structures on unstable land or land that is prone to liquefaction.

The explanations and reasons state that when a request is made for a plan change to rezone land for new residential or business development, the Council will require information on past activities on the site. The Council may require the stability of the site (or part of the site) be tested.

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.

However, few rules in the Township Volume specifically address geotechnical natural hazards. The rules largely focus on subdivision and to a lesser extent, the earthworks rules manage geotechnical hazards. The SDP requires activities such as large scale earthworks and earthworks on slopes to be managed through a resource consent process, to ensure sites are properly stabilised, filled and recontoured.

There are no specific natural hazard rules relating to geotechnical matters in the subdivision section, however, subdivision is a restricted-discretionary activity. The matters the Council will exercise its discretion over include Rule 12.1.4.12 Geotechnical Assessment as follows:

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.

This would imply that the Council will require a geotechnical investigation and assessment for every subdivision under the Township Volume. However, in practice, not all subdivisions are required to provide a geotechnical assessment.

3.2 Rural Volume

Unstable land and soil erosion are recognised as important issues in the land and soil section of the Rural Volume of the SDP. As per the Township Volume, the objectives and policies also defer to the Natural Hazards Section.

The unstable land and soil erosion objectives and policies include:

Objective B1.1.2 - People and their property are not affected by contaminated soil or unstable land and any adverse effects on the environment are avoided, remedied or mitigated.

Policy B1.1.4

Require earthworks on slopes to be carried out in ways that minimise the likelihood of land slipping or slumping.

Policy B1.1.5

Avoid adverse effects on people or their property from locating buildings or infrastructure on unstable land.

The natural hazard objectives and policies 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.

As with the Township Volume, the rule framework for managing geotechnical risk in the Rural Volume relies heavily on the subdivision rules and to a lesser extent, on the earthworks rules. However, there are some additional specific provisions in the form of matters of restricted discretion that require a geotechnical assessment. These are 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;

This provision does not apply to other buildings.

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). This provision applies to both dwellings and other buildings.

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 Volume, there are no specific natural hazard rules relating to geotechnical matters. In addition, the matters the Council will restrict the exercise of its discretion over does not include any reference to geotechnical issues as per the Township Volume (Rule 12.1.4.12). 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.

3.3 Discussion – Role of ONLs and VALs matters of control/restricted discretion

SDC commissioned landscape reports for the DPR (Selwyn District Landscape Study: Landscape Characterisation and Evaluation Report, October 2017 and Outstanding Natural Features and Landscapes, Planning and Landscape Analysis, February 2018). These reports identified areas of Outstanding Natural Landscape (ONL) and Visual Amenity Landscapes (VALs). The areas identified were compared to the LWRP planning map areas of high erosion risk to determine whether the two areas overlapped. This is a useful analysis because currently the SDP has rules in the ONLs and VALs requiring restricted discretionary activity or controlled activity resource consents respectively, for buildings and dwellings as described above (Section 3.2). The matters of discretion or matters of control relate to geotechnical considerations and site stability. If the VALs and ONLs overlapped with the high erosion risk areas of the LWRP, these rules could assist in managing geotechnical risk in the high erosion areas.

The investigation concluded that there is only a partial overlapping of areas, meaning that the geotechnical risk considerations would not be able to be addressed in high erosion risk areas that fell outside outside ONLs and VALs if reliance was on these two rules alone. Specific rules addressing slope instability and geotechnical considerations across the District would provide a better outcome from a risk management perspective.

While a policy addressing earthworks and geotechnical risks, such as slope instability, is supported it is considered that the policy should be focused on avoiding risk to life-safety and reducing damage to property, and not be coupled with issues such as landscape character. Separate geotechnical earthworks policies addressing the risk associated with this natural hazard are recommended as are supporting rules with low volume earthworks threshold in areas of high erosion risk or potential for slope instability.

3.4 Earthwork Provisions

Earthworks are generally managed by way of location, quantity (volume and area), maximum cut face and rehabilitation rules in the SDP. A discretionary activity consent is generally required where the permitted conditions cannot be met.

Earthworks are an important component of subdivision and development and can be important in the development of hazard mitigation works such as stop banks, rockfall bunds and retaining walls in dealing with geotechnical risk. Earthworks, if not properly controlled, can cause and/or exacerbate geotechnical risks.

A major issue that was considered in the Baseline Report was the potential for earthworks provisions in the LWRP and the SDP to overlap, causing unnecessary duplication in consenting processes. This has been a focus of recent amendments to the RMA, with councils being clearly tasked to reduce/remove duplication in district plans provisions where another statutory process addresses the same matter.

To understand the overlaps between geotechnical risk and earthworks, three separate areas of evaluation were undertaken in the Baseline Report:

- The earthworks options report (DW011) was reviewed with reference to the geotechnical risk topic;
- A comparison between the LWRP earthworks rules and the SDP earthworks rules was undertaken; and
- Overlapping functions between Selwyn and ECan in respect to earthworks and geotechnical issues were evaluated through a specific case study of the s42a Report and Decisions for the Central Plains Water – Water Storage Facility (RC155704 and CRC1645541).

The focus of the earthwork provisions in the LWRP for ECan is on discharge of sediment or sediment-laden water, in circumstances where it will enter surface water and effects on water quality and ecology, and on soil erosion in the high risk soil erosion areas on steep hillslopes. The focus for SDC is related to other matters such as amenity (dust, visual impact, noise, traffic effects). This difference in matters considered means that the question of duplication is less significant than first anticipated.

The joint resource consent application case study confirmed that view in respect to overlapping provisions between the LWRP and the SDP. Both consent applications had an earthworks component; for ECan it was excavation over the unconfined and semi confined aquifer; for SDC it was earthworks over the volume threshold in its plan, and lack of ability to rehabilitate. However, it was established that each of these two 'earthworks' consent applications have a different focus. The ECan consent was primarily concerned with water quality, and the damming relating to the impounding of water in large quantities (potential for dam breach and inundation). The SDC earthworks consent considered a myriad of effects associated with earthworks including the visual impact, dust and noise, but was also concerned with a potential dam breach.

The actual earthworks rules that overlapped in this case focused on different matters; one being the protection of water quality (ECan), the other being construction noise, visual and dust from earthworks (SDC). Dust is the only area of overlap that appeared unnecessary in this case study, but it is understood from discussions with officers that ECan is uncomfortable dealing with the amenity effects of dust, as opposed to viewing it as an air contamination issue.

There was overlap in considering the effects on ecology, dust, tangata whenua values and of a dam breach. However, the areas of overlap were small.

3.5 District Plan Maps

Fault lines are currently mapped on the electronic planning maps, based on 1:250,000 scale source mapping; and include the Greendale Fault. There are no rules associated with these fault lines, and no fault avoidance zones as per the Ministry for Environment (MfE) guidelines. 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. The corresponding rule for these lines is Rule 3.1.4 in the Rural Volume where erecting a building seaward of Hazard Line 1 is a non-complying activity.

4.0 Summary of Relevant Statutory and/or Policy Context and Other Background Information

4.1 Overview

The RMA provides the relevant statutory basis for addressing natural hazards in the DPR.

A natural hazard is defined in the Act as :

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 30 of the RMA lists the functions of regional councils and includes:

...

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

(iv) the avoidance or mitigation of natural hazards:

(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 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).

More recently the concept of risk in respect to natural hazards has been formalised in the RMA with the amendment to the matters of national importance to incorporate the management of significant risks from natural hazards (section 6 (h)). The risk based approach to natural hazard management is the subject of another baseline report for the district plan review.

Section 6
…
(h) – the management of significant risks from natural hazards

4.2 New Zealand Coastal Policy Statement (NZCPS 2010)

The NZCPS deals specifically with the New Zealand coastal environment. In respect to natural hazards its focus is coastal hazards including consideration of climate change.

The key objectives and policies in the NZCPS of relevance to managing coastal related geotechnical risk in the Selwyn District are:

Objective 5

To ensure that coastal hazard risks taking account of climate change, are managed by:

- *Locating new development away from areas prone to such risks;*
- *Considering responses, including managed retreat, for existing development in this situation; and*
- *Protecting or restoring natural defences to coastal hazards.*

Supporting this objective are a number of polices including, in particular, Policy 3 (precautionary approach), Policy 24 (identification of coastal hazards), Policy 25 (subdivision, use and development in areas of coastal hazard risk), Policy 26 (natural defences against coastal hazards) and Policy 27 (Strategies for protecting significant existing development from coastal hazard risk).

Relevant matters in terms of this report include priority to maintaining and protecting natural features as defences against coastal hazards to protect coastal land uses; the requirement to identify areas in the coastal environment potentially affected by coastal hazards over the next 100 years including consideration of the effects of climate change; avoiding redevelopment, or change

in and use that would increase the risk of adverse effects; discouraging hard protection structures were practicable; and identifying long-term sustainable risk reduction approaches, including relocation or removal of existing development and structures at risk.

4.3 Canterbury Regional Policy Statement (CRPS 2013)

Chapter 11 of the CRPS provides a framework for managing natural hazard risks in Canterbury. It also sets out the responsibilities of the local authorities in the region for the control of land use to avoid or mitigate natural hazards[1].

The objectives and policies relevant to this evaluation report are:

- Objectives 11.2.1, 11.2.2, 11.2.4; and
- Policies 11.3.3, 11.3.4, 11.3.5, 11.3.6, 11.3.9.

Objective 11.2.1 seeks that new subdivision, use and development of land that increases risks associated with natural hazards be avoided. Objective 11.2.2 focuses on avoiding or mitigating the effects of hazard mitigation works on people, property and infrastructure. Co-operation from agencies and organisations to achieve integrated management of and preparedness for Canterbury's natural hazards is the outcome sought from Objective 11.2.4.

Policy 11.3.3 requires new subdivision, use and development of land close to an active fault trace, or in areas susceptible to liquefaction and lateral spreading, to be managed to mitigate their adverse effects. A general risk management approach is required for natural hazards not covered by the specific policies of 11.3.1, 11.3.2 and 11.3.3. This general risk management approach (Policy 11.3.5) requires subdivision use or development of land to be avoided if the risk from natural hazards is unacceptable. In determining whether the risk is unacceptable the CRPS requires consideration of the likelihood of the natural hazard event and the potential consequences for people, communities, property, infrastructure and the environment. A precautionary approach is required where there is uncertainty in the likelihood and consequences of the event. Further exploration of this policy is provided in the baseline report that discusses the risk based approach to natural hazard planning (NH001).

Policy 11.3.6 promotes the use of natural topographic (or geographic) and vegetation features for assisting in avoiding or mitigating natural hazards, and requires that they be maintained, protected and restored, where appropriate.

Policy 11.3.4 requires new critical infrastructure to be located outside high hazard areas unless there is no reasonable alternative, and in relation to other areas be designed to maintain, as far as practicable, its integrity and function during natural hazard events. As defined in the CRPS high hazard areas include areas likely to be subject to coastal erosion over the next 100 years and includes land within the coastal hazard lines.

Objective 11.2.4 is implemented by Policy 11.3.9 which requires lead agencies to investigate and identify natural hazards, provide mapping and analysis of the effects of natural hazards, including the effects of climate change and sea level rise. Setting standards and guidelines for organisations

[1] Chapter 11 Canterbury Regional Policy Statement 2013, Chapter 11, page 11-1.

involved in civil defence and emergency management is also required by this policy, as is development of communication strategies to build community resilience and any other matters that will assist in integrated management of natural hazards. The lead agencies identified in this policy include ECan, territorial authorities, Te Rūnanga o Ngāi Tahu, papatipu runanga, Crown Research Institutes (CRI) and their partner organisations.

The key results from this regional policy framework in respect to natural hazards is that residential or industrial development is not located in areas where natural hazards are most likely to occur. If development must occur in area subject to natural hazards, the potential adverse effects are mitigated or managed by appropriate design and placement of structures and facilities. It is also anticipated that through this framework, communities will become increasingly resilient to natural hazards and hazard mitigation works do not adversely affect the environment.

4.4 Section 106 of the RMA

Section 106 of the Act restricts the subdivision of land where 'natural hazards' may result, even if the subdivision complies with the relevant District Plan rules. SDC therefore, has an obligation under Section 106 to decline subdivision consents where natural hazards, including geotechnical hazards cannot be adequately mitigated. Investigation undertaken for the baseline report indicated that very few councils use s106 of the act to turn down subdivisions, but mainly focus on placing conditions of consent on subdivision applications and hence manage geotechnical risk largely through mitigation measures.

To assist in Section 106 subdivision assessments Selwyn District Council has identified and mapped, at a high level, geotechnical investigation areas. The mapping is based on a report prepared for the Council by Geotech Consulting Limited (dated: 12/07/2013) supported by mapping at a scale of 1:250,000. This report sits outside of the SDP and is used to guide the use of Section 106 of the RMA by subdivision staff. It emphasises that a large part of the district, west of the line provided in Figure 5 in the baseline report "damaging liquefaction" was unlikely. This land is underlain predominantly by deep gravel soils and for much of it also deep groundwater levels, such that the possibility of liquefaction over much of that area of the district is extremely low.

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.
- for larger subdivisions of 15 lots or more, geotechnical investigations should be done at the subdivision stage.

The report identifies that on some properties there remains a low risk that geotechnical issues may be undiscovered, but will be identified at the 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 lots 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 Ministry of Business Innovation and Employment (MBIE) guidelines and includes subsurface testing.

Discussions with SDC consent staff indicates that this process has worked reasonably well, and is an enabling approach. However, there is an expectation that once subdivided a site is suitable for building (and potential cost implications if the site is found to need specialised foundations for a building after it has been purchased, in smaller subdivisions). Some concern has been raised as to the liability issues that this approach could create for SDC. Furthermore the approach is not intended to consider other geotechnical risk such as potential land instability on the Port Hills and other steeper parts of the district.

4.5 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 hazard events including erosion, falling debris, subsidence, inundation or slippage. Section 73 provides for a notice to be placed on land subject to natural hazards where consent has been granted subject to mitigation of the natural hazards (s72) and will not exacerbate a known natural hazard.

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

4.6 Mahaanui Iwi Management Plan (IMP)

The IMP includes objectives and policies in relation to natural hazards, however, these focus on the management and the effects from coastal hazards including climate change and sea level rise. Effects of coastal erosion on cultural sites of significance is identified in policy TAN 6.4 and requires that Ngāi Tahu cultural and historic heritage sites are protected from coastal erosion. TW10.1 is also focused on coastal erosion and seeks to encourage research on the nature, extent and effects of coastal erosion on the Te Waihora and Taumutu coastline, in particular.

In respect to climate change policy R3.3 requires 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.

It is considered that consultation with Mahaanui Kurataiao Limited (MKT) will be required throughout the plan drafting process to further this discussion and to interpret/apply these provisions. There are significant concerns raised in respect to the effects of coastal erosion and climate change at Taumatu coastline and Te Koru and potentially other sites of cultural significance at risk.

4.7 Guidance from Ministry for Environment (Planning for Development of Land on or Close to Active Faults)[2]

Selwyn District has 24 areas of known or suspected active faults and folds. The main active faults in Selwyn District are Greendale, Porters-Amberley, Torlesse and Esk, and Cheeseman.

Movement of the Greendale Fault resulted in a magnitude 7.1 earthquake in September 2010. The recurrence interval for this fault line has recently been revised from Class IV (5000 -10,000 years) to Class V (10,000-20,000 years) with an estimated average recurrence interval in the range of 10,000 to 60,000 years[3]. This is important in terms of its classification, and the types of buildings and structures recommended to be located within "fault avoidance zones" as per the MfE's guidance on planning for active faults in New Zealand.

The MfE 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:

- Identify active faults in their district, with maps that are at the right scale for the purpose.
- Create fault hazard avoidance zones on their district planning maps.
- Evaluate the fault rupture hazard risk within each fault avoidance zone.
- Avoid building within fault hazard avoidance zones where possible.
- 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 determine:

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

The guidance assists planners and decision-makers to take a risk-based approach to establishing fault avoidance zones and developing new provisions. The risk-based approach from this guidance can be found in Appendix B of the Baseline Report.

[2]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]R Van Dissen et al - Greendale Fault rupture of 2010 (Darfield Earthquake, New Zealand): an Example of Recurrence Interval and Ground-surface Displacement Characterisation for Land-use Planning and Engineering Design Purposes, 6th International Conference on Earthquake Geotechnical Engineering November 2015.

4.8 Other Relevant Legislation/Statutory Requirements & Documents

For completeness the following legislative and statutory requirements and other documents are also relevant to this topic:

- Local Government Act 2002
- Civil Defence Emergency Management Act 2002
- Planning and Engineering Guidance for Potentially Liquefaction-Prone Land (MBIE and MfE, September 2017).
- Coastal Hazards and Climate Change guidance for Local government (MfE, December 2017).

5.0 Summary of Neighbouring Councils Approaches to Managing Geotechnical Risk

5.1 Overview

To enable an evaluation of how the SDP and other methods adopted by SDC compare with the approaches of other districts in the Canterbury Region, four other districts were investigated:

- Ashburton District Council (ADC)
- Waimakariri District Council (WDC)
- Hurunui District Council and (HDC)
- Christchurch City Council (CCC)

It should be emphasised that many councils use a combination of methods to manage geotechnical risk, and these have been discussed in section 4. Of particular importance is the use of section 106 in respect to subdivision and the Building Act 2002 alongside district plan provisions and some reliance on regional plan provisions (earthworks, vegetation removal rules in high erosion zones etc.).

5.2 Ashburton District Council

The Ashburton District Plan (ADP) does not have a specific natural hazards chapter, rather natural hazards are referenced in several chapters. The ADP acknowledges that the main natural hazards facing the district are flooding, coastal erosion and earthquakes. The ADP identifies that its steeper upland areas are likely to be subject to a range of hazards such as erosion and subsidence however these areas are not subject to much development pressure.

The objectives and policies relating to natural hazards relate to protection (of life and infrastructure) from natural hazards, through the avoidance or mitigation of adverse effects. Rules to achieve the relevant objectives and policies primarily control subdivision.

ADC acknowledged its obligations under section 106 of the RMA relating to the subdivision of land at risk of natural hazards and have adopted *New Zealand Standard 4404:2004 Land Development*

and Subdivision Engineering, with some variations. While they do not form rules in the ADP, the requirements and recommended practices can form conditions of resource consent.

Overall, the ADP management of geotechnical hazards is not comprehensive and is largely through the subdivision process, through developments requiring resource consent for other reasons, or the plan change process, where specific conditions, consent notices (in the case of subdivision) and standards (incorporated into plan changes) can be applied. Correspondence with ADC planners indicated that they recognise that the rules are "pretty silent" on managing geotechnical risk.

5.3 Waimakariri District Council

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, more recently, Plan Change 27 in respect to natural hazards management. The Waimakariri District Council is currently reviewing its entire District Plan.

Currently, the WDP has specific chapters dealing with natural hazards and subdivision chapters which contain specific geotechnical considerations. These are:

Chapter 8 – Natural hazards – Objectives and policies
Chapter 27 – Natural hazards – Rules
Chapter 18 – Constraints 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 understanding of earthquake risk and associated natural hazards. Policy 8.3.1.1 states:

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:

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;

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 the District Plan. It should be noted that these rules only apply to the Residential 6, 6A and Business 1 Zones at Pegasus.

The Subdivision Rules Chapter (Chapter 32) also contains specific geotechnical matters to be addressed for subdivisions. For example restricted-discretionary activity consent is required for subdivision of land within the West Kaiapoi 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.

This provision is similar to a matter of discretion for a restricted discretionary subdivision in the SDP identified in Section 3.1.

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.

Other methods used to manage geotechnical risk include the provision of information on properties through LIMs. However, discussions with WDC indicate that in respect to subdivision 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.

5.4 Hurunui District Council

HDC has recently reviewed its District Plan. The process is almost complete with only one outstanding appeal and there are no natural hazard matters remaining to be resolved. The Hurunui District Plan Revised Version (HDP) manages geotechnical risk through objectives, policies, and rules. These are 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 Awareness Zone and Hanmer Springs Hazard Zones (slope instability). These overlays are shown on the planning maps.

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. 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. However, a building of importance[4] as defined in the HDP is a non-complying activity.

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

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.

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

[4] The Building of Importance concept has its origins in the Building Code and NZ1170.

permitted activity. However, geotechnical analysis is expected at the time of subdivision or plan change[5].

Land Instability Areas have also been identified as Natural Hazard Areas and are mapped on the planning maps. There are rules regulating the siting, erection, replacement or extension of buildings.

Overall, the purpose of introducing avoidance and awareness zones in areas subject to fault lines, liquefaction and instability areas is to be able to require an appropriate level of investigation into the relevant hazard prior to subdivision, development and use of the land.[6]

Discussions with HDC planners indicate that most of the natural hazards are managed through Chapter 15 of the HDP. Measures outside the HDP to manage geotechnical hazards include the use of Section 106 of the RMA, the Building Act, and LIMs. The Council has also established and developed a natural hazards database on the Council's geographic information system.

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.

In terms of section 106, 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.

5.5 Christchurch City Council

The Christchurch District Plan (CDP) was made operative in July 2017 and includes a specific Natural Hazards Chapter (Chapter 5).

CCC in its CDP take a 'risk-based' approach and state:

*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)

[5]Hurunui District Plan, Revised Version December 2017, Explanation to Policies 15.3 and 15.4.
[6]Section 32 Report – Natural Hazards Chapter 15

It is noted that the language the Natural Hazards Chapter of the CDP aligns with both the CRPS and internationally recognised risk assessment literature.[7]

The CDP identifies a liquefaction management area, based on the district wide assessment discussed in section 2.3.4 of the baseline assessment and shown on the map in Figure 5 (see Appendix 1). This information was combined with more detailed information gathered from MBIE's Technical Category 1, 2 and 3 areas, created during the aftermath of the Canterbury Earthquake Sequence 2010-2011, to assess the severity of liquefaction damage in the City. The specific policies in respect to geotechnical risk include 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.

The policy requires the Liquefaction Management Area to be mapped where damaging liquefaction is most likely to occur. In these areas where the need for consents is triggered (by subdivision generally, where a vacant lot is created, and by denser residential developments on larger lots), matters of discretion apply and additional information is required to be provided with each application dealing with the potential liquefaction issues. Location within the Liquefaction Management area does not of itself trigger a resource consent. However, it is noteworthy that these provisions do not solely relate to subdivision as per the current Selwyn District Plan. The CDP also has specific additional information requirements for resource consents required in areas located in the liquefaction management area where a geotechnical report is required.

In terms of slope instability a suite of polices apply. 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.

[7] *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines, November 2009 and SA/SNZ HB 436: Risk Management Guidelines – companion to AS/NZS ISO 31000: 2009*

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 people or property.

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

Slope Instability Management areas:

- Rock fall Management Area
- Cliff Collapse Management Area
- Mass Movement Management Area
- 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 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.

In terms of other methods, CCC uses section 106 of the RMA 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.

6.0 Summary of Gaps and Main Issues Identified

It is considered that the approach to managing geotechnical risk in Selwyn District is not robust or up to date in the sense of giving effect to the higher order documents and policy guidance documents being provided from Central Government. Considering the approaches reviewed, it is most similar to the approach taken by ADC. 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 and costs to obtain detailed natural hazard information. However, it is not as robust (or "best practice") compared with some of the neighbouring districts such as Hurunui District and Christchurch City. It is also not risk-based. Hurunui District, in particular, has a similar geographical spread to SDC and 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. The Christchurch City Council has also given considerable thought to policy provisions for location of critical infrastructure in areas subject to high hazards (see Policy 11.3.4 of the CRPS discussed earlier).

The main gaps identified for the Selwyn District are:

1. Absence of a comprehensive risk-based approach to natural hazard management including geotechnical risks and a clear objective and policy framework.
2. Lack of robust identification on the planning maps of areas of slope instability and liquefaction risk and few rules specifically dealing with geotechnical risk, particularly active faults.
3. A focus on subdivision as the main point of capture for the management of geotechnical risk when many land development projects do not involve subdivision. The majority of the other districts reviewed capture this through requiring land use resource consents in locations where geotechnical risks have been identified and mapped.
4. The absence of a policy framework for strategic and critical infrastructure in high hazard areas (some of these will be located in high flood risk areas rather than areas of high geotechnical risk within Selwyn).

Many of the gaps result from the SDP predating the CRPS.

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. However, many of the councils have included provisions to cover the situation where land development occurs without subdivision. 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.

Overall, SDCs approach could be more comprehensive and integrated through managing the risk of liquefaction, slope instability and active faults within a framework that is also appropriate to other natural hazards, such as flood and coastal 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 matters of discretion, matters of control and additional information requirements to guide resource consent planners and users of the plan. The approach to managing geotechnical risk could be improved by providing clearer provisions that are specifically targeted at addressing geotechnical risk.

Section 6(h) 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 (Section 31, RMA). This elevated status needs to be embraced in the DPR.

7.0 Summary of Options to Address Issues

Based on the matters discussed in the Baseline Report and summarised in this report two options have been provided below addressing management of geotechnical risk within the DPR.

7.1 OPTION 1 Status quo

This option would result in no change to the provisions in the SDP managing geotechnical risk. Reliance would continue to be placed on capturing geotechnical risk through geotechnical investigations at the subdivision and building consents stage and through requests for specific information to support plan changes. The onus would continue to fall on developers to identify geotechnical risk. ONLs and VALs would continue to be the only trigger for the requirement for a geotechnical investigation in relation to potential slope instability. The faultlines identified on the planning maps would continue to alert the community and developers to the risk from faultlines, but would only be effective if a resource consent was triggered by another matter (not the natural hazard per se as there are no attached rules).

Effectiveness in Addressing Issue:

Maintaining the status quo is not considered to be effective in addressing geotechnical risks in the district.

The Baseline Report has highlighted a number of inadequacies with the current provisions in the SDP. To continue with the provisions unchanged would not address the issues identified. In particular it is considered that the current provisions do not give effect to the NZCPS (in respect to coastal erosion hazard) and the CRPS (all natural hazards).

In terms of the CRPS, policies 11.3.3, 11.3.5 and 11.3.6 will not be given effect to because subdivision and development will not be managed specifically to avoid or mitigate the effects of active faults and areas of liquefaction or lateral spread. A risk based approach has not be adopted generally throughout the existing plan. Including consideration of the likelihood of the natural hazard event and the potential consequences for people, communities, property, infrastructure and the environment

There is currently no real acknowledgment of the role of natural features in assisting in avoiding or mitigating natural hazards, or policies requiring them to be protected and restored where appropriate. This means that the plan is currently more heavily focused on engineering solutions and hard protection structures and is therefore potentially inconsistent with the NZCPS and the CRPS.

Risks:

There are a number of risks associated with the carrying over of the SDP rules. As noted above, Option 1 would not be effective in addressing the identified problems with the current rules package and the matters outlined in the baseline report would remain unresolved.

The onus would continue to fall on developers to identify geotechnical risk in their subdivision developments and plan changes for rezonings. However, there is some risk of liability for the

Council if it approves a subdivision consent in an area where it does not require a geotechnical report, which is later found to require costly foundation design due to geotechnical risks identified at a later stage of site development. There is also the risk exposure where development does not require a subdivision, and the geotechnical risk is of a nature that cannot be addressed by individual site development. This could happen for example during an earthquake that triggered rock fall over a wide area of the Port Hills.

Budget or Time Implications:

There would be no budget or time implications given that this option would effectively result in a roll-over of the existing provisions and would not need further drafting resources, except to make the provisions consistent with any new structure adopted.

Stakeholder and Community Interests:

Minimal consultation has taken place to date in respect to this topic.

The current plan does not effectively consider the cultural implications of geotechnical risk on the community. This has been identified in the Baseline Report as including potential loss of items, features and places of significant cultural value due to coastal erosion. It is considered that engagement with iwi is required to provide culturally acceptable solutions to these issues. Adopting Option 1 would undermine the ability to consider these issues unless a hybrid option of the status quo plus iwi input was considered.

ECan and other Crown Institutions would be unlikely to support Option 1 given the considerable new guidance and policy provisions that have been developed since the SDP was made operative. See comments provided below from ECan in respect to Option 2.

Recommendation:

That this option not be adopted for further engagement.

7.2 OPTION 2 – Comprehensive risk-based framework

This option involves adopting and progressing the recommendations provided in the Baseline Report as follows:

Faultlines

1. Follow the 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. It is considered that the Hurunui District's approach to fault avoidance and fault awareness provisions is a useful approach for Selwyn District to adopt. That approach follows closely the MfE Guideline. It is recommended that the risk-based approach outline from the MfE Guideline (provided in Appendix B of the Baseline Report) be used for an initial higher level consideration of priority areas.

   For the RI Class V Greendale Fault with a recurrence interval between 20,000 and 30,000 years, establish a fault avoidance zone (buffer area) similar to that developed in Hurunui

District Plan for the Hanmer and Hope faults and determine the Building Importance Category. Under the MfE Guideline, the Greendale Fault would require provisions making structures in building importance category 4 a non-complying activity. This process should be repeated for other active faults where there is sufficient information or adopt the fault awareness zone approach used in the HDP.

2. Develop an objective and policy framework for faultlines similar to the examples below that have been developed for Hurunui District:
   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.

Liquefaction

3. Adopt an approach similar to CCC in terms of a policy framework for managing liquefaction risk (acknowledging that the areas of liquefaction prone land is much smaller in Selwyn District and the district is less populous and experiences less development pressure). The following policy from the CDP could be adapted, or form the basis for consideration of a policy:
   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.

4. Identify a Liquefaction Management Area (or other label) on the planning maps using information from SDC's technical consultants, as identified in the Baseline Report.

5. Develop provisions relevant to both subdivision, development and use and provide reasonably detailed information requirements for developing on land prone to liquefaction.

Slope instability including rockfall and mass movement

6. Further investigate areas on the Port Hills and possibly also Malvern Hills where rock fall, mass movement and soil erosion may occur (see baseline report section 2.3.5 as a starting point and the high erosion risk maps in the LWRP). Consideration should also be made in respect to the level of development anticipated in these areas over the life of the district plan.

7. Develop specific provisions in respect to slope stability rather than relying on the ONL and VAL provisions to trigger this consideration. These areas do not sufficiently overlap or align with areas of high erosion risk or closely align with areas of known slope instability. The existing provisions are focused on identifying the outstanding natural areas and visual amenity landscapes not natural hazard risk.

8. A useful policy that could assist in providing a framework is the slope instability policy for the remainder of the Port Hills in the CDP. This policy is as follows:
   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.*

   This policy recognises that large areas of the Port Hills have not been investigated but a slope instability risk, such as rockfall, could still be present should development be proposed and could be usefully adapted for the Selwyn District.

Geotechnical risk and earthworks

9. Develop a clearer connection between earthworks and geotechnical related natural hazards as well as exploring the areas where duplication with the LWRP including setbacks from waterbodies and differing maximum volumes thresholds occur. In respect to potential for overlapping functions explore the use of section 33 of the RMA to transfer powers to ECan for earthworks associated with large dam construction, hard protection structures adjacent to MHWS and similar structures. Clearer provisions could include development of matters of control and matters of discretion that specifically target geotechnical risk when earthworks are being undertaken.

10. Consider a lower threshold volume specifically for high erosion risk areas and other areas of likely slope instability. The LWRP already has a low threshold in the High Erosion Risk Areas and this could be relied upon, but those areas are not confirmed to also be an accurate representation of areas of slope instability in the Selwyn District (rockfall, cliff collapse and mass movement) and this requires further investigation.

General Approach to geotechnical risk

11. Consider Consider setting up a register of suitably qualified and experienced geotechnical professionals to assist in reviewing resource consents and building consents, and potentially plan changes. This register should be governed by a select panel (approximately 3) of best

practice geotechnical industry leaders. Professionals within the register could be sought to 'screen" and review the most complex or geotechnically challengingapplications.

12. 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.

13. Investigate the 15 lot cut off for requiring geotechnical assessment for subdivisions in the low to very low geotechnical risk area to determine whether this is appropriate and update the district plan provisions to be consistent with what will happen in practice.

14. Given the concern over the effects of coastal erosion and climate change at the Taumatu coastline including Te Koru and other cultural sites of significance and ancestral lands, consult with iwi as part of determining appropriate district plan provisions in respect to geotechnical risk.

15. Develop appropriate district plan provisions for all other land developments types in terms of geotechnical risks. Ensure that the provisions are clearly related to the risk from natural hazards.

16. Include additional matters of control, matters of discretion and additional information requirements to guide resource consent planners, developers and others using the Plan for liquefaction, slope instability, active faults and any other geotechnical risks identified.

17. Include a statement in the reviewed plan similar to that of HDP recognising the seismically active nature of the district and its potential exposure to a number of geotechnical risks.

18. Investigate policy provisions that will assist in relation to the location of critical and strategic infrastructure within Selwyn District to give effect to the CRPS.

19. Give effect to section 6(h) of the RMA. It is recommended that the DPR process be used to re-focus and strengthen natural hazards provisions overall, including those relating to geotechnical risk, with greater cross boundary consistency with the approaches taken by CCC and HDC.

Effectiveness in Addressing Issue:

Overall Option 2 is a more considered approach which will give better effect to the higher order documents discussed in Sections 4.2 and 4.3 than Option 1 and would address the gaps identified in the Baseline Report (summarized above). It will enable SDC to undertake an up to date

assessment of its geotechnical hazards utilising the most recent Central Government guidelines and refocus the provisions for managing geotechnical risk in light of the addition of Section 6(h) to the RMA. It would also enable greater cross boundary consistency with neighbouring districts, particularly CCC and HDC.

Risks:

It is considered that the inclusion of more robust geotechnical risk provisions in the DPR will reduce the risks to SDC in dealing with new development in the district.

There are some risks in terms of introducing new provisions in the district plan process that would need to be properly consulted upon. The new provisions are likely to be controversial with property owners.

Budget or Time Implications:

There are budget and time implications in taking this approach. While it is considered that few additional technical reports will need to be commissioned, considerable work will be required to bring the provisions of the reviewed plan together and to draft provisions appropriately, including updated planning maps. Additional technical advice will be required.

Stakeholder and Community Interests:

It is considered that this option will better give effect to the Iwi Management Plan, the CRPS and the NZCPS and as a consequence it likely to receive greater support than Option 1 from existing stakeholders such as iwi, ECan and Central Government. However, greater consultation will be required with property owners who are likely to be affected by the new provisions.

The Baseline Report was provided to Environment Canterbury who generally supports its recommendations. The comments received from ECan on the Baseline Report are provided below[8]:

Active fault recommendations

- Environment Canterbury would support the development of policies on fault avoidance areas and fault awareness areas. This would be consistent with Policy 13.3.3 in the CRPS.

Geotechnical risk and earthworks recommendations

- Environment Canterbury would support an assessment of the overlaps or potential overlaps in management between the District Plan and the LWRP. Environment Canterbury would be happy to assist with this process.
- Environment Canterbury would be happy to discuss the transfer of powers under Section 33 of the RMA to Environment Canterbury for earthworks associated with large dam construction, hard protection structures adjacent to MHWS and similar structures.

[8] Email correspondence, Sam Leonard, Environment Canterbury, 12 June 2018

Liquefaction recommendations

- Environment Canterbury would support the development of a policy framework for managing liquefaction risk. This would be consistent with Policy 13.3.3 in the CRPS.

Slope stability recommendations

- Environment Canterbury would support the development of specific slope stability provisions in the District Plan. Environment Canterbury would be happy to assist with the identification of potential overlaps with the LWRP provisions for High Soil Erosion areas.

General recommendations

- Environment Canterbury would also support the general recommendations in the Report.

Recommendation:

That Option 2 be accepted for further development and engagement.

8.0 Summary of Stakeholder Engagement

To date, discussions have been held with the neighbouring Canterbury district council's: CCC, HDC, WDC and ADC .Discussion with each council focused on identifying the methods each council uses to manage geotechnical risk both within and outside of their district plan. The methods each council identified are addressed in full in the Baseline Report and have been discussed in Section 5 of this report. While this assessment of other councils natural hazard provisions assists in cross boundary consistency and best practice approaches it does not amount to stakeholder engagement on the DPR with these councils which is yet to be undertaken.

Discussions have also taken place with resource consent officers and subdivision officers and building consent staff within SDC itself. As provisions are developed it is considered that close liaison will be required to understand the effect of introducing new provisions on existing processes if Option 2 is adopted.

More engagement is considered to be required with both iwi and ECan to further progress the understanding of geotechnical risk in Selwyn District and to effect greater co-operation with lead organisations, including addressing cross boundary issues.

9.0 Preferred Option for Further Engagement

The Project Team recommends that:

Option 2, being the management of geotechnical risk through a risk-based objectives and policy framework that acknowledges the smaller population base and widely distributed nature of the district, and its assets, coupled with additional and updated rules and planning maps be adopted for further engagement as per the recommendations in the Baseline Report summarized above.

Appendix 1 – Baseline Report

Link to Baseline report:

Managing Geotechnical Risk, [PDF, 3361KB] June 2018