

8. Natural Hazards

8.1 Introduction

The Kaikoura District is susceptible to a wide range of natural hazards, including flooding, fault rupture, liquefaction, tsunami, debris inundation, and coastal inundation. Natural hazard events can damage property and infrastructure and can lead to injury or loss in human life. It is therefore important to identify areas subject to natural hazards and to restrict or manage subdivision, use and development.

This chapter focuses on the following natural hazards as they present the greatest risk to people and property, and the future effects can be addressed through appropriate land use planning measures.

- Flooding:
- Debris inundation,
- Fault rupture:
- Liquefaction: and
- Wildfire

Some natural hazards are influenced by climate change. It is predicted that rainfall events will become more intense, storm events will become more common and sea level will rise. The flooding assessments required by this chapter will incorporate current climate change predictions based on the Intergovernmental Panel on Climate Change's advice and current practice in local government.

The district is also susceptible to other natural hazards such as severe winds, wildfires and ground shaking from earthquakes. These hazards are primarily managed by other statutory instruments or processes. For example, the Building Act 2004 deals with severe winds by use of building materials during construction.

The Canterbury Regional Policy Statement (CRPS) recognises that for existing urban areas the community has already accepted some natural hazard risk in order to support the ongoing development of the district's existing communities. The CRPS accordingly requires development in high hazard areas in these locations to be either avoided or mitigated.

Risk

Risk is a product of both the consequences (for example, loss of life or damage to properties) and likelihood from a natural hazard occurrence. A risk-based approach to natural hazards balances allowing for people and communities to use their properties and undertake activities, while also ensuring that their lives and significant assets are not likely to be harmed as a result of a natural hazard event.

The level of risk can be either acceptable or unacceptable. This is determined by:

- The likelihood of the natural hazard event;
- The potential consequence of the natural hazard event for people and communities, property and infrastructure and the environment, and the emergency response organisations; and
- The consent process with the hazard overlays identifying areas for assessment.

This chapter anticipates the use of hazard mitigation works where it is appropriate to do so. These measures can reduce the consequences from natural hazards and reduce the associated risk.

Potential hazard mitigation works that can be incorporated into developments to reduce the consequences of natural hazards include:

- Building design and location (for example minimum floor levels or the ability for buildings to be relocated);
- Raising ground levels;
- The creation of flood water detention areas;
- The introduction, retention or improvement of existing natural systems that mitigate natural hazard effects;
- Use or size of materials in infrastructure design and building construction and location;
- The types of activities within buildings and structures;
- Provision of access to water sources for fire fighting
- Private mitigation works and community mitigation works

The chapter sets out a framework for determining where development in certain hazard areas should be avoided, including in areas identified as High Flood Hazard.

The District Council is required under the Resource Management Act to control any actual or potential effects of the use, development, or protection of land including for the purpose of the avoidance or mitigation of natural hazard events.

The District Council and the Regional Council both have functions for avoiding or mitigating natural hazard events in the District.

The areas potentially at risk from flooding are shown on the Proposed District Plan Map Series as Flood Hazard Assessment Overlays. Outside of the District Plan, the Regional Council also maintains flooding maps that indicate likely flow paths and depths for areas where more detailed flood modelling has been undertaken. These areas are based on geomorphological studies undertaken by the Regional Council and LIDAR information which incorporate historical flood data. While the flood hazard maps are based on the best available information, plan users should be aware that in extreme events, localised flooding or ponding may still occur on areas not marked as at-risk areas.

If there is any doubt as to the flood risk, it is recommended that developers check with the Regional Council prior to planning any building project. The Natural Hazard Chapter also recognises that not all areas of the District that may be at risk of flooding are identified on the planning maps.

Coastal erosion and inundation from the sea and tsunamis

Several sections of the Kaikoura coastline are subject to coastal erosion, and this erosion poses a threat to the main transport links which pass through the District. The November 2016 7.8M earthquake resulted in significant damage to Kaikoura where parts of the coast were uplifted. The North Canterbury Transport Infrastructure Recovery (NCTIR) has rebuilt the Road and Railway corridor to provide additional resilience to the coastal transport corridor.

Coastal erosion is widespread along the Kaikoura coastline and varies from -0.67 m/yr at Goose Bay to -0.29 m/yr at Oaro Beach. However, these rates are likely to vary significantly due to high intensity storms which can rapidly erode coastal areas. As a consequence of extreme weather events, some areas are potentially prone to inundation from the sea.

8.2 Objectives

8.2.1 Risk from natural hazards

New land use and development is managed in areas subject to natural hazards to ensure that natural hazard risk is avoided or mitigated to an acceptable level.

8.2.2: Risk from Flood Hazards

New land use and development:

1. is managed in the Urban Flood Assessment Overlay to ensure the risk to people and property is avoided or mitigated and the ability of communities to recover from natural hazards is maintained;
2. is avoided in High Flood Hazard Areas outside of the Urban Flood Assessment Overlay.

8.2.3 Infrastructure

1. Upgrading maintenance and replacement of existing critical infrastructure, and non-critical infrastructure, and new non-critical infrastructure, within all-natural hazard overlays is enabled where the infrastructure does not increase the risk to life or property from natural hazard events, or transfer the risk to another site; and
2. New critical infrastructure avoids High Flood Hazard Areas, unless this is not possible or is impractical when considering operational and technical constraints and therefore is designed to maintain its integrity and ongoing function during and after natural hazard events or can be reinstated in a timely manner.

8.2.4 Hazard Mitigation Works

Hazard mitigation works that may adversely affect people, property and the environment is avoided in the first instance and mitigated where such works are necessary.

8.3 Natural Hazard Policies

8.3.1 Identification of natural hazards

1. Identify areas that may be susceptible to natural hazards through the use of natural hazard overlays, and use the most up to date information available to provide site specific natural hazard assessments;
2. Recognise that climate change will alter the frequency and severity of some natural hazard events, and ensure that natural hazard assessments, and any mitigation works take into account the effects of climate change

8.3.2 Risk-based approach

1. Take a risk-based approach to managing natural hazards commensurate with the scale of development, whereby the level of risk is assessed as the combination of the likelihood of a natural hazard event occurring and the consequences of that event – for people and communities, property and infrastructure.

8.3.3 Additions to buildings in all hazard overlays

Provide for additions to existing hazard sensitive buildings within all natural hazard overlays where it can be demonstrated that:

1. The change in onsite risk resulting from the building addition to life and property is not unacceptable; and
2. The change in risk resulting from the building addition to adjacent properties, activities and people is not unacceptably increased.

8.3.4 Hazard mitigation works

Hazard mitigation works:

1. undertaken by or on behalf of the Crown, Canterbury Regional Council or the Council are enabled for the purpose of reducing the risk to life and property from flooding where area wide mitigation is necessary to protect existing communities from natural hazard risk which cannot be reasonably avoided; or
2. not undertaken by or on behalf of the Crown, Canterbury Regional Council or Council, will only be acceptable where;
 - a. natural hazard risk cannot be reasonably avoided;
 - b. any adverse effects of those works on the natural and built environment and on the cultural values of Ngati Kuri are avoided, remedied or mitigated; and
 - c. the mitigation works do not transfer or create unacceptable hazard risk to people, property, infrastructure or the natural environment.

8.3.5 Natural features providing natural hazard resilience

Restore, maintain or enhance natural features, such as natural ponding areas, coastal dunes, wetlands, water body margins, and riparian vegetation, where they assist in avoiding or reducing natural hazards.

8.3.6 Operation, maintenance, replacement and repair of all infrastructure

Enable the operation, maintenance, replacement, repair or removal of all existing infrastructure in all identified natural hazard overlays

8.3.7 New and upgrading of non-critical infrastructure

1. Enable the development of new non-critical infrastructure and upgrading of existing non-critical infrastructure in flood hazard assessment overlays only where the infrastructure does not increase flood risk on another site; and
2. Provide for the development of new non-critical infrastructure and upgrading of existing non-critical infrastructure in all other identified natural hazard overlays

8.3.8 Critical infrastructure

- 1 Enable the operation, maintenance, replacement, repair and upgrading of existing critical infrastructure in Flood Assessment Overlays only where the infrastructure does not increase flood risk on another site;

- 2 Provide for operation, maintenance, replacement, repair and upgrading of existing critical infrastructure in all other identified Natural Hazard Overlays;
- 3 Manage new critical infrastructure in all Natural Hazard Overlays which are outside of High Flood Hazard Areas to ensure that there is a low risk to life and property damage;
- 4 Avoid new critical infrastructure in High Flood Hazard Areas unless:
 - a. Avoidance is impossible or impracticable when considering operational and technical constraints, in which case critical infrastructure must be designed to maintain, as far as practicable, its integrity and ongoing operation during and after natural hazard events, or be able to be reinstated in a timely manner; and
 - b. The critical infrastructure does not significantly increase the natural hazard risk to life on the site, or increase risk to life and property on another site

8.3.9 Earthworks

Manage earthworks to avoid significant offsite effects associated with the displacement of floodwaters.

8.3.10 High Flood Hazard Areas within the Urban Flood Assessment Overlay

Avoid land use and development for hazard sensitive buildings in High Flood Hazard Areas of the Urban Flood Assessment Overlay, unless it can be demonstrated that;

1. minimum floor levels, as determined by a Flood Hazard Assessment Certificate are incorporated into the design of the development to ensure buildings are located above the flood level so that the risk to life and potential for property damage from flooding is mitigated; and
2. the risk to surrounding properties is no more than minor: or
3. the development is not likely to require new or upgraded community hazard mitigation works

8.3.11 High Flood Hazard Areas outside of the Urban Flood Assessment Overlay

Avoid land use and development for Hazard Sensitive Buildings outside of the Urban Flood Assessment Overlay in High Flood Hazard Areas as determined by a Flood Hazard Assessment Certificate, unless:

1. the activity incorporates mitigation measures so that the risk to life and property damage is acceptable; and
2. the risk to surrounding properties is not increased;
3. the activity does not require new or upgraded community scale mitigation works.

8.3.12 Flooding outside of High Flood Hazard Areas within the Urban and Non-Urban Flood Assessment Overlays

Provide for land use and development for Hazard Sensitive Buildings outside of High Flood Hazard Areas where it can be demonstrated that;

1. the nature of the activity means the risk to life and potential for damage from flooding is acceptable; or
2. the activity is ancillary to the existing main development; or
3. buildings are located above the flood level, as determined by a Flood Hazard Assessment Certificate so that the risk to life is acceptable and potential for property damage from flooding is mitigated; and

4. the risk to surrounding properties is not significantly increased.

8.3.13 Debris Inundation Overlay

Land use and development is avoided for Hazard Sensitive Buildings in the Debris Inundation Overlay which results in unacceptable risk to either life or property.

8.3.14 The Fault Avoidance Overlay and Fault Awareness Overlay

Land use and development is:

1. enabled only where there is an acceptable risk to life and property;
2. avoided for Hazard Sensitive Buildings in the Fault Avoidance Overlay where these result in an unacceptable risk to life and property;
3. managed for Hazard Sensitive Buildings in the Fault Awareness Overlay by locating the building away from the fault or where it can be demonstrated that mitigation measures will result in an acceptable risk to life and property.

8.3.15 Other natural hazards

Encourage the consideration of other natural hazards such as wildfire as part of land use and development.

8.4 Coastal Hazards

Coastal erosion, tsunamis, storm events and saltwater inundation have the ability to cause damage to property and threaten life.

Objective 1

To avoid damage to assets or infrastructure, disruption to the community and loss of life as a result of coastal hazard events.

Policies

1. To avoid subdivision, use and development that increases the risk to people and property from coastal hazard events.
2. To permit the establishment of new protection structures in the coastal environment only where they are the best practicable option for the future and so that adverse effects are avoided to the extent practicable. When considering any application to renew or replace existing structures, the abandonment or relocation of those structures will be considered among the options.
3. To recognise and enhance the ability of natural features such as hard rock shorelines, beaches, sand dunes and wetlands to protect the built environment from coastal hazard events and to recognise that some natural features may migrate inland as the result of dynamic coastal process including sea level rise.

	<p>Activity status where compliance with rule 8.5.3.a is not achieved</p> <p>Activity status where compliance with rule 8.5.3.b is not achieved</p>	<p>Non-complying</p> <p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The likely extent of flooding on the site; 2. The nature, design and intended use of the building and its susceptibility to damage; 3. Proposals to mitigate any risk created by any failure to meet minimum finished floor levels, including risk to the health and safety of the occupants; 4. the extent of any positive effects from the proposal.
<p>8.5.4</p> <p>All zones within the:</p> <p>DEBRIS INUNDATION OVERLAY</p>	<p>The establishment of any new hazard sensitive building</p>	<p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The extent of debris flow or landslide inundation hazards on the site; 2. The nature, design and intended use of the building, and its susceptibility to damage; 3. Proposals to mitigate any risk arising from debris flow or landslide debris inundation hazards on the site; 4. Whether there is unacceptable risk to either life or property.
<p>8.5.6</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>NON-URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>DEBRIS INUNDATION OVERLAY; or</p>	<p>Additions to existing hazard sensitive buildings that:</p> <ol style="list-style-type: none"> a. do not increase the floor area by more than 25m² in any continuous 5-year period; or b. If located within a flood assessment overlay, have a finished floor level equal to or higher than the minimum floor level as stated in a Flood Assessment Certificate issued in accordance with activity standard 8.6.1. <p>Activity status when compliance is not achieved</p>	<p>Permitted</p> <p>Restricted discretionary</p>

<p>FAULT AVOIDANCE OVERLAY; or</p> <p>or FAULT AWARENESS OVERLAY</p>		<p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The natural hazard risk on the site 2. The nature, design and intended use of the building and its susceptibility to damage; 3. Proposals to mitigate any risk arising from natural hazards on the site, including risk to the health and safety of occupants; 4. The potential to exacerbate natural hazard risk, including to any other site; and 5. The extent of any positive effects from the proposal.
<p>8.5.7</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>NON-URBAN FLOOD ASSESSMENT OVERLAY</p>	<p>Above ground earthworks, buildings and new structures that:</p> <ol style="list-style-type: none"> a. will not worsen flooding on another property through the diversion or displacement of floodwaters; or b. meet the definition of land disturbance <p>Activity status when compliance is not achieved</p>	<p>Permitted</p> <p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The likely extent of flooding on the site; 2. The potential for the activity to exacerbate flooding on any other site; and 3. The extent to which the earthworks or new structure impedes the free passage of floodwaters
<p>8.5.8</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>NON-URBAN FLOOD ASSESSMENT OVERLAY</p>	<p>*New non-critical infrastructure, or the operation, maintenance, repair, replacement, upgrading of non-critical infrastructure where:</p> <ol style="list-style-type: none"> a. The activity does not result in permanent raising of the ground level. <p>Activity status when compliance is not achieved</p>	<p>Permitted</p> <p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The likely extent of flooding on the site;

		<ol style="list-style-type: none"> 2. The nature, design and intended use of the infrastructure and its susceptibility to damage; 3. The potential for the activity to exacerbate natural hazard risk, including to any other sites; and 4. The extent of any positive effects from proposal.
<p>8.5.9</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>NON-URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>DEBRIS INUNDATION OVERLAY; or</p> <p>FAULT AVOIDANCE OVERLAY; or</p> <p>or FAULT AWARENESS OVERLAY</p>	<p>Operation, maintenance, repair and replacement of existing critical infrastructure</p> <p>New critical infrastructure</p>	<p>Permitted</p> <p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The extent to which infrastructure exacerbates the natural hazard risk or transfers the risk to another site; 2. The ability for flood water conveyance to be maintained; 3. The extent to which there is a functional or operational requirement for the infrastructure to be located in the High Flood Hazard Overlay and there are no practical alternatives; 4. The extent to which the location and design of the infrastructure address relevant natural hazard risk and appropriate measures that have been incorporated into the design to provide for the continued operation
<p>8.5.10.</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p> <p>NON-URBAN FLOOD ASSESSMENT OVERLAY</p>	<p>The change of use of any existing building that is not currently a hazard sensitive building to a hazard sensitive building where the activity:</p> <ol style="list-style-type: none"> a. Is located on land outside of High Flood Hazard Areas; and b. Has a finished floor level equal to or higher than the minimum floor level. <p>As stated in a Flood Hazard Assessment Certificate issued in accordance with activity standard 8.6.1</p>	<p>Permitted</p>

	<p>Activity status when compliance with rule 8.5.10.a is not achieved</p> <p>Activity status when compliance with rule 8.5.10.b is not achieved</p>	<p>Non-complying</p> <p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The likely extent of flooding on the site; 2. The nature, design and intended use of the building or structure and its susceptibility to damage with reference to the hazard sensitivity classification 8.6.1 3. Proposals to mitigate any risk created by the failure to meet minimum finished floor levels, including risk to the health and safety of occupants; 4. The proposals for the activity to exacerbate natural hazard risk, including to any other sites; and 5. The extent of any positive effects from the reduction in floor levels
<p>8.5.11</p> <p>All zones within the:</p> <p>DEBRIS INUNDATION OVERLAY; or</p> <p>FAULT AVOIDANCE OVERLAY; or</p> <p>FAULT AWARENESS OVERLAY</p>	<p>The change of use of any existing building that is not currently a hazard sensitive building to a hazard sensitive building</p>	<p>Restricted discretionary</p> <p>Matters of discretion are restricted to:</p> <ol style="list-style-type: none"> 1. The nature, design and intended use of the building or structure; 2. An assessment of natural hazards on the site; 3. Proposals to mitigate any risk arising from natural hazards on the site, including risk to the health and safety of occupants; 4. The potential for the activity to exacerbate natural hazard risk, including to any other sites; and 5. The extent of any positive effects of the proposal.
<p>8.5.12</p> <p>All zones within the:</p> <p>URBAN FLOOD ASSESSMENT OVERLAY; or</p>	<p>The establishment of any new camping grounds where:</p> <ol style="list-style-type: none"> 1. the land is not susceptible to flooding in a 500 year ARI flood event: <p>as stated in a Flood Hazard Assessment Certificate issued in accordance with activity standard 8.6.1.</p>	<p>Permitted</p>

NON-URBAN FLOOD ASSESSMENT OVERLAY	Activity status when compliance is not achieved	Restricted discretionary Matters of discretion are restricted to: 1. An assessment of natural hazards on the site; 2. Proposals to mitigate any risk arising from natural hazards on the site, including risk to the health and safety of occupants; 3. The potential for the activity to exacerbate natural hazard risk, including to any other sites; and 4. The extent of any positive effects of the proposal.
8.5.13 All zones within the: FAULT AVOIDANCE OVERLAY; or DEBRIS INUNDATION OVERLAY	The establishment of any new Camping grounds	Restricted Discretionary Matters of discretion are restricted to: 1. An assessment of natural hazards on the site; 2. Proposals to mitigate any risk arising from natural hazards on the site, including risk to the health and safety of occupants; 3. The potential for the activity to exacerbate natural hazard risk, including to any other sites; and 4. The extent of any positive effects of the proposal.

8.6 Natural Hazards Standards

8.6.1 Flood Hazard Assessment Certificate within the Urban and Non-urban Flood Assessment Overlays

A Flood Hazard Assessment Certificate will be issued by Council (that is valid for three years from the date of issue) which specifies:

1. whether or not the activity is located on land that is within a High Flood Hazard Area; and
2. where the activity is located on land that is within the Urban Flood Assessment Overlay, a minimum finished floor level for any new building or extension (or part thereof) that is 300mm above the 500 year ARI flood level; and
3. where the activity is located on land that is within the Non-Urban Flood Assessment Overlay outside of High Flood Hazard Areas, a minimum finished floor level for any new building or structure (or part thereof) that is 300mm above the 500year ARI flood level; or
4. for campgrounds, whether the land is susceptible to flooding in a 500 year ARI flood event

The above will be determined with reference to:

- a. The most up to date models and maps held by Kaikoura District Council or Canterbury Regional Council;
and
- b. Any relevant field information

Note:

1. Subdivision of any land located within the Natural Hazard Overlays is addressed in Chapter 13 Subdivision.
2. Please refer to the Regional Council for advice on whether consent is required in terms of the Proposed Regional Coastal Environment Plan.

