

TIMARU



DISTRICT COUNCIL

Te Kaunihera ā-Rohe  
o Te Tihi o Maru



YOUR PLAN OUR FUTURE  
TIMARU DISTRICT PLAN REVIEW

## Natural Hazards S.32

May 2022



**YOUR PLAN OUR FUTURE**  
**TIMARU DISTRICT PLAN REVIEW**  
LAND USE PLAN

**Timaru District Council**

**Section 32 Report**

**Natural Hazards Chapter**

**May 2022**

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# 1 District Wide Matter: Natural Hazards

## 1.1 Introduction

The district of Timaru is subject to a range of natural hazards including river flooding, coastal erosion and inundation, overland flows, slope instability, earthquakes, liquefaction and tsunami. Coastal hazards, being coastal erosion, inundation and tsunami are addressed in the Coastal Environment chapter as required by the New Zealand National Planning Standards (NPS).

The district is framed by hills and mountains to the west and a coastline to the east connected by expansive plains that are framed by the Rangitata River to the north and the Pareora River to the south. The Plains themselves are crossed by other smaller but significant rivers that are important for recreation and as sources of potable/stock water. These river systems lead to significant flood hazard risks.

## 1.2 Community / Stakeholder / Iwi Engagement

The Council undertook consultation on the topic of natural hazards as part of the wider consultation on the district plan review. This included the publication of a natural hazards' discussion document and three public drop-in sessions held in Geraldine and Timaru during January and February 2017. The feedback from the public drop-in sessions, which more than 65 people attended, was included in the Community Feedback and Initial Committee Direction on Discussion Documents report. The main issue identified for the purposes of consultation with the community in 2017 and the feedback received is contained in section 1.4.2. In addition to that, the Canterbury Regional Council provided commentary as follows:

- Provisions around normal residential development on or near active faults (i.e., within fault awareness areas) are not required in the District Plan given the very low risk to most residential development from surface fault ruptures. However, it is appropriate to apply provisions/rules around the surface fault rupture hazard for development of large subdivisions or important buildings/critical infrastructure/buildings with emergency functions within the fault awareness areas. The faults of most concern are the Geraldine-Mt Hutt fault system at Mt Peel and the Butler Downs faults in the upper Rangitata.
- There should be some level of geotechnical investigation of some liquefaction susceptibility areas, but these may only be very small areas near the coast.

### Draft District Plan Consultation

A draft natural hazards chapter (excluding coastal hazards) was prepared and notified for public comment as part of consultation on the draft District Plan. Submissions were received from various stakeholders with interests in the zone. In total submitters provided 91 feedback points on this Chapter. In summary:

- A number of submitters challenged the overland flow paths provisions, including fencing restrictions (NH-R7) and how these work in urban areas.
- A number of submitters noted that the provisions cover structures (in addition to buildings) which are varied, and which often do not suffer damage or risk transference in natural hazard events.
- A number of submitters questioned the status of regionally significant infrastructure (RSI) in high hazard areas, suggesting this should not be non-complying and questioned the provisions in so far as they relate to telecoms noting these do not displace floodwaters (NH-R6) and investigations should not be required for faults. Some submitters suggested there should be separate provisions for maintenance and upgrading of RSI, versus new RSI.

- Some submitters considered requiring resource consent for RSI in the liquefaction area is onerous and unnecessary (NH-R12), noting that the appropriateness of building foundations in liquefaction areas can be assessed at building consent stage.
- Many comments were provided on the earthwork's provisions, including suggesting these were onerous.
- The threshold for impervious surfaces in rural and industrial areas was questioned by some submitters.
- A number of submitters questioned Policy NH-P13 and Rule NH-R21 for buildings and structures on the river side of a stop bank, stating that prohibited status was too onerous, especially for structures such as culverts, bridges and water races.

## 1.3 Strategic directions

The strategic directions of relevance to this topic are:

### SD-O3 Climate Change

The effects of climate change are recognised, and an integrated management approach is adopted, including through:

- taking climate change into account in natural hazards management;
- enabling the community to adapt to climate change;
- encouraging efficiency in urban form and settlement patterns.

### SD-O4 Natural Hazards

Natural hazards risks are addressed so that:

- areas subject to natural hazards and risk are identified;
- development is avoided in areas where the risks of natural hazards to people, property and infrastructure are assessed as being unacceptable; and
- for other areas, natural hazards risks are appropriately mitigated.

The strategic objectives seek to manage the effects of climate change and natural hazards on development. This includes avoiding development in areas of 'unacceptable risk'. This is not clarified and is assumed to mean significant/high hazard i.e., flood events resulting in high velocities and water levels. In areas where the risk from natural hazards is 'acceptable', Objective SD-O4 states that development can occur if the hazards are mitigated. Presumably, this could include applying a minimum floor height to buildings.

## 1.4 Problem definition

### 1.4.1 The efficiency and effectiveness of the Operative Plan

The planning maps in the Operative Plan identify stop banks. The maps do not identify areas at risk from any natural hazards (except coastal erosion and inundation).

The Operative Plan Natural Hazard provisions address river flooding. Other natural hazards including earthquakes, subsidence, and wind were deemed to be more effectively addressed through the Building Act. As such, the Plan identifies two relevant issues:

1. River flooding recognising that a large part of the plains is subject to some degree of flood risk including all of the main settlements and some of the holiday huts.

2. Filled sites are at risk of subsidence and differential settlement of buildings.

The objectives and policies seek to avoid further non-essential development or redevelopment in the most hazard prone areas of the district, especially adjacent to rivers and the sea. Non-essential development is seen as being new residential and other intensive development including commercial and industrial developments. However, the Plan does explicitly provide for the reconstruction of existing household units and holiday huts, and the modification of existing dwellings to decrease the level of flood risk or damage.

The policies also actively encourage the relocation of household units from the most hazard prone locations to alternative sites in relatively flood free areas where adverse environmental effects can be avoided. Furthermore, they seek to limit further zoning for residential development in the most hazard prone locations and ensure that if household units are constructed, there is no more than a 0.5% chance, in any one year, of a flood reaching the floor level. There are also objectives and policies that seek to improve knowledge of natural hazard risks, minimise risks to life and property from land subsidence, and minimise costs to the wider community from measures to reduce the exposure of individuals or particular communities.

The policies also direct that new residential and other intensive development within 100 metres of the landward side of the centreline of a stop bank, or on sites subject to a 2.0% chance, in any one year, of flooding, are discretionary activities. Any application must be accompanied by, amongst other matters, a report from the Canterbury Regional Council to show the flood risk for that site.

The Residential Zone also has objectives and policies that seek to avoid new residential development in areas that are subject to a significant flood hazard risk. The Recreation 1 Zone seeks to manage new development in most of the holiday huts whilst providing for the reconstruction or modification of existing household units including holiday huts at Milford Huts. Subdivision in the Rural 4B (Blandswood) Zone requires consideration of natural hazards as does subdivision for utility services, public utilities, telecommunication facilities and radio-communication facilities.

Overall, the objectives and policies essentially seek to minimise adverse effects from flooding by avoiding areas that pose a significant risk to new development and managing activities in other areas i.e., building to minimum floor height or requiring development in certain areas be subject to a consent process. There is no specific policy framework that applies to utilities despite these often being provided for in 'at risk' areas. It is also considered that whilst the objectives and policies are very directive, they do not provide an overall picture of how natural hazards will be managed in the district.

The rules in District Wide Rules Part D6.16 are as follows:

**Permitted activities**

- All household units and other residential activities constructed with a floor height such that the risk of flood waters rising to that level shall not exceed 0.5% in any year, except that this rule shall not apply to extensions of existing household units and other residential activities where the extension will not increase the total floor area by more than 20%. The 20% referred to above shall apply from 7 October 1995. Any subsequent extensions to existing household units shall require a resource consent and shall be required to comply with the minimum floor height.

- In the Residential 1 Zone at Temuka Northwest, household units and other residential buildings constructed with a minimum floor height 150mm above the 0.5% Annual Exceedance Probability flood level. Applications are to be accompanied by a flood hazard assessment from a suitably qualified person.

#### **Restricted discretionary activities**

- Household units in the Residential 1 Zone at Temuka Northwest that do not comply with the permitted activity standards.

#### **Discretionary activities**

- Other than for non-habitable accessory buildings, public utilities and utility services the erection of a building or structure on the landward side of a Regional Council stop bank within 100 metres of the centreline of that stop bank identified on the District Plan maps.
- The erection of a building or structure other than in the Recreation 1 Zone or the Commercial 2A Large Format Store (Retail Park) zone on land subject to a risk of flooding which exceeds 2.0% in any year. This rule does not apply to:
  - (a) The maintenance of existing buildings or structures or to the minor upgrading of existing public utilities, utility services, telecommunication facilities or radiocommunication facilities; or
  - (b) Public utilities, utility services, telecommunication and radiocommunication facilities or non-habitable buildings ancillary to public utilities, utility services, telecommunication facilities and radiocommunication facilities.
- The reconstruction of existing household units at Milford Huts which fail to meet the timeframes specified in section 10 of the Resource Management Act (i.e., existing use rights).

#### **Non-complying activities**

- Any residential activity with a floor height which does not meet the permitted activity standards except at Milford Huts and Temuka Northwest.

#### **Prohibited activities**

- Household units and other residential activities on the river side of a Regional Council stop bank.
- Household units (including holiday huts) and other residential activities within any area identified in the planning maps as subject to coastal inundation, except those provided for as discretionary activities in the Recreation 1 Zone at Milford Huts only.
- In the Residential 1 Zone at Temuka Northwest, the following applies:
  - (i) household units are prohibited within the High Hazard Stop bank Setback Area identified on the Outline Development Plan; and
  - (ii) all buildings are prohibited within the Stop bank Maintenance Area, being identified as all that land measured 10 metres east of the toe of the stop bank.

These rules are duplicated in the Residential and Recreation zone chapters but not the Commercial zone chapter (Commercial 2A Large Format Store (Retail Park)).

Overall, the policy framework and rules in the operative Plan appear to have been effective at managing risks from flooding. However, the duplication of rules in the zone chapters and the Natural Hazards chapter is unnecessary and confusing. Furthermore, some of the rules could be reworded to ensure clarity and a clear understanding of their intent.

The operative District Plan does not address overland flows, slope instability, earthquakes and liquefaction.

## 1.4.2 Issues identified

Flood hazard risk is a significant issue for the district. There are extensive stop banks along the Rangitata, Waihi, Opihi, Orari and Pareora rivers but many of the settlements in the district are vulnerable to flooding as they are either not protected and/or the stop banks have design limits. This means the stop banks can be breached because of erosional processes, and overtopped or outflanked during a large flood event. Additional significant protective measures to enlarge or reinforce stop banks are expensive, and avoidance of the more serious natural hazards has, to date, been considered the more appropriate response.

The district has experienced many major flood events, in particular in 1945 and 1986. The 1945 event caused the most widespread flooding in the Canterbury area in the past century, because whilst the flood flows in most of the rivers were lower than in the March 1986 flood, the flood occurred at a time when the standard of flood protection works and stop banks was much lower. This resulted in more rivers breaking out of their banks. Furthermore, in the weeks leading up to the 1945 flood, unsettled and wetter than average conditions prevailed in Canterbury, culminating in heavy rainfall on the 20th and 21st February. Much of the heavy rain fell in a 36-hour period, with the worst-hit areas receiving up to 300 mm of rain.

The March 1986 flood flows were the largest recorded in the south Canterbury foothill rivers during the 20th century. Flooding of property and houses occurred in many locations around South Canterbury but most notably in the Pleasant Point Township and the hut settlements adjacent to the Opihi River, Levels Plains and Seadown, parts of Geraldine and Fairlie townships, the Washdyke industrial area, the Pareora Valley and Pareora Huts. This resulted in substantial damage to property, in the range of \$120 million (2010 value) of which a substantial amount was met by the Government.

The Butlers and Stratheona holiday huts are at significant risk from surface and river flooding and the Milford and Rangitata holiday huts are at risk from river and coastal inundation as well as coastal erosion. The majority of the holiday huts at Waipopo are at significant risk from river flooding but some areas could possibly be developed subject to mitigation i.e., minimum floor heights. The Blandswood holiday huts are at risk from periodic flash flooding but otherwise are less vulnerable than the other holiday huts. However, access via the ford in the Kōwhai Stream to the holiday huts on its west bank can be difficult, if not impossible at times. For these reasons, the Council's policy has been to generally avoid all new development of holiday huts in these locations.

The district is also prone to other natural hazards including overland flows, slope instability, earthquakes and liquefaction.

The Natural Hazards Discussion Document prepared by the Timaru District Council (TDC) in November 2016 identified the issues set out below with the operative Plan.



### **1.4.2.1 Should areas of known natural hazard risk be mapped in the District Plan?**

In addition to flooding, the district is also known to be subject to other significant hazards including fault rupture, lateral spreading, liquefaction, landslides, ground shaking, rockfall, alluvial fans, land instability, overland flow paths and fire risk. However, these hazards are not specifically identified and addressed by the operative District Plan.

The current approach means that the presence of a known natural hazard is not necessarily a trigger for resource consent, even though in some instances, the natural hazard risk is high, and development should be discouraged in certain areas. In other instances, regionally significant infrastructure and development could be located in areas subject to natural hazards and hazard mitigation methods, such as stop banks and other hard protection structures may be required.

Council's knowledge of natural hazards in the district is continually growing as further study is undertaken, including that in conjunction with Canterbury Regional Council. Furthermore, climate change may increase the risks from some natural hazards. It is therefore suggested that the approach taken in addressing natural hazards in the District Plan should be able to accommodate new information. As a result, consideration of the nature and extent of Natural Hazard Mapping in the District Plan is required.

Whilst there was general support for mapping of natural hazards in the District Plan, this was coupled with some reservations about potential costs associated with such an approach if every known hazard was to be mapped. Additionally, respondents also indicated it was important to couple the mapping of natural hazards with an assessment of risk and an analysis of the sensitivity of activities to those hazards when drafting plan provisions. One respondent seeks only hazards that have occurred to be mapped rather than modelling predictions.

### **1.4.2.2 Should the District Plan take a sensitivity-based approach to activities in natural hazard areas?**

This approach would take into consideration the sensitivity of the land use to natural hazard risk and provide for appropriate activities in hazard prone areas. For example, in a rural zone grazing / farming would be permitted but a new dwelling may be subject to a consent process and/or a minimum floor height standard or prohibited depending on the level of risk.

In an urban context, land can be zoned according to its risk from natural hazards i.e., land adjacent to rivers is zoned as open space rather than for residential activities. The other way a sensitivity approach can be applied is to restrict activities that can influence or increase the hazard risk.

A sensitivity-based approach was generally supported, whilst noting that in some instances, activities that are potentially sensitive to natural hazards (particularly infrastructure) sometimes have no option but to establish and operate in natural hazard areas. The Council needs to understand the level of risk associated with a hazard when developing plan provisions. There was strong support for the inclusion of relevant provisions to give effect to the Regional Policy Statement natural hazard requirements while duplication of consenting process with the regional council should be avoided. One respondent seeks provisions for farm operations within natural hazard areas, which have less risk than houses, schools or a hospital. One respondent seeks provisions for the operation and future development of its existing food processing site within the coastal inundation area at Pareora.

### **1.4.2.3 How should the district plan control activities that can affect or be affected by natural hazards?**

The rules should recognise that while flooding is an issue in areas of the district, some parts are protected from flooding (to a certain design standard) by structures such as stop banks. Furthermore, in urban areas during heavy rainfall events the capacity of the existing stormwater network can be exceeded resulting in overland flows of water. This needs to be considered when changes to land use involve increases in impermeable surfaces or the construction of structures in overland flow paths. Such activities can result in changes to the direction of overland flows, potentially causing flooding on properties that previously may not have experienced flooding.

Overland flows on rural land can also be affected by development such as sheds, dwellings, fencing, border dykes and irrigation channels.

The other contributing factor is changes in rainfall intensities due to climate change.

Consequently, consideration needs to be given to controlling/managing activities in areas prone to natural hazards including applying measures such as minimum floor levels. Noting that such measures can make people feel 'safe' and less likely to evacuate, potentially creating the need to evacuate people from dwellings surrounded by water in a flood event which brings additional risks. Alternatively, people need to be prepared to be confined to their houses for 2-3 days.

Private property rights are also a relevant consideration in the wider approach to natural hazards. Providing provisions that are overly restrictive is counter-productive to sustainable management and the continued growth of the district. This needs to be balanced against natural hazard risk to people and property.

### **1.4.2.4 Should the District Plan include provisions relating to natural defences?**

Natural defences, such as wetlands or vegetated dunes, have a role to play in addressing river and coastal flooding and could be (a) protected by plan provisions and (b) considered as an alternative to hard protection structures.

There was general support for managing activities on and around natural defences as well as encouraging the use of natural defences, where practicable. Such an approach would align with the Regional Policy Statement. One respondent raised the need to limit the use of off-road vehicles around sensitive natural defences.

### **1.4.2.5 Insurance**

The insurance market in NZ has been changing since the Christchurch Earthquake sequence, with many insurers moving to a risk-based insurance scheme. It is feasible that inappropriate development in natural hazard zones may not be able to obtain insurance. This has implications ranging from being able to obtain bank funding to purchase a property (banks generally require insurance for mortgages) through to significant effects on personal financial position if the development is damaged or destroyed by a natural hazard. It is possible that insurance restrictions will have a greater or at least complementary impact to district plan controls.

## 1.4.3 Background

### 1.4.3.1 Climate change

The following section is based on the following report: 'The impacts of climate change in Canterbury: a summary of the literature.' Prepared by ECan. September 2019.

The number of snow days per year is predicted to decrease with consequent changes to river flows as a result of declining snow melt.

There are differences of opinion on extreme rainfall events, with some predicting that moderate and extreme rainfall events are likely to increase. Whilst others state that there may be a decrease in extreme rainfall events in eastern areas of Canterbury. However, MfE note that Carey-Smith et al found that the large regional variability between climate model simulations does not provide enough confidence in these regional patterns and recommends that until further information suggests otherwise, climate change rainfall augmentation factors should be assumed to be uniform over New Zealand. These national augmentation factors present estimates in the increase of rainfall for each degree of warming for each event duration and return period.

There is significant uncertainty surrounding projections of tropical cyclones into the future (Pearce et al., 2017). Therefore, the frequency with which ex-tropical cyclones and other storms of tropical origin may reach Canterbury in the future is uncertain.

The current consensus is that future changes in extratropical storm tracks (such as the low-pressure southerly weather systems experienced in Canterbury every few days) are likely to be small compared to natural inter-annual variability (IPCC, 2013; Ministry for the Environment, 2017b).

#### **In summary:**

- Average annual temperatures increase annually to 0.7 - 1°C by 2040, 0.7 - 3°C by 2090
  - Spring 0.6°C - 2.6°C
  - Summer 0.6°C - 3.0°C
  - Autumn 0.7°C - 3.0°C
  - Winter 0.7°C - 3.3°C
- Rainfall will vary within the region and seasonally will generally increase during spring, summer and autumn and likely decrease in the winter.
- Snowfall & snowy days will significantly decrease (30 days less per year by 2090) Duration of snow cover decreases (particularly at lower elevations).
- Westerly winds increase (particularly in winter & spring).
- NZ sea level rise will be 0.18 - 0.27m by 2040, 0.42 - 0.90m by 2090.

#### **River flooding**

Pearce et al present a brief synopsis of changes to mean annual flood (MAF) and Q5 discharge (flow threshold exceeded 5% of the time). MAF is projected to either increase or remain about the same across the Canterbury region. There is a tendency for increases to be larger for more extreme emission scenarios.

Canterbury tends to exhibit a west-east pattern in change in Q5 discharge, with slight increases towards the very west, decreases across much of inland Canterbury from north to south as well as Banks Peninsula, and increases along much but not all coastal and near-coastal Canterbury. Where

there are increases, they tend to be larger with the higher emission scenario; the same trend is not apparent for the decreases (Pearce et al., 2017).

#### **Mean Discharge**

Models show variability in mean discharge throughout Canterbury depending on the time period and emission scenario. Southern coastal Canterbury tends to become wetter, particularly for the higher emission scenario and late-century, and inland Canterbury often becomes drier, but otherwise there is no pronounced pattern in the changes (Pearce et al., 2017).

#### **Mean Annual Low Flow (MALF)**

Canterbury exhibits a mix of increases and decreases in MALF under climate change. The increases tend to be isolated to southern Canterbury and inland portions of mid-Canterbury, although these decline in extent later in the century (Pearce et al., 2017).

#### **Low Flow Timing**

Low flow conditions tend to be reached sooner after winter across Canterbury except for high alpine areas in the west and areas across the Canterbury Plains. Changes in the major alps-fed rivers tend to reflect changes in their source areas, which can differ from the surrounding rivers across the Plains. The Rangitata, for example, reaches low flow conditions later while the Waimakariri reaches them earlier. There is no strong dependency on emission scenarios or time period (Pearce et al., 2017).

#### **Drought**

An increase in climatic drought frequency is projected for Canterbury (Pearce et al., 2017). For the Canterbury Plains, even very mild future climate changes are expected to shift current drought-prone areas towards a more drought prone setting.

Under the most likely mid-range emissions scenario the projected increase in percentage of time spent in drought for Canterbury from 1980-99 levels is about 7-10% for 2030-2050 and 10% for 2070-2090 (Pearce et al., 2017).

Overall, the literature presents an uncertain future for Canterbury in terms of rainfall frequency and intensity. As such, a precautionary approach should be taken when managing natural hazards that may be affected by climate change.

### **1.4.3.2 Holiday huts**

The following issues have been identified for holiday huts in the District:

1. The need for clear objectives, policies and rules that manage activities in the clusters of holiday huts to avoid or minimise risks to human life and property from river flooding, coastal erosion and inundation. The policies appear to enable the building of new, and the rebuilding of existing huts in areas at high risk of flooding. Although, it is noted that the District Plan cannot extinguish existing use rights, even if there is a high risk to the property from natural hazards.
2. To differentiate the distinct character of the holiday huts from the residential zones of the district. The clusters of holiday huts generally have an informal layout, diversity of housing styles, clustering of buildings (no minimum lot size), and a lack of non-residential activities.
3. The clusters of holiday huts have the potential to generate reverse sensitivity effects on surrounding primary production activities.
4. The clusters of holiday huts can generate adverse effects on water quality due to the reliance on septic tanks and other forms of wastewater disposal. Whilst effects on water quality are generally

managed by Environment Canterbury (ECan), the Council needs to manage/control the land use (holiday huts) that contribute to the issue. This could lead to demand for the Council to provide services such as clean and safe potable water supplies and wastewater treatment and disposal systems.

ECan has undertaken or commissioned additional flood assessments and hazard mitigation since the District Plan was made operative in 2005. This may affect the level of risk to life and property within the clusters of holiday huts. The huts at Rangitata lie seaward of the Coastal Hazard 1 and 2 lines, and the Milford huts are at significant risk from coastal and river inundation.

The other clusters of holiday huts at Butlers, Waipopo and Stratheona are protected by stop banks along the Opihi River but are still at risk from overtopping and surface flooding during significant rain events. The Opihi River has a history of causing flooding including in 1994 when many of the holiday huts were evacuated as a precaution because the Opihi River threatened to overtop its stop banks. Even as recently as 2017, residents were evacuated from the Rangitata, Milford, Waipopo and Stratheona huts during a significant rain event.

The holiday huts at Blandswood are considered at risk because significant rainfall events can cause flash flooding in the Kowhai Stream. After a serious flood in 1975, which killed four children, further flood defence structures were constructed at Blandswood. However, the constant gravel movement in Kowhai Stream, steep stream gradient and inevitable risk of future thunderstorms mean that the risk of similar flash flooding remains.

ECan now closely monitors rainfall in the Kowhai Stream catchment and uses a warning sign system based on antecedent rain levels and other education measures to keep the residents informed of the flood risk. When the warning sign is on "high" it means that antecedent rain conditions are likely to have saturated the Kowhai Stream Catchment leaving it vulnerable to extreme runoff and flash flooding should a heavy thunderstorm occur. The residents of this area known to evacuate or move to higher ground immediately if heavy or prolonged rainfall occurs. However, the area essentially remains at significant risk from major rainfall events.

Overall, all of the clusters of holiday huts are at risk from flooding and the Milford and Rangitata huts from coastal inundation as well. This risk may increase because of climate change causing more extreme weather events.

### **1.4.3.3 Flooding and overland flows**

Flooding is a significant issue in the Timaru District. There was a very significant flood event in 1986 that caused widespread damage that cost millions to repair. Whilst there have been several other large flood events in the district since then (1994, 2017 and 2019), none have been as widespread or as damaging.

The 1986 flood event provides a good case study/example of what can happen as a result of a 1 in 100-year return event (1% AEP). This example focuses on the Pareora floodplains to demonstrate the need for a precautionary and proactive approach to flood management. The Pareora huts are located adjacent to the upper reach of the Pareora River below the gorge and within a valley. In 1986, the stop bank at the Pareora huts was overtopped by 700mm and then was breached. Four huts were washed away and a further 35 were flooded. The typical depth of water in the huts was 0.5m, although water depths of over 1m were recorded in 11 huts. It is estimated that approximately 500m<sup>3</sup>

of water spilled across the floodplain. The flood waters were essentially funnelled through the holiday huts between the surrounding hills. The township of Pareora is at low risk of flooding due to its location but the meat works is at significant risk during a 0.2% AEP.

Modelling in 2010 confirmed that the existing river channel can carry flows of 500m<sup>3</sup>/s (1 in 10yr event) but to retain that capacity or to even increase the capacity of the Pareora River requires the constant removal of shingle from the riverbed<sup>1</sup>. Other important protection measures include retaining the stop bank, retaining live planting on the river berms and live tree erosion control. Other measures could be implemented such as a secondary stop bank but this is costly and requires land that could otherwise be used for primary production. Even then, there are no guarantees that such measures would protect the holiday huts and surrounding residential properties during a 0.2% (1 in 200-year event) or a 0.5% AEP (1 in 500-year event).

Furthermore, natural hazards will be affected by climate change through varying rainfall, temperature, sea level and river processes. It is predicted that climate change will exacerbate the existing effects of flooding on infrastructure and community services, including roads, stormwater and wastewater systems and drainage, river flood mitigation works, and private and public assets including houses, businesses and schools. As such, it is likely that flood risk may increase to unacceptable levels in some places. This will require a different management approach than has been previously applied, with a combination of avoiding risk where possible, retreat from certain areas, controlling risk through structural or regulatory measures, transferring risk through insurance, accepting risk, emergency management planning, warning systems, and communicating risk (including residual risk) to affected parties<sup>2</sup>. Consequently, it will not be possible to only manage flood hazards through the district plan

#### **1.4.3.4 Slope instability**

This is generally addressed through the earthworks chapter and building consent processes.

#### **1.4.3.5 Faults and liquefaction**

These issues have not historically been well understood in the district but have been most recently explored through ECan undertaking technical reports and modelling to better understand the risks involved.

### **1.4.4 Technical reports**

A range of technical reports have informed this chapter:

- Liquefaction hazard in Timaru District, Geotech Consulting Ltd, June 2013 (<https://www.ecan.govt.nz/data/document-library/?Search=PU1C/7695-1>)
- Guidelines for using regional-scale earthquake fault information in Canterbury, Geotech Consulting Ltd, December 2015<sup>3</sup>
- General distribution and characteristics of active faults and folds in the Timaru District, GNS, December 2016<sup>4</sup>

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<sup>1</sup> Fauth, C, ECan. Pareora River channel capacity investigation. Report No. R10/10. 2010

<sup>2</sup> <https://www.mfe.govt.nz/sites/default/files/preparing-for-future-flooding.pdf>

<sup>3</sup> GNS (2015) Guidelines for using regional-scale earthquake fault information in Canterbury <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>4</sup> GNS (2016) General distribution and characteristics of active faults and folds in the Timaru District, South Canterbury, <https://www.timaru.govt.nz/pdp-supporting-info>

- The impacts of climate change in Canterbury: a summary of the literature, ECan, September 2019<sup>5</sup>
- Timaru District recreational hut communities, overview assessment of flooding and coastal hazards, ECan, June 2020<sup>6</sup>
- Using earthquake fault information in the Timaru District Plan review, ECan, May 2020<sup>7</sup>
- Review of liquefaction susceptibility for Timaru District, Ecan, 2021<sup>8</sup>
- Using liquefaction information in the Timaru District Plan review, ECan, June 2020<sup>9</sup>

*Note: separate technical reports have also informed the coastal hazards provisions located in the Coastal Environment Chapter.*

#### 1.4.4.1 Holiday huts

ECan has prepared a report entitled ‘Timaru District recreational hut communities, overview assessment of flooding and coastal hazards.’. The report concludes that most of the settlements are prone to severe flooding which equates to the high hazard classification under the CRPS provisions. The exceptions are some limited areas within the Waipopo Huts area and at South Rangitata Huts where the river flooding poses a lower risk to life and property damage than typical of the other hut settlements. However, South Rangitata is also prone to coastal hazards.

The report also confirms that each community faces varying challenges regarding the safety of people, and that evacuation, warning and education initiatives are critical for the continued viability of the established holiday huts. It is also noted that climate change has the potential to further increase hazard risk in these locations.

#### 1.4.4.2 Earthquakes

GNS has prepared a report (General distribution and characteristics of active faults and folds in the Timaru District, South Canterbury, December 2016)<sup>4</sup> that provides a general outline of the locations and character of active geological faults and folds in the Timaru District. A fault is a fracture within the rock of the Earth’s crust, along which movement has occurred. Commonly, strain builds up in the rock of the Earth’s crust and is released suddenly by a slip event (rupture) on a fault, causing an earthquake. Folds represent bending or buckling of rock, and commonly form above an underlying fault.

There are approximately 18 known faults in the Timaru District, with a range of recurrence intervals of between greater than 10,000 years and 1,200 years. Regional geological mapping has detected 14 areas of active faults or folds at the ground surface in the Timaru District. The main hazards associated with active faults include: (i) strong ground shaking from local large earthquakes, and (ii) sudden ground surface offset or buckling at the fault which may result, for example, in the destruction or tilting of buildings in the immediate vicinity. However, no large earthquakes have been centred in the Timaru District since European settlement in the mid-1800s, but the nature of hazards

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<sup>5</sup> <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>6</sup> <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>7</sup> Ecan (May 2020), Using earthquake fault information in the Timaru District Plan <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>8</sup> Ecan (2021), Review of liquefaction susceptibility for Timaru District <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>9</sup> Ecan (June 2020), Using liquefaction information in the Timaru District Plan <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>4</sup> GNS (2016) General distribution and characteristics of active faults and folds in the Timaru District, South Canterbury, <https://www.timaru.govt.nz/pdp-supporting-info>

posed by active faults was demonstrated recently during the 2010 Darfield Earthquake that resulted in ground-surface rupture, and sideways land shift, on the Greendale Fault on the Canterbury Plains, and severe ground shaking across a wide area.

Most of the active faults are in remote locations, far from any existing developments. Accordingly, in regard to ground-surface fault rupture hazard, they are of minimal consequence. However, they do represent potential sources of major earthquakes that would be accompanied by widespread strong ground shaking, possibly along with localised earthquake-triggered landslides in hilly terrain and liquefaction in any localised low-lying areas, such as close to modern river beds, and the coastal fringe, for example near Washdyke, Waimataitai and Saltwater Creek.

The only definitely active fault close to any development is the Peel Forest Fault, which lies close to the villages of Peel Forest and Blandswood. The main consequence of a rupture of this fault would be disruption of the Rangitata Gorge Road, which provides the only road access to Blandswood, and to the farms of the middle to upper parts of the Rangitata valley. There would also be disruption to the Orari Gorge Road. In both cases, restoration to serviceability could probably be achieved by large earthmoving equipment within a short time frame.

Rupture of the Waihi fault would affect minor roads along the range-front northwest of the Geraldine area.

Although it is judged to be unlikely, on account of the considerable uncertainty as to whether the Brothers Fault is in fact an active fault, a rupture of the Brothers Fault may pass through the village of Cave and would disrupt State Highway 8.

The active faults and folds of the Timaru District have been mapped at a regional scale. The precision of regional-scale fault mapping is not sufficiently accurate for site-specific use (e.g., at property boundary scales). The dataset presented is not intended to be used directly for hazard zoning, but rather to serve as a tool for hazard zoning prioritisation. Thus, a goal of the dataset is to highlight areas where more detailed mapping and site-specific fault avoidance zonation should be considered if substantial building or other infrastructural development is proposed. Furthermore, the return intervals presented in the report are only provisional estimates based on many assumptions and span broad time ranges. If there were any need for improved knowledge regarding the return interval of any particular fault (e.g., for land-use planning purposes), site-specific geological investigations would be necessary.

ECan has provided advice to TDC on using earthquake fault information in the TDC Plan, dated 22 May 2020<sup>10</sup>.

### 1.4.4.3 Liquefaction

Geotech Consulting Ltd prepared a report for Environment Canterbury and Timaru District Council in June 2013 titled 'Liquefaction hazard in Timaru District'<sup>11</sup>. The soils of Timaru District are categorised into 'nil to extremely low liquefaction potential' (Zone 4), 'very low liquefaction potential' (Zone 3), 'low potential' (Zone 2) and 'moderate liquefaction potential' (Zone 1). There are very limited areas

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<sup>10</sup> Ecan (May 2020), Using earthquake fault information in the Timaru District Plan <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>11</sup> <https://www.ecan.govt.nz/data/document-library/?Search=PU1C/7695-1>



within the district that have a moderate potential for liquefaction. Most of the District has a very small risk of liquefaction, and it would only occur in small, isolated areas.

The areas of highest susceptibility to liquefaction are the valley bottoms close to the coast at Timaru between Washdyke Lagoon and Saltwater Creek, where looser fine-grained sediments and shallow groundwater are present.

The report suggests that in the moderate potential areas/Zone 1, all new development and construction should have appropriate site investigations carried out with liquefaction specifically addressed as part of the testing and analysis. In the low potential areas/Zone 2, important structures should have liquefaction included in the site investigation and reporting as a potential hazard. Otherwise, it is recommended that new urban subdivisions of more than five new lots in low potential areas should address the liquefaction potential as part of the geotechnical reporting at consent stage. Residential buildings should have a standard NZS3604 style soils investigation carried out. If this shows sandy soils to below the water table, it is recommended that either a deep soils investigation be carried out to quantify the liquefaction hazard, or a Foundation Category TC2 type of foundation be used (MBIE Guidance document). In very low potential areas/Zone 3, soil testing is still recommended as the report states that if soil testing for new buildings does show sandy soils extending to below the water table, then either deep site testing to quantify the risk or the use of TC2 type foundations is recommended.

ECan has provided advice to TDC on using liquefaction information in the TDC Plan, dated 9 June 2020<sup>12</sup>. A report was also released in 2021.<sup>13</sup>

### 1.4.5 Issues with Operative District Plan

- Natural hazard information that is not 100% exact (i.e. filled sites) or collated by Environment Canterbury and is not shared with the public.
- Natural hazard information needs to be reviewed to ensure up-to-date data is on hazard register.
- It is unclear if the District Plan rules are sufficient to avoid development in areas where mitigation (i.e. finished floor levels) is not appropriate.
- District Plan refers to 'hazard prone locations' rather than Canterbury's Regional Policy Statement 'high hazard areas' which is specifically in relation to a 1 in 500-year flood event. Terminology of hazard information different between ECan and Council.
- Hazard prone locations are not shown on District Plan maps. If there is no line on a District Plan map how do you manage the hazard?
- Dual resource consent requirements with ECan regarding land use consent for development within coastal hazard areas.
- Potential for new development located in flood prone areas to exacerbate flooding elsewhere as a result of its design/location.

### 1.4.6 Other information

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<sup>12</sup> ECan (June 2020), Using liquefaction information in the Timaru District Plan <https://www.timaru.govt.nz/pdp-supporting-info>

<sup>13</sup> ECan (2021), Review of liquefaction susceptibility for Timaru District <https://www.timaru.govt.nz/pdp-supporting-info>

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| Guidelines for using regional-scale earthquake fault information in Canterbury | GNS Science | December 2015 | <p>Recommendations for using the 1:250,000- scale fault datasets.</p> <p>The recommendations include delineating Fault Awareness Areas (FAAs) of 125 metres either side of the mapped line for definite (well expressed), definite (moderately expressed), likely (well expressed), likely (moderately expressed) faults and monocline folds, and 250 metres either side of the mapped fault line for all other faults and monocline folds. This reflects the fact that the well expressed and moderately expressed faults and monocline folds are likely to be mapped more precisely than the not expressed and possible faults and monocline folds.</p> | <a href="https://www.timaru.govt.nz/pdp-supporting-info">https://www.timaru.govt.nz/pdp-supporting-info</a> |
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### 1.4.7 Best practice / other Council approaches

The identification and management of natural hazards is an issue that has been addressed by several Councils around New Zealand. In Canterbury and Otago, the following second-generation Plans have been identified to guide TDC as the Districts are similar in size to Timaru and some of the Plans reflect best practice, having been prepared recently.

| Plan  | Description of Approach  |
|---|--|
| Mackenzie District Plan (operative, 1 <sup>st</sup> generation) | <p>The planning maps identify the Kimbell Environs Flood Risk Area, Kimbell Hazard Area and the Ostler Fault Hazard Area.</p> <p>The Plan contains definitions of "High Flood Risk", "Low Flood Risk", and "Floor Height".</p> <p>Chapter 18 identifies anticipated natural hazards in the Mackenzie District. These include flood hazard, shallow slumps and earth flows, slumping or slipping, active alluvial fans, rockfall fans, earthquakes, drought, wind and fire.</p> <p>One issue is identified, and this relates to the adverse effects of natural hazards. There is one objective to 'avoid loss of life and minimise the cost of damage and disruption to the community, or other parts of the environment from natural hazards.'</p> <p>The policies seek to:</p> <ul style="list-style-type: none"> <li>• increase community awareness of natural hazard risks.</li> <li>• continually develop and refine a hazards register.</li> <li>• monitor the degree to which the long-term trends in land use practices and patterns may increase the vulnerability of communities to natural hazards.</li> </ul> |

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|   | <ul style="list-style-type: none"> <li>• mitigate the effects of natural hazards.</li> <li>• ensure that buildings are constructed appropriately to mitigate the risks, with a higher level of flood mitigation required for residential buildings.</li> <li>• ensure that any proposed developments area subject to an adequate natural hazard assessment and identifies the methods to avoid or mitigate a hazard risk.</li> <li>• minimise the likelihood of damage to future assets.</li> <li>• differentiate between areas of High Flood Risk and Low Flood Risk and impose controls accordingly.</li> </ul> <p>The policies are achieved through a mix of education, rules, and gathering information. The rules are in the relevant chapter i.e. the Residential Zone chapter contains rules on residential buildings in High Flood Risk areas and minimum floor heights related to 200yr and 500yr return flood periods. However, to ascertain the 200- or 500-year flood levels or whether a property falls within a high or low flood risk area it is necessary to obtain a flood risk assessment from a suitably qualified expert.</p> <p>Subdivision (outside the Mackenzie Basin Subzone) is a Controlled Activity with the matters of control including consideration of natural and other hazards.</p>   |
| <p>Selwyn<br/>Operative<br/>District Plan<br/>(1<sup>st</sup><br/>generation)<br/><i>Note there is<br/>also a<br/>Proposed<br/>Plan</i></p> | <p>The planning maps identify ECan Defined Flood Zones: Lake Ellesmere Flood Area, Lower Plains Flood Area and Waimakariri Flood Plain.</p> <p>The Plan identifies several natural hazards – flooding, earthquakes, unstable land, drought, snow and wind storms, fire and coastal erosion.</p> <p>The objectives seek to ensure that activities do not lead to or intensify the effects of natural hazards, and that potential loss of life or damage to property from natural hazards is mitigated, whilst not creating or exacerbating adverse effects on other people or the environment.</p> <p>The policies seek to:</p> <ul style="list-style-type: none"> <li>• promote awareness among residents of natural hazard risks, and ways to minimise loss of life and damage to property.</li> <li>• Avoid new residential or business development in areas at risk from natural hazards unless any potential risk can be adequately mitigated.</li> <li>• Avoid locating dwellings and principal buildings between waterbodies and stopbanks and within the bed of any river or lake.</li> <li>• New dwellings and principal buildings in the Living 1A and Living 2A Zone at Tai Tapu are located and designed to avoid flooding in a 2% Annual Event Probability.</li> <li>• Earthworks undertaken in the Living 1A and Living 2A Zone at Tai Tapu do not divert or displace flood waters onto other’s property.</li> <li>• Mitigation measures do not lead to or intensify a potential natural hazard elsewhere, and any other effects are managed.</li> </ul> |

- Ensure any new residential or business development does not adversely affect the efficiency of the District's land drainage system or the risk of flooding from waterbodies.
- Develop the information base on the location and characteristics of natural hazards.
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The rules provide for the following activities:

**Permitted**

- On land located within the Living 1A or 2A Zones at Tai Tapu, earthworks are limited to the forming of any accessway to a site or the preparation of any site to erect a building, provided that these earthworks do not alter or impede the land drainage pattern.
- Earthworks in Rural Zones required to form a vehicular accessway through or within properties and the forming of building platforms, provided that the existing land drainage patterns are not altered or impeded; or any other earthworks which do not raise the mean average level of the land subject to the earthworks or reduce the storage capacity of surface water ponding areas.
- Any new dwelling or other principal building, except within:
  - (a) Any area shown on the Planning Maps as the Waimakariri Flood Category A area;
  - (c) Between any waterbody and any stopbank designed to contain floodwater from that waterbody; and
  - (d) Lower Plains flood area; unless a minimum building floor level 300mm above a 2% Annual Exceedance Probability (AEP) hazard event is identified and the building floor level is at or above that level;
  - (e) Ellesmere/Te Waihora flood area, unless a minimum building floor level of 3m above mean sea level (Lyttelton Datum 1937) is identified.

**Restricted discretionary:**

- Dwellings or other principal building on land located in the Living 1A or 2A zones at Tai Tapu where the minimum floor level is less than 6.93m above mean sea level.
- Any dwelling on land located in the Living 3 zone at Tai Tapu with a minimum freeboard height of 400mm above the 0.5% Annual Exceedance Probability flood event.

**Non-Complying**

- Any new dwelling, or part dwelling thereof, or other principal building, on Lots 58 to 108 shown on the Plan attached as Appendix 24 at Rakaia Huts.

**Prohibited Activities**

- Any dwelling or other principal building between any waterbody and any stop bank designed to contain flood water from that waterbody.

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|   | <p>Subdivision in flood hazard areas does not appear to be subject to specific controls.</p>  |
| <p>Selwyn<br/>Proposed<br/>Plan 2020<br/>(hearings<br/>currently<br/>underway)</p>    | <p>The proposed plan departs from the operative plan in a number of ways. The Council has mapped natural hazards areas across Selwyn based on new research, technical assessments and computer modelling.</p> <p>While the current District Plan manages a risk from a 50-year flood event the Proposed Plan identifies and manages areas at risk from a 200-year flood event. As a result more areas of the District are now identified as being at risk of flooding. The rules manage subdivision and new buildings in areas subject to flooding to meet the 200-year flood level event (instead of the current 50-year flood level event), plus freeboard.</p> <p>The proposed plan also includes rules for managing development within liquefaction and fault risk areas covering subdivision, new important infrastructure and major hazard facilities.</p> <p>The proposed plan also introduces new rules for wildfire, requiring specific setbacks for woodlots and shelterbelts.</p>  |
| <p>Ashburton<br/>District Plan<br/>(operative,<br/>2<sup>nd</sup><br/>generation)</p> | <p>The planning maps only identify stopbanks.</p> <p>There is one objective and one policy on natural hazards that are located in the Residential Zone: These seek to avoid or mitigate potential effects of natural hazards on residential areas and development.</p> <p>The rules require a report identifying flood risk and the height of the 1 in 200-year flood event to be obtained from the Canterbury Regional Council or a suitably qualified expert.</p> <p>Site standards in the Residential Zone enable new buildings or extensions to existing buildings on a site at risk from flooding, provided it has a minimum floor height of 150mm above the level of the 1 in 200-year flood event. Some exceptions apply to small scale buildings or extensions to buildings with a gross floor area up to and including 30m<sup>2</sup>; and/or an unsealed or permeable floor. Non-compliance with this standard is a restricted discretionary activity.</p> <p>The zone standards require that no additional residential units are constructed in or relocated into the Residential B Zone at Lake Clearwater, Hakatere, Rakaia or Rangitata River Mouths. Furthermore, all buildings are to be set back a minimum distance of 100m from the centre line of any stopbank that has been erected by the Canterbury Regional Council. In the Rural Zone, no new structures, buildings or extensions to existing buildings can be erected on a site identified as being at high risk from flooding. Non-compliance with these standards is a non-complying activity.</p> <p>Subdivision in a High Hazard flood risk area is a discretionary activity.</p> |

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| <p>Hurunui District Plan (operative, 2<sup>nd</sup> generation)</p> | <p>The planning maps identify coastal hazard line, faults and folds, coastal hazards, fault avoidance zones and fault awareness zones, flood and liquefaction assessment zones.</p> <p>Chapter 15 contains the objectives, policies and rules that manage natural hazards. The plan also contains a schedule of natural hazard areas: coastal hazard area, fault avoidance zones, land instability areas and a schedule of Natural Hazard Assessment and Awareness Areas.</p> <p>The objective provides for subdivision, use and development while avoiding or mitigating the adverse effects of natural hazards.</p> <p>The policies seek to avoid subdivision, use and development:</p> <ul style="list-style-type: none"> <li>• if the risk from the natural hazard is unacceptable and in high hazard areas, the matters in Policy 11.3.1 of the Canterbury Regional Policy Statement 2013 are not met.</li> <li>• within the Fault Avoidance Zone unless the adverse effects of fault rupture can be mitigated to ensure that there is no greater risk to health and safety during and after an earthquake.</li> <li>• within any Fault Awareness Zones for post emergency infrastructure or infrastructure.</li> <li>• in a Liquefaction Awareness Zone unless a geotechnical investigation is undertaken.</li> </ul> <p>The policies also seek to:</p> <ul style="list-style-type: none"> <li>• recognise that climate change could alter the frequency and duration of some natural hazard events.</li> <li>• assess the risks of natural hazards prior to land being rezoned and to avoid or mitigate those risks.</li> <li>• ensure that new subdivision within the Mt Lyford area appropriately addresses the risk of uncontrolled wildfire.</li> <li>• ensure that mitigation works are undertaken in a way which avoids, remedies or mitigates adverse effects on cultural, social and environmental values and the health and safety of communities.</li> <li>• generally avoid development, excluding critical infrastructure, within areas at risk from flooding or ponding during a 0.5% AEP (Annual Exceedance Probability) storm event.</li> </ul> <p>The Plan permits any activity within a Natural Hazard Area or a Natural Hazard Assessment and Awareness Area that complies with the relevant standards. As well as buildings on sites within the Residential (River Edge) or Woodbank (River Edge) Zone in Hanmer Springs subject to certain requirements, and extensions to dwellings that increase the floor area by up to 10% from that existing at 15 October 2016 within a Flood Assessment Zone.</p> <p>Any activity that does not meet any one or more of the standards for permitted activities and is not classified as a non-complying activity, and subdivision of land within a Natural Hazard Area or Natural Hazard Assessment and Awareness Area</p> |
|---|--|

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|  | <p>that complies with the standards for controlled activities, are discretionary activities.</p> <p>A Building of Importance<sup>14</sup> located within a Fault Avoidance Zone is a non-complying activity.</p>  |
| <p>Christchurch District Plan (operative, 2<sup>nd</sup> generation)</p> | <p>The planning maps identify Fixed Minimum Floor Level Overlay within Flood Management Area, Flood Management Area, High Flood Hazard Management Area, Residential Unit Overlay within the High Flood Hazard Management Area, Liquefaction Management Area (LMA), Cliff Collapse Management Area 1, Cliff Collapse Management Area 2, Mass Movement Management Area 1, Mass Movement Management Area 2, Remainder of Port Hills and Banks Peninsula Slope Instability Management Area, Rockfall Management Area 1, Rockfall Management Area 2 and Annual Individual Fatality Risk Certificate (AIFR).</p> <p>Objectives and policies seek to avoid new subdivision, use and development in areas where risk from natural hazards is unacceptable. This requires a determination to be made by the Council on a case-by-case basis, but presumably would include development within high flood hazard management areas, rockfall and slope instability areas. Critical infrastructure is sought to be avoided in areas at significant risk from natural hazards, and such infrastructure should be designed to keep functioning during and after natural hazard areas and recognise the benefits of infrastructure and the need for its repair, maintenance and ongoing use in areas affected by natural hazards. The policies also seek that activities do not transfer or create unacceptable risk from natural hazards to other areas, and that natural features that avoid or reduce risk from natural hazards are protected. There are also policies on raising public awareness of natural hazards and that the level of assessment of natural hazards reflects their scale and significance. The policies also provide clear guidance on the mapping of flood management areas, liquefaction management areas and areas of slope instability risk and, the management of activities within them.</p> <p>The Plan has sets of rules that apply in different management areas i.e. Flood Management Area (FMA), Te Waihora/Lake Ellesmere and Waiwera/Lake Forsyth FMA, Waimakariri FMA, Flood Ponding MA and High Flood Hazard MA. Of particular relevance, in the FMA, the Plan permits new buildings within and outside Fixed Minimum Floor Overlay (FMFO) and additions that increase ground floor area provided certain standards are met. Development outside FMFO requires the applicant to obtain a Minimum Floor Level Certificate from Council.</p> <p>The Plan also permits a range of other activities including small scale additions, garages, utilities, filling and excavation for certain activities. Otherwise, activities are restricted discretionary. More restrictive rules apply in the Waimakariri FMA and the High Flood Hazard MA, where no new residential buildings are permitted.</p> |

<sup>14</sup> Defined as including:

- 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.

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|  | Residential units in the Residential Unit Overlay are restricted discretionary activities and outside these overlays are non-complying. |
|--|---|

## 1.5 Statutory and Planning Context

| Statutory document  | Alignment requirement for Proposed District Plan                   | Comment   |
|---|--|---|
| NZCPS   | Give effect to   | Implement according to the applicable policy statement's intentions.  |
| NPS/NES   |  |   |
| CRPS  |  |   |
| Canterbury Land and Water Plan  | Not be inconsistent with   | Are the provisions of the Proposed DP compatible with the provisions of this higher order documents?<br><br>Do the provisions alter the essential nature or character of what the higher order document allows or provides for? |
| Specific management plans and strategies prepared under other legislation   | Have regard to   | Give genuine attention and thought to the matter<br>As above.   |
| Ashburton District Plan<br><br>Waimate District Plan<br><br>Westland District Plan<br><br>Mackenzie District Plan               | Have regard to the extent to which there is a need for consistency |   |
| Iwi Management Plan of Kati Huirapa<br><br>Te Whakatau Kaupapa Ngai Tahu Resource Management Strategy for the Canterbury Region | Take into account  | Address the matter and record.  |

### 1.5.1 Resource Management Act 1991 (RMA)

The key provisions of the Resource Management Act of direct relevance to this topic include:

#### Section 6 – Matters of national importance



*In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:*

*(h) the management of significant risks from natural hazards.*

The RMA was amended in 2017 to introduce the above clause to manage significant risks from natural hazards. Guidance from the MfE website on this matter states that it takes a risk-based approach to managing all-natural hazards. This involves considering both the likelihood of natural hazards occurring and the consequences when they do.

Whilst a range of natural hazards occur in the Timaru District (river flooding, overland flows, slope instability, earthquakes, and liquefaction), the evidence outlined above suggests that river flooding poses the most significant risk in terms of frequency. However, a large-scale earthquake may be a low risk in terms of occurrence but high risk in terms of magnitude of effects.

Further consideration must be given to the fact that active fault lines in the District are located in remote areas with little development, and whilst shaking and ground movement may affect built development and infrastructure many miles away, the impact will likely be less than if an earthquake occurred adjacent to or under Timaru or a settlement such as Geraldine. In contrast, many settlements including the holiday huts are located in proximity to rivers and are therefore vulnerable to flooding and overland flows. These types of events have occurred with greater frequency in the District than earthquakes and generally affect or could potentially affect a much greater number of people, built development and infrastructure.

Natural hazards such as liquefaction, and slope instability probably have a lower likelihood of occurring and the effects of liquefaction and slope instability are likely to be limited in location and extent.

Consequently, the Council has determined that it has an obligation to at least recognise the natural hazards that may occur within its District and actively manage those that pose a significant risk.

#### **Section 7 – Other matters**

*In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—*

*(c) the maintenance and enhancement of amenity values.*

*(f) maintenance and enhancement of the quality of the environment.*

The management of natural hazards and their potential effects must take into consideration the need to maintain and enhance amenity values and, maintain and enhance the quality of the environment. This is particularly relevant to the building of hazard defences such as stopbanks, and the use of mitigation measures such as minimum floor heights that have the potential to change the character of an area.

#### **Section 31 – Functions of territorial authorities**

*(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; and....*

Provisions in the Plan need to ensure that the use and development of land will generally avoid areas that are at significant risk from or could be significantly affected by natural hazards. In all other areas, adverse effects will be managed and mitigated, where this is possible and appropriate.

#### **Section 106**

Section 106 is also a relevant consideration as well. Section 106 pertains to the consideration of subdivision applications and states:

*(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; .....*

*(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.*

## **1.5.2 National Planning Standards**

A territorial authority must prepare and change its district plan in accordance with any regulations.<sup>15</sup> The NPS require that all District Plans must include a Natural hazards chapter if relevant to the district.<sup>16</sup> This chapter must be included under the Hazards and Risks of the District Plan, in Part 2: District Wide Matters.

The Natural Hazards chapter should contain all provisions relating to natural hazards except coastal hazards (if they are addressed in the District Plan). Coastal hazards are included in the Coastal Environment chapter and cross-referenced to the Natural Hazards chapter.

The NPS sets out the spatial layers for district plans (Table 18). Of specific relevance to the Natural Hazards chapter, Table 18 states that an overlay spatially identifies distinctive values, risks or other factors which require management in a different manner from the underlying zone provisions, and that overlays are likely to address matters covered in district-wide chapters.

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<sup>15</sup> RMA section 74(1)(ea)

<sup>16</sup> National Planning Standards, District Plan Structure Standard, Mandatory direction 3.

## 1.5.3 Canterbury Regional Policy Statement 2013

The key provisions of the Regional Policy Statement of direct relevance to this topic include:

### **Chapter 5 - Land Use and Infrastructure**

The CRPS includes objectives and policies directing:

#### **5.3.2 Development conditions (Wider Region)**

*To enable development including regionally significant infrastructure which:*

1. *avoid or mitigate:*
  - a. *natural and other hazards, or land uses that would likely result in increases in the frequency and/or severity of hazards.*
  - b.

### **Chapter 11 – Natural Hazards**

The CRPS includes objectives requiring:

#### **11.2.1 Avoid new subdivision, use and development of land that increases risks associated with natural hazards.**

*New subdivision, use and development of land which increases the risk of natural hazards to people, property and infrastructure is avoided or, where avoidance is not possible, mitigation measures minimise such risks.*

#### **11.2.2 Adverse effects from hazard mitigation are avoided or mitigated**

*Adverse effects on people, property, infrastructure and the environment resulting from methods used to manage natural hazards are avoided or, where avoidance is not possible, mitigated.*

#### **11.2.3 Climate change and natural hazards**

*The effects of climate change, and its influence on sea levels and the frequency and severity of natural hazards, are recognised and provided for.*

#### **11.2.4 Effective integration of the management of, and preparedness for, natural hazards**

*The level of cooperation between agencies and organisations necessary to achieve integrated management of Canterbury's natural hazards, and preparedness for natural hazards is maintained or enhanced.*

### **Policies**

#### **11.3.1 Avoidance of inappropriate development in high hazard areas**

*To avoid new subdivision, use and development (except as provided for in Policy 11.3.4) of land in high hazard areas, unless the subdivision, use or development:*

1. *is not likely to result in loss of life or serious injuries in the event of a natural hazard occurrence; and*
2. *is not likely to suffer significant damage or loss in the event of a natural hazard occurrence; and*
3. *is not likely to require new or upgraded hazard mitigation works to mitigate or avoid the natural hazard; and*
4. *is not likely to exacerbate the effects of the natural hazard; or*
5. *Outside of greater Christchurch, is proposed to be located in an area zoned or identified in a district plan for urban residential, industrial or commercial use, at the date of notification of the CRPS, in which case the effects of the natural hazard must be mitigated; or ....*

#### **11.3.2 Avoid development in areas subject to inundation**

*In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:*

1. *is of a type that is not likely to suffer material damage in an inundation event; or*
2. *is ancillary or incidental to the main development; or*
3. *meets all of the following criteria:*
  - a. *new buildings have an appropriate floor level above the 0.5% AEP design flood level; and*

- b. *hazardous substances will not be inundated during a 0.5% AEP flood event;*

*provided that a higher standard of management of inundation hazard events may be adopted where local catchment conditions warrant (as determined by a cost/benefit assessment).*

*When determining areas subject to inundation, climate change projections including sea level rise are to be taken into account.*

#### **11.3.3 Earthquake hazards**

*New subdivision, use and development of land on or close to an active earthquake fault trace, or in areas susceptible to liquefaction and lateral spreading, shall be managed in order to avoid or mitigate the adverse effects of fault rupture, liquefaction and lateral spreading.*

#### **11.3.4 Critical infrastructure**

*New critical infrastructure will be located outside high hazard areas unless there is no reasonable alternative. In relation to all areas, critical infrastructure must be designed to maintain, as far as practicable, its integrity and function during natural hazard events.*

#### **11.3.5 General risk management approach**

*For natural hazards and/or areas not addressed by policies 11.3.1, 11.3.2, and 11.3.3, subdivision, use or development of land shall be avoided if the risk from natural hazards is unacceptable. When determining whether risk is unacceptable, the following matters will be considered:*

- 1. the likelihood of the natural hazard event; and*
- 2. the potential consequence of the natural hazard event for: people and communities, property and infrastructure and the environment, and the emergency response organisations.*

*Where there is uncertainty in the likelihood or consequences of a natural hazard event, the local authority shall adopt a precautionary approach.*

#### **11.3.6 Role of natural features**

*The role of natural topographic (or geographic) and vegetation features which assist in avoiding or mitigating natural hazards should be recognised and the features maintained, protected and restored, where appropriate.*

#### **11.3.7 Physical mitigation works**

*New physical works to mitigate natural hazards will be acceptable only where:*

- 1. the natural hazard risk cannot reasonably be avoided; and*
- 2. any adverse effects of those works on the natural and built environment and on the cultural values of Ngāi Tahu, are avoided, remedied or mitigated.*

*Alternatives to physical works, such as the relocation, removal or abandonment of existing structures should be considered.*

#### **11.3.8 Climate change**

*When considering natural hazards, and in determining if new subdivision, use or development is appropriate and sustainable in relation to the potential risks from natural hazard events, local authorities shall have particular regard to the effects of climate change.*

#### **11.3.9 Integrated management of, and preparedness for, natural hazards**

*To undertake natural hazard management and preparedness for natural hazard events in a coordinated and integrated manner by ensuring that the lead agencies have particular regard to:*

- 1. the investigation and identification of natural hazards;*
- 2. the analysis and mapping of the consequential effects of the natural hazards identified;*
- 3. the effects of climate change and resulting sea level rise;*
- 4. the setting of standards and guidelines for organisations involved in civil defence and emergency management;*
- 5. the development and communication of strategies to promote and build community resilience; and*
- 6. any other matters necessary to ensure the integrated management of natural hazards in the Canterbury region.*

**High Hazard Areas are defined as:**

1. flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1, or where depths are greater than 1 metre, in a 0.2% AEP flood event;
2. land outside of greater Christchurch subject to coastal erosion over the next 100 years; and
3. land within greater Christchurch likely to be subject to coastal erosion including the cumulative effects of sea level rise over the next 100 years. This includes (but is not limited to) the land located within Hazard Zones 1 and 2 shown on Maps in Appendix 5 of this Regional Policy Statement that have been determined in accordance with Appendix 6; and
4. land subject to sea water inundation (excluding tsunami) over the next 100 years. This includes (but is not limited to) the land located within the sea water inundation zone boundary shown on Maps in Appendix 5 of this Regional Policy Statement.

When determining high hazard areas, projections on the effects of climate change will be taken into account.

The key objective is that any increased risk to people and property from natural hazards is avoided and where that is not possible, risks are minimised through the use of mitigation measures. In summary, this is to be achieved by:

- having particular regard to the effects of climate change when considering the risks posed by natural hazards or the appropriateness of use, development or subdivision.
- avoiding new subdivision, use and development in high hazard areas, unless certain conditions are met. Critical infrastructure can be located in these areas if there is no reasonable alternative.
- in areas subject to inundation during 0.5% AEP flood event; any new subdivision, use and development is avoided unless there is no increased risk to life, and the subdivision, use or development.
- managing new subdivision, use and development of land on or close to an active earthquake fault trace, or in areas susceptible to liquefaction and lateral spreading to avoid or mitigate adverse effects.
- for other natural hazards, subdivision, use or development of land shall be avoided if the risk from natural hazards is unacceptable.
- maintaining, restoring and protecting natural topographic (or geographic) and vegetation features that act to avoid or mitigate natural hazards.
- minimising the need and extent of new physical mitigation works.
- ensuring an integrated approach to the management of, and preparedness for, natural hazards.

| CRPS Method   | Manner addressed in proposed District Plan  |
|---|---|
| <p>Outside of greater Christchurch: Set out objectives and policies, and may include methods in district plans, to avoid new subdivision, use and development that does not meet the criteria set out in Policy 11.3.1 clauses (1) to (5) for known high hazard areas excluding those areas subject to coastal erosion within the next 100 years and within the beds of lakes and rivers.</p> | <p>Objectives, policies and rules that specifically address high hazard areas.</p>  |
| <p>Set out objectives and policies and may include methods in district plans to avoid new subdivision, use and development of land in known areas subject to inundation by a 0.5% AEP flood event, other than in the</p>  | <p>Objectives, policies and rules that specifically address land that is subject to inundation by a 0.5% AEP flood event.</p> |

| CRPS Method  | Manner addressed in proposed District Plan  |
|--|---|
| circumstances determined in Policy 11.3.2 clauses (1) to (3).  |   |
| Where there is a known flooding risk, include provision in their district plans that require a 5% AEP flood event to be determined, and its effects assessed, prior to new subdivision, use or development of land taking place. Where the territorial authority has adopted a standard less frequent than a 0.5% AEP flood event, the expected flow and effects of that less frequent AEP flood event will be determined. | The Council has not adopted a standard less frequent than a 0.5% AEP flood event.   |
| Set out objectives and policies and may include methods in district plans to manage new subdivision, use and development of land in areas on or adjacent to a known active earthquake fault trace.   | Objectives, policies and rules that specifically manage subdivision of land and critical infrastructure in fault awareness areas.<br><br>Adverse effects on other buildings and structures will be managed through the Building Act.  |
| Set out objectives and policies and may include methods in district plans to manage new subdivision, use and development of land in areas known to be potentially susceptible to liquefaction and lateral spreading.   | Objectives, policies and rules that specifically manage regionally significant infrastructure and subdivision of land known to be potentially susceptible to liquefaction and lateral spreading.<br><br>Adverse effects on other buildings and structures will be managed through the Building Act. |
| Ensure that the risk of earthquake fault rupture, liquefaction and lateral spreading hazards are assessed before any new areas are zoned or identified, in a district plan, in ways that enable intensification of use, or where development is likely to be damaged and/or cause adverse effects on the environment.  | Matters will be considered at the time of rezoning of land.   |
| Set out objectives and policies and may include methods in district plans to ensure that new critical infrastructure is located outside known high hazard areas, unless there is no reasonable alternative.  | Objective, policy and rule to manage regionally significant infrastructure in natural hazard areas unless there are operational or functional location needs and no feasible alternatives.  |
| Where critical infrastructure is located in high hazard areas, encourage the provider to ensure that it will be able to be maintained and reinstated, if necessary, within a reasonable timeframe.   | Addressed through specific policy.  |
| Ensure the potential effects of natural hazards are taken into account in the development of any new critical infrastructure.  | As above.   |

| <b>CRPS Method</b>   | <b>Manner addressed in proposed District Plan</b>   |
|--|---|
| Set out objectives and policies and may include methods in district plans to ensure that subdivision, use or development of land will be avoided if the risk from natural hazards is unacceptable.   | Objective, policies and rule to avoid subdivision use and development in high hazard areas and manage it in other locations.        |
| Set out objectives and policies and may include methods in district plans to ensure that where subdivision, use or development occurs in an area where there is residual risk from natural hazards, appropriate mitigation is required to manage that risk.                          | The level of risk in most areas is addressed on a site-by-site analysis basis enabling consideration if risks from natural hazards. |
| When setting out objectives, policies or methods in their regional and district plans, recognise the role of natural features in providing mitigation for the adverse effects of natural hazards and provide for the maintenance and protection of those features where appropriate. | Objective and policy address the role of natural features in providing mitigation for the adverse effects of natural hazards.       |
| Set out objectives and policies and may include methods in district plans to avoid impediments to accessing community owned mitigation structures for maintenance purposes.  | Not relevant to Timaru District.  |
| When setting out objectives, policies or methods in regional and district plans, take into account the current projections on the effects of climate change.   | All projections of flood hazards have/will take into consideration the effects of climate change.                                   |

### 1.5.4 Other relevant documents

The other relevant documents for this topic include:

| <b>Document</b>   | <b>Relevance</b>  |
|---|---|
| <b>Iwi Management Plan of Kāti Huirapa</b>  | General relevance to the whole Plan and specific relevance to Tāngata whenua chapters.  |
| <b>Te Whakatau Kaupapa Ngai Tahu Resource Management Strategy for the Canterbury Region</b> | General relevance to the whole Plan.  |
| <b>Local Government Act 2002</b>  | <ul style="list-style-type: none"> <li>• The purpose of this Act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities.</li> <li>• Section 11A – The Council is required to have particular regard to the avoidance or mitigation of natural hazards.</li> <li>• Section 145(b) gives local authorities powers to make bylaws for the purpose of protecting, promoting or maintaining public health and safety.</li> </ul> |

| Document  | Relevance   |
|---|---|
|   | <ul style="list-style-type: none"> <li>• Under section 149, regional councils have the power to make bylaws for flood protection and flood control works.</li> </ul>  |
| <p><b>Civil Defence Emergency Management Act 2002</b></p> | <ul style="list-style-type: none"> <li>• The CDEM Act provides the framework under which natural hazards are to be managed, and sets out the duties, responsibilities and powers of central and local government, lifeline utilities and emergency services. It establishes an ‘all-hazards’ approach that seeks to achieve the sustainable management of hazard risk through the ‘4 R’s’ of reduction, readiness, response and recovery.</li> <li>• The CDEM Act, which is administered by the Ministry of Civil Defence and Emergency Management (MCDEM), requires the formation of a number of regional CDEM Groups<sup>17</sup> and each must prepare a CDEM Group Plan that details how the risks that threaten their region will be managed. It is generally expected that the risk reduction component of the CDEM Group plans will be achieved through land use planning measures under the RMA.</li> </ul>   |
| <p><b>Building Act 2004</b></p>                           | <ul style="list-style-type: none"> <li>• While the RMA is focused on ensuring that the use of land sufficiently avoids or mitigates the potential effects of natural hazards, the Building Act concerns itself with ensuring that any building constructed is safe and fit for purpose, including consideration of the risks from natural hazards, through compliance with the Building Code regulations.</li> <li>• Section 71 of the Building Act requires that territorial authorities (TA’s) refuse consent for the construction of a building or major alterations on land that is subject to natural hazards where the proposed works will accelerate, worsen or create a hazard on that land or any other property, unless the TA considers adequate mitigation measures are taken to protect the land, building or other property. However, section 72 does allow building consent authorities to grant building consent for land subject to natural hazards with no mitigation when it is determined that the proposed works will not accelerate, worsen or create a hazard, and it is considered reasonable to grant a</li> </ul> |

<sup>17</sup> CDEM Groups are made up of representatives from territorial authorities, regional council, emergency services and lifeline utilities.



| Document | Relevance  |
|----------|--|
|          | <p>waiver or modification of the Building Code. In these situations, the property owner takes on the risk which is recorded on the title for the property through procedures under section 73 of the BA.</p> <ul style="list-style-type: none"> <li>• The Building Code regulations established under the Building Act set certain performance requirements for new buildings, for example that surface water must not enter houses in a 1 in 50 year (2% AEP) flood event (Clause E1.3.2).</li> <li>• In addition, section 31 provides for the preparation of Project Information Memoranda (PIM) when requested from the TA. While not compulsory, a PIM will identify any special feature of the land, which includes susceptibility to natural hazards, such as the potential for erosion, slippage, or flooding.</li> </ul> |

In addition, there are a range of other standards and guidance documents of relevance to this topic:

| Document   | Author and date  | Summary   |
|--|--|---|
| Risk management - Principles and guidelines AS/NZS ISO 31000:2009, and SA/SNZ HB 436:2013<br>Risk management guidelines — Companion to AS/NZS 31000:2009 | Standards Australia<br>Standards New Zealand<br><br>Standards Australia Limited/ Standards New Zealand<br>2009<br>2013 | All Hazards -This is the national guidance around the management of risk.   |
| Risk-based land use planning for natural hazard risk reduction <sup>18</sup>   | GNS Science 2013   | All Hazards – This provides the basis for taking a risk-based approach to the management of natural hazards.  |
| Preparing for future flooding: A guide for local government in New Zealand <sup>19</sup>   | Ministry for the Environment 2010  | Flooding - This provides guidance on estimating the impacts of climate change on flood and options to manage the risk from flooding.  |
| Coastal Hazards and Climate Change: A Guidance Manual for  | Ministry for the Environment<br>2008<br>Updated 2017   | This document provides non-statutory guidance on addressing sea level rise as a result of climate change. This includes the differing sea level scenarios that should be considered and |

<sup>18</sup> <https://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox>

<sup>19</sup> <https://environment.govt.nz/publications/preparing-for-future-flooding-a-guide-for-local-government-in-new-zealand/>

| Document   | Author and date                   | Summary   |
|--|-----------------------------------|---|
| Local Government in New Zealand <sup>20</sup>  |                                   | the need for detailed consultation with the community.  |
| Climate change effects and impact assessment: A Guidance Manual for Local Government in New Zealand - 2nd Edition <sup>21</sup>                | Ministry for the Environment 2008 | Coastal hazards / Flooding – This is a non-statutory guidance document that provides guidance on the natural hazards that arise or whose effects are worsened by climate change.  |
| Managing Flood Risk – A Process Standard. Standards New Zealand NZS 9401:2008  | Standards New Zealand 2008        | Flooding - This standard sets out a process for managing flood risk within New Zealand.   |
| New Zealand's next top model: Integrating tsunami inundation modelling into land use planning <sup>22</sup>                                    | GNS Science 2019                  | This is non-statutory guidance around the management of tsunami hazards. It provides guidance on the level of modelling required for land use planning, management approaches to tsunami and potential mitigation measures.   |
| Planning for development of land on or close to active faults: A guideline to assist resource management planners in New Zealand <sup>23</sup> | Ministry for the Environment 2003 | <p>This document provides guidelines to consider when planning for development close to faults that will have relevance to hazards policy development in District Plans. The guidelines recommend a risk-based approach, based on risk management standard AS/NZS 4360:1999 (latterly AS/NZS ISO 31000:2009).</p> <p>The risk-based approach combines the key elements of Fault recurrence interval; Fault Complexity; and Building Importance Category.</p> <p>The guidance recommends that for land use planning purposes, faults should be mapped and classified at a minimum scale of 1:10,000.</p> |
| Climate Change Guidance Note <sup>24</sup>   | Quality Planning Website          | Climate change – This is non-statutory guidance. The aim of this Guidance Note is to  |

<sup>20</sup> <https://environment.govt.nz/publications/coastal-hazards-and-climate-change-guidance-for-local-government/>

<sup>21</sup> <https://environment.govt.nz/publications/climate-change-effects-and-impacts-assessment-a-guidance-manual-for-local-government-in-new-zealand/>

<sup>22</sup> <https://www.eqc.govt.nz/resilience-and-research/research/search-all-research-reports/new-zealands-next-top-model-integrating-tsunami-inundation-modelling-into-land-use-planning/>

<sup>23</sup> <https://environment.govt.nz/publications/planning-for-development-of-land-on-or-close-to-active-faults-a-guideline-to-assist-resource-management-planners-in-new-zealand/>

<sup>24</sup> <https://www.qualityplanning.org.nz/node/722>

| Document | Author and date | Summary   |
|----------|-----------------|---|
|          |                 | <p>promote understanding about the effects of climate change; and provide best practice information on how to assess the significance of, and respond where necessary to, the effects of climate change. A particular focus is how this can be done within local authorities' existing risk assessment, policymaking and decision-making processes. The Guidance Note covers an overview of how particular regard may be given to the effects of climate change, information on expected climate change effects in New Zealand.</p> <p>Advice on methods for considering and addressing climate change effects under the RMA.</p> |

## 2 Approach to Evaluation

Section 32(1)(b) requires an evaluation of whether the provisions are the most appropriate way to achieve the objectives by identifying other reasonably practicable options, assessing the efficiency and effectiveness of the provisions in achieving the objectives, and summarising the reasons for deciding on the provisions.

The assessment must identify and assess the benefits and costs of environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions, including opportunities for economic growth and employment. The assessment must, if practicable, quantify the benefits and costs and assess the risk of acting or not acting if there is uncertain or insufficient information available about the subject matter.

The proposed provisions relevant to the Natural Hazards Chapter have been assessed in accordance with the following issues:

**Issue 1 –**

The need to identify and map areas of the District at risk from natural hazards and the level of any risk.

**Issue 2**

The need to generally avoid subdivision, use and development in high hazard areas.

**Issue 3**

The need to protect people, buildings and structures from risks associated with identified natural hazards.

**Issue 4**

The need to avoid exacerbating any risks from natural hazards.

**Issue 5**

The need to protect, maintain and restore natural features that assist in mitigating the effects of natural hazards.

## 2.1 Scale and significance

The table below sets out the scale and significance of managing natural hazards in the district in terms of Council's statutory obligations, who may be affected by any proposed changes to the management regime, the type of effects that may occur and where in the District is mostly likely to be affected by the proposed changes to the District Plan. This will inform the nature and extent of the analysis of the proposed changes to the natural hazard provisions. For example, proposed provisions that will result in an overall high level of scale and significance will require a more in-depth analysis of proposed objectives, policies and rules including, potentially, an economic analysis, compared to changes that will have a low-level significance.

| <b>Issue:</b><br>A risk-based approach to new subdivision, use and development <sup>25</sup> |   |             |
|--|---|-------------|
| Reasons for change in policy   | District Plan Review.<br><br>Approach in NPS regarding the need to address natural hazards in the Natural Hazard chapter.<br><br>The need to recognise and provide for the management of significant risks from natural hazards.<br><br>Having regard to the efficient use and development of natural and physical resources; the maintenance and enhancement of amenity values; and the maintenance and enhancement of the quality of the environment in the Resource Management Act.<br><br>Minimizing the risk to human life and property from natural hazards.          | High        |
| Relevant Statutory Considerations / Drivers  | RMA Parts 6, 7 and 31<br>RPS Chapters 5 and 11  | Medium      |
| Degree of shift from status quo required   | A small shift in policy approach to give effect to the chapter specific approach in the NPS and to continue avoiding and minimizing risks from natural hazards on human life and property. However, the range of natural hazards being controlled by the Plan will increase significantly and the mapping of natural hazards may mean that development within a greater area of the District is subject to natural hazard controls. However, this does not change that these areas were already subject to these hazards; rather that they are being more actively managed. | Medium/High |
| Who and how many will be affected?   | It is likely that the Council, landowners, hut leases/owners and iwi will be affected. The number of people affected could be quite large. However, this does not change that these areas   | High        |

<sup>25</sup> Note: the introduction of new provisions for new development does not change the risk levels for existing development or avoid all natural hazard risks.

|  |  |             |
|--|--|-------------|
|  | were already subject to these hazards and people would as such already be affected by them; rather the change is that the areas where hazards are present will be more actively managed.   |             |
| Degree of impact on, or interest from iwi / Maori          | It is likely that iwi will have a particular interest in this topic because they own land within the District i.e. at Arowhenua and Waipopo.   | High        |
| When will effects occur?                                   | Natural hazards occur on a generally irregular basis, but the risk is on-going. As such, adverse effects may arise every year or once every decade or every 10,000 years.  | Medium      |
| Geographic scale of impacts / issue                        | <p>River flooding occurs along the Opihi River, the Rangitata and the Pareora Rivers. An extreme event could affect a large area of rural land as well as several holiday hut areas, residential properties and the Pareora meat works.</p> <p>There is also the potential for surface flooding in areas of Washdyke.</p> <p>In addition, liquefaction could occur in small areas whilst slope instability could affect large areas of the high country.</p> <p>Active fault lines, whilst in remote areas, could affect large areas of the District if there is an earthquake, although this will depend on the magnitude of the event.</p> | Medium/High |
| Type of effect(s)  | <p>Residential properties and holiday huts could currently be built in locations that are subject to significant risk from natural hazards.</p> <p>Rezoning of land and consequent development of land in areas where natural hazard risk is high and whilst mitigation measures could be applied, it is safer for people to not live in such areas.</p> <p>The need to obtain consent to undertake works or development in residential areas including the holiday hut precinct.</p> <p>The proposed changes would address these existing issues and enable a more active approach to managing natural hazard risk.</p>                     | Medium      |
| Degree of policy risk, implementation risk, or uncertainty | Risks from natural hazards are known and can generally be appropriately managed. That said, climate change has the potential to create uncertainty as rainfall intensity may increase causing an increased likelihood of flooding. Therefore, over the life of the Plan, there may be  | Medium/High |

|   |   |                    |
|---|---|--------------------|
|   | <p>greater uncertainty around the appropriateness of some natural hazard provisions and a precautionary approach is advised.</p> <p>Furthermore, the exact location of river breakouts and stopbank breaches is unknown and could occur in several locations depending on the nature of a flood event.</p> <p>It is also likely that some risk will remain despite the provisions in the District Plan, especially for existing development in areas currently subject to risk.</p> |                    |
| <b>Overall Assessment of Scale and Significance</b> |   | <b>Medium/High</b> |

## 2.2 Approach to managing natural hazards

As set out above, the Council has a requirement to manage risks from natural hazards under both the RMA and the LGA. The approach in the District Plan therefore is to manage risks arising from the following hazards: flooding from rivers and stormwater, liquefaction, and fault lines (coastal hazards are covered in the Coastal Environment Chapter s32).

### 2.2.1 Liquefaction

ECan has provided TDC with information on the level of risk and extent of liquefaction in the event of an earthquake in Timaru District. Noting that liquefaction risk for buildings can be appropriately managed under the Building Act the PTDP only applies to subdivision activities within liquefaction awareness overlays. Subdivision within these areas is restricted discretionary to enable site specific geotechnical investigations to be undertaken.

### 2.2.2 Fault lines

ECan has provided the Council with the location and extent of known fault lines in the district and advice on how these should be managed. These are to be mapped and new regionally significant infrastructure and subdivision provided for as restricted discretionary activities to enable site specific investigations to be undertaken (the maintenance, replacement and upgrading of existing regionally significant infrastructure is permitted). To support this approach the PTDP includes an Earthquake Fault (infrastructure or facilities) Awareness Area overlay and an Earthquake Fault (subdivision) Awareness Area Overlay.

ECan do not recommend requiring a rule for new buildings and structures because the faults are not mapped in enough detail to be able to require this. Also, most of the faults are in rural areas and have relatively long recurrence intervals so the risk is considered to be acceptably low.

### 2.2.3 Flooding – river and stormwater

The Council has determined that its priority is to protect human life and property, in that order, and not provide explicitly for egress to and from properties or across the district during a natural hazard event i.e., it does not propose to require that roads and driveways in areas prone to flooding and overland flows are raised above the maximum height in any flood event. Neither does the Council anticipate that people will be rescued during flood events as these generally subside within a short timeframe (days not weeks) and people can remain in their homes until they can leave without assistance, or alternatively, vacate their homes in advance upon receiving flood warnings.

Areas potentially subject to flooding are identified via a Flood Assessment Area Overlay. Within this overlay there are areas susceptible to high flood hazard, flood depressions, and flow paths. The mapping excludes flooding of less than 100mm depth and remaining areas less than 30m<sup>2</sup> (to avoid capturing only minor flooding incidences), but includes a freeboard tolerance and a buffer (5m either side) for known overland flow paths. In addition, areas of known high flood hazard are mapped in the planning maps as a High Hazard Area Overlay, with express more restrictive rules applying in these areas.

Based on expert technical advice and legal input it is proposed to manage flood hazards through a certification approach. This certification approach will determine the actual level of risk on the site i.e. no risk, 0.5% AEP, high hazard risk or risk to flow path disruption, and then the appropriate course of action to manage any risk identified. In addition, the rules themselves seek to differentiate between activities that may be susceptible to flooding ('natural hazard sensitive activities' such as dwellings) and those that are unlikely to be (such as farm sheds). Due to concerns with flow path displacement the rules also seek to differentiate between large buildings and buildings less than 30m<sup>2</sup>, with the latter less likely to cause displacement. Small structures (less than 30m<sup>2</sup>) located within road corridors are enabled as these are common in these locations and are unlikely to disrupt flow paths with significant consequences.

## 2.2.4 Mapping

For this chapter the following areas are mapped:

- Flood assessment areas
- High (flood) hazard areas
- Earthquake Fault (Infrastructure or Facilities Awareness) areas
- Liquefaction awareness areas
- Earthquake Fault (Subdivision Awareness) areas.
- 

*Note: coastal hazards are also mapped as described in the Coastal Environment Chapter s32.*

### Changes proposed

| Operative Plan   | Proposed Plan   |
|--|---|
| The planning maps in the Operative Plan identify stopbanks. They do not identify hazard areas.   | Natural hazards are proposed to be mapped as set out in 2.2.4 above.  |
| The objectives and policies essentially seek to minimise adverse effects from flooding by avoiding areas that pose a significant risk to new development and managing activities in other areas i.e. building to minimum floor height or requiring development in certain areas be subject to a consent process. There is no specific policy framework that applies to utilities despite these often being provided for in 'at risk' areas. It is also considered that whilst the objectives and policies are very directive, they do not provide an overall picture of how natural hazards will be managed in the District. | The intent of the proposed objectives and policies is generally the same as for the operative plan but have been developed to provide clear direction for each type of natural hazard that may occur in the District. |

|  |   |
|--|---|
| <p>Rules that enable residential units in flood hazard area (0.5% AEP) to be constructed with MFL.</p> <p>Otherwise consent is required for as a non-complying activity.</p>   | <p>In 0.5% AEP areas, natural hazard sensitive activities are permitted if they meet MFL and are not located within an overland flow path, or otherwise are RDA.</p>  |
| <p>Discretionary: the erection of a building or structure on the landward side of a Regional Council stopbank within 100 metres of the centreline of that stopbank identified on the District Plan maps.</p>   | <p>Removed as dealt with via a flood assessment.</p>  |
| <p>Discretionary: The erection of a building or structure other than in the Recreation 1 Zone or the Commercial 2A Large Format Store (Retail Park) zone on land subject to a risk of flooding which exceeds 2.0% in any year.</p>   | <p>In high hazard areas, all natural hazard sensitive activities are proposed to be non-complying.</p> <p>In flood hazard areas (0.5% AEP), natural hazard sensitive activities that apply MFL are permitted. Otherwise they are RDA.</p> |
| <p>Discretionary: The reconstruction of existing household units at Milford Huts which fail to meet the timeframes specified in section 10 of the Resource Management Act (i.e. existing use rights).</p>  | <p>Buildings are non-complying activities in high hazard areas. There are two small areas of the Waipopo huts that will be subject to flood assessment on a case-by-case basis.</p>   |
| <p>Prohibited: Household units and other residential activities on the river side of a Regional Council stopbank.</p>  | <p>No longer prohibited. Now managed through the flood assessment area overlay and high hazard area overlay provisions.</p>   |
| <p>Prohibited: In the Residential 1 Zone at Temuka North West where the household units are within the High Hazard Stopbank Setback Area identified on the Outline Development Plan; and all buildings within the Stopbank Maintenance Area, being identified as all that land measured 10 metres east of the toe of the stopbank.</p> | <p>No longer prohibited. Now managed through the flood assessment area overlay and high hazard area overlay provisions and future flood hazard identification.</p>  |
| <p>The District Plan does not address overland flows, slope instability, fault lines and liquefaction.</p>   | <p>Policies and Rules to generally control buildings in areas identified as being subject to overland flows, fault lines and liquefaction.</p> <p>Slope instability is proposed to be addressed in the earthworks chapter.</p>            |



## 2.3 Quantification of Costs and Benefits

The level of detail of analysis in this report is medium to high.

Activities within the high hazard areas can adversely impact on the health, safety, and wellbeing of the community, as well as the integrity of buildings and structures. It is considered that there is a significant cost (economic and social) to the district if activities are not appropriately managed and, in some cases heavily restricted from establishing in high hazard areas.

In other hazard areas, an assessment of potential adverse effects and risks can be undertaken to determine the appropriateness of a proposal and mitigation measures applied. Applications for development that cannot meet required standards or effects cannot be mitigated, can be declined.

Section 32(2)(b) requires that if practicable the benefits and costs of a proposal are quantified. It is considered that adverse effects on and of natural hazards can be quantified in terms of the economic cost of reconstructing buildings, structures and infrastructure lost during natural hazards; the cost of new public mitigation measures and works and any loss of development potential. It is noted that the intent of the rules is to continue to provide for development within areas zoned residential, commercial, and industrial where there is certainty over flood levels and mitigation can be applied. However, in the rural areas and settlements (outside of Timaru), where there is less certainty as to the level of risk, there is a cost associated with requiring hazard reports from ECan for all development in flood assessment areas.

However, it is difficult to quantify the social cost of natural hazards i.e., the cost of replacing a building or structure can be easily calculated. The same cannot be said for a human life, or the loss of jobs (through destruction of workplaces), or the loss of a community. This can be seen in the aftermath of the Christchurch earthquake in 2011 (e.g., when large areas of the east of the city were red zoned and established communities had to relocate, or when large buildings were unsafe and took months to remove, making buildings around them consequentially unsafe). This is a matter that is more effectively addressed outside of the District Plan but the avoidance of high hazard areas, and the mitigation of the effects of other hazards are likely to limit future, potential social costs.

## 2.4 Choice of Evaluation Method

Given the scale and significance of the issues related to natural hazards and the regulatory directive to protect people and development from the risks associated with natural hazards, it is proposed to assess the preferred option against the operative provisions (status quo) and one other, feasible and realistic option. The options will be assessed using a cost-benefit analysis, given the discussion above on costs and benefits.

## 2.5 Proposed Objectives

This section of the report evaluates the proposed objectives as to whether they achieve the purpose of the Act.

|  |  |
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| <b>NH-01</b>   | <b>Areas subject to natural hazards</b>      |
| Risk to human life and significant risk to property, from natural hazards is: <ol style="list-style-type: none"><li>1. avoided in high hazard areas; and</li><li>2. avoided or mitigated elsewhere to an acceptable level.</li></ol> |  |
| <b>NH-02</b>   | <b>Regionally Significant Infrastructure</b> |
| Regionally Significant Infrastructure is located outside of high hazard areas where practicable.   |  |
| <b>NH-03</b>   | <b>Natural hazard mitigation works</b>       |

Natural hazard mitigation works reduce risks to people and property, with a preference for the use of natural features and buffers.

### 3 Evaluation of Objectives

The following table has been used to evaluate the relevant objectives.

| Category      | Criteria  | Comments  |
|---------------|---|---|
| Relevance     | Directed to addressing a resource management issue                              | Achieves.<br>The objectives seek to avoid risk to human life and regionally significant infrastructure, and avoid significant risk to property, from natural hazards, where possible or otherwise mitigated, through applying a risk-based management approach.   |
|               | Focused on achieving the purpose of the Act                                     | Achieves<br>The objectives seek to achieve s6(h) by managing the significant risk from natural hazards.   |
|               | Assists a council to carry out its statutory functions                          | Achieves<br>The objectives will avoid and mitigate potential and actual adverse effects from natural hazards as required under the RMA and LGA.   |
|               | Within scope of higher-level documents  | Achieves.<br>The CRPS seeks to manage the impacts of natural hazards on people and property as well as not exacerbate hazard risks. It is considered that the proposed objectives will achieve this.  |
| Feasibility   | Acceptable level of uncertainty and risk  | Achieves<br>The intent is to address a wide range of natural hazards and avoid development in high hazard areas and manage activities in other areas, through a risk-based management approach.   |
|               | Realistically able to be achieved within council's powers, skills and resources | Partly achieves<br>The provisions will generally be able to be achieved within council's powers, skills and resources. However, the identification and mapping of natural hazards is likely to require assistance from ECan, as are the issuance of flood risk certificates.  |
| Acceptability | Consistent with identified iwi/Māori and community outcomes                     | The feedback from the community on the discussion document suggests that there is general support for rules to identify and manage natural hazards but there was concern expressed about the costs. Also, the level of risk should be assessed and the sensitivity of activities to natural hazards analysed and provide for existing activities such as farming. The objectives have been written to address the level of risk and manage activities |

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|  |   | within each area according to their sensitivity to the natural hazard. Unless specifically managed through the overlay, activities are subject to the underlying zone provisions.   |
|  | Will not result in unjustifiably high costs on the community or parts of the community. | Achieves<br>The proposed objectives are intended to avoid and manage development to reduce the need for public mitigation works and costly emergency response. There may be some additional cost to those developing sites in hazard affected areas due to required mitigation measures. There will also be a cost to those in the flood assessment areas in requiring a flood risk certificate from the Council but this is not considered to be unjustifiably high. The costs incurred are significantly outweighed by the costs of recovering from a natural hazard event. |

Based on the evaluation above, option 1 is considered to be the most appropriate to achieve the purpose of the Act.

## 4 Identification of Options

**Option 1:** Map areas at risk from natural hazards and apply a certification process and risk-based rules, permitting some development with standards and requiring resource consent for sensitive development or in high hazard areas or where mitigation measures such as minimum floor levels are not met.

**Option 2:** Status quo. This option involves a continuation of the operative Plan provisions including not identifying areas subject to some natural hazards and applying, objectives, policies and rules that mainly relate to the management of flood hazards.

**Option 3:** Identify (map) areas according to the level of risk from natural hazards (0.5% AEP, High Hazard areas, overland flow paths, fault lines and liquefaction areas) across the district as a whole and apply rules accordingly.

**Option 4:** Rely on methods outside the District Plan. This would rely on the Building Act/Code, bylaws, emergency management/civil defence planning and response, and/or physical hazard protection works to manage natural hazards.

## 5 Evaluation of Options

### 5.1 Evaluation table

| <b>OPTION 1</b><br><i>Map areas at risk from natural hazards and apply a certification process and risk-based rules, permitting some development with standards and requiring resource consent for sensitive development or in overland flow paths or in high hazard areas or where mitigation measures such as minimum floor levels are not met</i> |  |  |                 |
|--|--|--|-----------------|
| <b>Benefits</b>  |  |  |                 |
| <b>Environmental</b>   | <b>Economic</b>  | <b>Social</b>  | <b>Cultural</b> |
| <ul style="list-style-type: none"> <li>Ensures better identification of</li> </ul>   | <ul style="list-style-type: none"> <li>No expensive district wide</li> </ul> | <ul style="list-style-type: none"> <li>Decision makers are provided with reliable</li> </ul> | None identified |

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| <p>areas at risk, enabling people and property to avoid areas subject to natural hazard risks.</p> <ul style="list-style-type: none"> <li>• Relies on existing available and up to date information on natural hazards that apply on a site/development specific basis.</li> <li>• Enables activities to be assessed with a clear understanding of the natural hazard risk to be avoided or mitigated.</li> <li>• Avoids the construction of new development in high hazard areas.</li> <li>• Where required, technical inputs will ensure development only occurs when it has been demonstrated as appropriate</li> </ul> | <p>assessment of natural hazards, especially flood risk, is required. Rather, detailed assessments are targeted to site specific proposals.</p> <ul style="list-style-type: none"> <li>• Requires assessment of activities that have the potential to be significantly affected by natural hazards.</li> <li>• Landowners have a clear understanding of natural hazard risks, once a flood risk certificate has been obtained. Activities may then be permitted if the floor level is achieved, thereby avoiding the need for a resource consent application.</li> <li>• Flood risk certificates are cheaper than a full resource consent application.</li> <li>• Enables existing activities such as farming, and buildings and structures that are not natural hazard sensitive or built to meet minimum floor heights outside of high hazard areas.</li> </ul> | <p>information on natural hazards and their associated risks to undertake an assessment of the effects of a proposal.</p> <ul style="list-style-type: none"> <li>• Clearly identifies activities that can be undertaken without resource consent.</li> <li>• Protection of property and life from natural hazards.</li> <li>• Contributes to community's sense of safety and security</li> </ul> |  |
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|   | <ul style="list-style-type: none"> <li>• Avoids duplicating rules that apply in the underlying Rural Zone thus minimising the risk of conflicting provisions and potentially unnecessary applications.</li> <li>• Enables the maintenance, replacement and upgrading of regionally significant infrastructure as a permitted activity.</li> <li>• Generally permits small buildings and structures that are unlikely to suffer from flood hazard events or cause flow path disruption.</li> <li>• Avoids duplication with the Building Act in areas subject to liquefaction.</li> <li>• Only applies a limited targeted approach to development within earthquake fault awareness areas.</li> </ul> |   |   |
| <b>Costs</b>  |   |   |   |
| <b>Environmental</b>  | <b>Economic</b>   | <b>Social</b>   | <b>Cultural</b>   |
| Natural hazard mitigation works can cause adverse environmental effects | <ul style="list-style-type: none"> <li>• Rules/standards may potentially limit some activities and development.</li> </ul>  | Inability to develop land could force people to move away from some areas and long-standing community connections | Kāti Huirapa may not be able to undertake economic development of their land in high hazard areas, or |

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|  | <ul style="list-style-type: none"> <li>• Monetary cost to the applicant of obtaining a flood risk certificate (especially if it identifies there is no flood risk on the site) but this is considered to be more reasonable than an uncertain consent path for all activities.</li> <li>• Possible need for the Council to amend maps in the future as the extent of hazard areas change.</li> <li>• Potential loss of economic and employment opportunities due to uncertainty created by the certification process (especially in hazard prone areas), as well as deterring the establishment of new activities.</li> <li>• Costs for landowners and ratepayers involved in obtaining resource consents.</li> <li>• Costs to Council in processing resource consents, although these costs are largely recoverable.</li> <li>• Value of land in high hazard areas could be affected</li> </ul> |  | <p>the mitigation measures required significantly increase development costs</p> |
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|  | <p>due to stringent controls and limits on activities. Low risk as not proposed to be mapped except in hut settlements and other specific areas. Generally, requires site specific assessment.</p> <ul style="list-style-type: none"> <li>• Cost to the community of not being able to insure and/or reconstruct buildings in high hazard areas. Low risk as not proposed to be mapped except in hut settlements plus other specific areas. Generally, requires site specific assessment.</li> <li>• Cost to applicants in applying mitigation measures.</li> <li>• May trigger a discussion about retreating from certain areas such as the hut settlements or not allowing these to be used as permanent residences.</li> <li>• Potential costs to Council of buying land/property to relocate buildings.</li> </ul> |  |  |
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|  | <ul style="list-style-type: none"> <li>Land may incur limits to obtain insurance or increase in insurance costs due to it being identified as high hazard (although insurance companies already have their own risk data).</li> </ul>  |  |  |
| <b>Efficiency</b>                          | The costs and benefits are finely balanced. There is an economic cost to natural hazard provisions but there are also significant benefits to the community and individuals including social wellbeing and minimising risks to future development and people.  |  |  |
| <b>Effectiveness</b>                       | <p>The proposed provisions are considered to be the most effective means of achieving the objective(s) as together they will:</p> <ul style="list-style-type: none"> <li>give effect to the provisions of the RMA and the CRPS.</li> <li>enable the Council to fulfil its statutory obligations, including s6(h).</li> <li>ensure that a robust process is undertaken and documented that the level of risk from natural hazards on each site is appropriate or can be managed as development is proposed.</li> <li>ensure that adverse effects on development in hazard areas, and effects on natural hazards are managed appropriately by avoiding development in high hazard areas and managing development in all other hazard areas.</li> <li>enable the Council to effectively administer its District Plan and to monitor the outcomes of the proposed provisions in a clear and consistent manner</li> </ul> |  |  |
| <b>Strategic Direction(s)</b>              | This would achieve the strategic objectives by avoiding development in high hazard areas and managing risks in all other areas.  |  |  |
| <b>Overall Appropriateness of Option 1</b> | This option is an appropriate way to achieve the preferred objectives as the policies are clear and the rules are tailored to hazard areas to ensure matters specific to each hazard can be addressed.   |  |  |

## OPTION 2

*This option involves a continuation of the operative Plan provisions including not identifying areas subject to natural hazards and applying, objectives, policies and rules that mainly relate to the management of flood and coastal hazard.*

| <b>Benefits Environmental</b>   | <b>Economic</b>  | <b>Social</b>   | <b>Cultural</b> |
|---|--|---|-----------------|
| <ul style="list-style-type: none"> <li>Requires assessment of activities that have the potential to generate significant</li> </ul> | <ul style="list-style-type: none"> <li>Enables existing activities such as farming.</li> <li>Where required, technical inputs</li> </ul> | <ul style="list-style-type: none"> <li>Protection of property and life from natural hazards.</li> </ul> | None identified |



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| <p>effects or have the potential to be significantly affected in some natural hazard areas.</p> <ul style="list-style-type: none"> <li>• Enables applications to be declined thus protecting development from natural hazards.</li> <li>• Activities that are appropriate can occur without the need for resource consent (e.g. farming).</li> </ul> | <p>will ensure development only occurs when it has been demonstrated as appropriate</p>   | <ul style="list-style-type: none"> <li>• Decision makers are provided with reliable information on the natural hazard risks to undertake an assessment of the effects of a proposal as site specific assessments are required.</li> <li>• Contributes to community's sense of safety and security</li> </ul>   |   |
| <p><b>Costs</b><br/><b>Environmental</b></p>   | <p><b>Economic</b></p>  | <p><b>Social</b></p>   | <p><b>Cultural</b></p>  |
| <ul style="list-style-type: none"> <li>• There is a focus on flood risks and no other environmental risks.</li> <li>• No clear rules that manage activities in high hazard areas.</li> <li>• Not all activities that could have increase a natural hazard risk are managed through the rules.</li> </ul>   | <ul style="list-style-type: none"> <li>• Rules/standards may potentially limit some activities and development.</li> <li>• Areas subject to natural hazards are not mapped, therefore site-specific assessments and reports are required at a cost to the applicant.</li> <li>• Landowners do not have a clear understanding of natural hazard risks or, where such risks occur, as it appears that a site-specific assessment is required for all buildings and structures, leading to development uncertainty.</li> </ul> | <ul style="list-style-type: none"> <li>• Uncertainty created by different and specific rules applying in different areas.</li> <li>• Inability to develop land could force people to move away from hazard prone areas and long-standing community connections.</li> <li>• The community does not understand where natural hazard risks are located</li> </ul> | <p>Kāti Huirapa may not be able to undertake economic development of their land in high hazard areas, or the mitigation measures required significantly increase development costs.</p> |

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|  | <ul style="list-style-type: none"> <li>• Potential loss of economic and employment opportunities due to uncertainty created by the certification process/consent path, as well as deterring the establishment of new activities.</li> <li>• Value of land in hazard areas declines due to uncertainty over natural hazard risk.</li> <li>• Cost to the community of not being able to insure and/or reconstruct buildings in natural hazard areas – mainly applies to the hut settlements.</li> <li>• Cost to applicant in applying mitigation measures.</li> </ul> |  |  |
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| <b>Efficiency</b>                          | This approach would not be efficient given the costs identified above.   |
| <b>Effectiveness</b>                       | The proposed provisions are not considered to be the most effective means of achieving the objective(s) as together they do not: <ul style="list-style-type: none"> <li>• identify natural hazard areas, or</li> <li>• address a broad range of natural hazards, or</li> <li>• give effect to the provisions of the CRPS</li> </ul>  |
| <b>Strategic Direction(s)</b>              | This would partly achieve the strategic objective as development would be avoided in some areas where the risks of natural hazards, to people, property and infrastructure are assessed as being unacceptable, noting that high hazard areas are not mapped. Natural hazard risks would, to some extent, be mitigated i.e., by applying a minimum floor height. However, the identification of hazards on a case-by-case basis would enable the effects of climate change to be addressed. |
| <b>Overall Appropriateness of Option 2</b> | Overall, this approach is not appropriate given that the natural hazard areas are not mapped and there is no comprehensive framework that reflects the different level of risk in each hazard area and the range of natural hazards in the District.   |

**OPTION 3**

*Identify (map) areas at potential risk from natural hazard and apply rules according to the level of risk.*

| <b>Benefits Environmental</b>   | <b>Economic</b>  | <b>Social</b>  | <b>Cultural</b> |
|---|--|--|-----------------|
| <ul style="list-style-type: none"> <li>• Ensures better identification of areas at risk, enabling people and property to avoid areas subject to natural hazard risks.</li> <li>• All areas at risk of flooding and other natural hazards can be clearly identified according to their level of risk and rules applied appropriately.</li> <li>• Enables activities to be assessed with a clear understanding of the natural hazard</li> </ul> | <ul style="list-style-type: none"> <li>• Requires assessment of activities that are likely to be affected by a natural hazard.</li> <li>• Landowners have a clear understanding of natural hazard risks, the types of activities that require consent and mitigation measures (where required).</li> </ul> | <ul style="list-style-type: none"> <li>• Decision makers and landowners are provided with reliable information on natural hazards and their associated risks to undertake an assessment of the effects of a proposal.</li> <li>• Protection of property and life from natural hazards.</li> <li>• Contributes to community's sense of safety and security</li> </ul> | None identified |

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| <p>risk to be avoided or mitigated.</p> <ul style="list-style-type: none"> <li>• Avoids the construction of new development in inappropriate locations.</li> <li>• Where required, technical inputs will ensure development only occurs when it has been demonstrated as appropriate</li> </ul> |  |   |   |
| <p><b>Costs</b><br/><b>Environmental</b></p>  | <p><b>Economic</b></p>   | <p><b>Social</b></p>  | <p><b>Cultural</b></p>  |
| <p>Mapping and identification of areas with natural hazards will not reflect the dynamic nature of the river environments in the district</p>   | <ul style="list-style-type: none"> <li>• Rules/standards may potentially limit activities and development.</li> <li>• Monetary cost to the Council and ratepayer of undertaking a comprehensive natural hazard assessment and detailed mapping.</li> <li>• Possible need for the Council to amend maps in the future as the extent of hazard areas and level of risk changes.</li> <li>• Cost to the Council of processing applications and cost to applicants involved in obtaining resource consents.</li> <li>• Cost to applicant in applying mitigation measures.</li> </ul> | <p>Inability to develop land could force people to move away from some areas and long-standing community connections.</p> | <p>Kāti Huirapa may not be able to undertake economic development of their land in high hazard areas, or the mitigation measures required significantly increase development costs.</p> |

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|  | <ul style="list-style-type: none"> <li>Land may incur limits to obtain insurance or increase in insurance costs due to it being identified as high hazard.</li> </ul>   |  |  |
| <b>Efficiency</b>                          | There are significant economic costs and environmental benefits associated with this option. However, there is certainty provided by mapping areas subject to natural hazards according to the level of risk. |  |  |
| <b>Effectiveness</b>                       | This option would achieve the desired outcome of protecting people and property from risks arising from natural hazards. Thus, any adverse effects would be assessed and avoided, remedied or mitigated.      |  |  |
| <b>Strategic Direction(s)</b>              | This option partly gives effect to the strategic directions as development is sought to be controlled in all areas subject to a natural hazard.   |  |  |
| <b>Overall Appropriateness of Option 3</b> | Option 3 is an appropriate way in which to achieve the objective(s), however it cannot be achieved as the level of risk from natural hazards cannot be identified and mapped at this time.                    |  |  |

#### **OPTION 4**

*Rely on methods outside the District Plan. This would rely on the Building Act/Code, emergency management/civil defence planning and response, physical hazard protection works to manage natural hazards*

| <b>Benefits Environmental</b>  | <b>Economic</b>                              | <b>Social</b>   | <b>Cultural</b> |
|--|--|---|-----------------|
| None identified  | Provides flexibility for use of land         | Sharing information increases community preparedness for a natural hazard event                               | None identified |
| <b>Costs Environmental</b>   | <b>Economic</b>                              | <b>Social</b>   | <b>Cultural</b> |
| Potential damage to some activities and development in natural hazard areas where the building regulations and other non-regulatory methods do not effectively avoid or mitigate the risks | Costs on ratepayers to fund the initiatives. | Community is unclear as to how natural hazards are to be managed i.e. the process for addressing hazard risks | None identified |

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| <b>Efficiency</b>                          | There are a range of activities in which the Council regularly engages that assist in meeting the objectives and policies set out for managing the impacts from natural hazards to people and property. As such, it would be efficient in managing duplication of requirements under different legislation   |
| <b>Effectiveness</b>                       | <p>If a natural hazard event does occur, active preparation by both residents and Council through civil defence and emergency management planning is effective for post-event actions and recovery.</p> <p>It may not be fully effective in managing natural hazard risks as some activities may not be managed under the Building Act, for example.</p> <p>Neither does it give effect to the NPS, which requires a chapter to be included in the District Plan to address natural hazards, if relevant to the District. Natural hazards are relevant to the Timaru District.</p> <p>Also doesn't give effect to the RPS which requires the Council to do so.</p> |
| <b>Strategic Direction(s)</b>              | This would partly achieve the strategic objectives as it would avoid some development in inappropriate locations and mitigation would be required under legislation such as the Building Act.  |
| <b>Overall Appropriateness of Option 4</b> | This option is not the most appropriate way to achieve the preferred objectives as it does not give effect to the RMA or the CRPS or the NPS. Neither does it provide clear direction to the community as to the type of natural hazards in the District, their location, extent and the level of risk they pose   |

## 5.2 Risk of Acting or Not Acting

Where there is uncertain or insufficient information, an evaluation of the risk of acting or not acting is important.

In this case it is considered that there is a degree of uncertainty as the Council cannot identify upfront the specific level of risk from flooding for each property across the District. It is therefore proposed to apply a certification process to identify the level of site-specific risk at the time of development, ensuring a suitable level of mitigation or requiring development to proceed along a consent path. There is therefore a process (albeit on a site-specific basis) that removes the uncertainty of general mapping and assessment processes. Furthermore, the proposed process differs little in intent and operation from the operative provisions.

It is therefore concluded that there is a low risk of acting in the proposed manner to introduce updated and replacement provisions to appropriately manage Natural Hazards.

## 6 Preferred Option

This evaluation has been undertaken in accordance with Section 32 of the RMA in order to identify the need, benefits and costs and the appropriateness of the proposal having regard to its effectiveness and efficiency relative to other means in achieving the purpose of the RMA. The evaluation demonstrates that Option 1 is the most appropriate option as:

- At this point in time there is insufficient certainty to identify the site-specific level of risk throughout the flood assessment area. Therefore, areas at potential risk from flooding are generally identified and site-specific assessments are required through a certification approach to determine appropriate management through rules.
- The proposed provisions will implement the strategic objectives by avoiding development on sites in high hazard areas and managing all other risks from natural hazards.

- The objectives and policies set a framework to enable a risk-based management approach to natural hazards. A certification process and risk-based rules are applied, permitting some development with standards and requiring resource consent for sensitive development or in overland flow paths or in high hazard areas or where mitigation measures such as minimum floor levels are not met.

Overall, it is considered that the set of preferred provisions is the most appropriate given that the benefits outweigh the costs, and the level of information on hazard risks available at this time. The risks of acting are also clearly identifiable and limited in their extent.