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## **4 NATURAL HAZARDS**

### **4.1 RESOURCES AND VALUES**

Communities of the Waitaki District are vulnerable to a variety of natural hazards. Some natural hazards have the potential to affect the whole District, such as an earthquake; whilst, others such as a tsunami will affect only coastal areas.

When assessing the "risk" of natural hazards to the communities, two aspects are considered. The first aspect is the nature of the hazard. For example, an earthquake may occur infrequently but cause widespread damage; whereas, a river flood may be frequent but cause damage to a localised area. The second aspect is the vulnerability of the community to a particular hazard. For example, intensive development on a flood plain may increase the number of assets and hence the vulnerability of that community to flooding.

The communities in Waitaki are at most potential risk from the following natural hazards:

- Flooding – in the extreme case, dam failure.
- Coastal erosion and inundation from the sea
- Earthquakes
- Severe Climatic Extremes - Floods, Snowfall, Wind and Drought.

### **4.2 ISSUE - Threat to People and Property**

**Property and people within the District are or have the potential to be threatened and adversely affected from damage or loss as a result of natural hazards, particularly flooding, coastal erosion and inundation by the sea.**

The 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 hazards. Flooding and coastal erosion are two natural hazards that can most effectively be avoided or mitigated by providing "protection" (e.g. stopbanks, breakwaters) or by guiding communities away from areas exposed to these hazards.

The frequency and extent of flooding from various rivers in the District is dependent on the particular characteristics of each river. For example, the Waitaki River is the largest in the District but it is relatively "incised" and generally has clearly defined flood banks. Consequently, most of the flooding tends to be confined within the flood banks with bank erosion being a serious concern in many areas. On the other hand, the Kakanui River and tributaries such as Waiareka Creek have formed a low gradient floodplain over which they have historically meandered. These floodplains are therefore vulnerable to flooding and since 1968 over 50 floods of the Kakanui River have occurred. The lower reaches of the Kakanui had a major flood in 1986. Even small creeks have periodically flooded land. Flooding and erosion of land has also occurred in the past from the Shag, Pleasant, and Waianakarua Rivers and Awamoa, Landon, Oamaru, Bow Alley and Kurinui Creeks.

The District's coastline consists of predominant headlands (Cape Wanbrow, Moeraki, Shag), eroding coastal cliffs and gullies, with beaches broken by the five main river systems draining the District. The rates of coastal erosion vary throughout the length of the coastline and vary over time and from place to place. The coastline from Oamaru north can have rates up to 1 metre erode in any year. Coastal protection works at

Oamaru have, in the past, been periodically upgraded when damaged. Further south, some high erosion rates have periodically occurred adjacent to Kakanui and Moeraki.

The Otago Regional Council have calculated that land up to 80 metres inland from the present day coast north of Oamaru is likely to become at risk from coastal erosion over the next 50 years. Towards Waitaki River assets up to 90 metres from the present day coast may become at risk. Monitoring of the coastline's erosion rates was also recommended by the Otago Regional Council at strategic locations further south including Kakanui, Moeraki Boulders area, Katiki Beach and Shag Beach.

Land instability has also been a problem at Moeraki. Some houses within the Township Zone of Moeraki have been damaged due to the movement of deep-seated landslides. Other natural hazards such as fire may increase or decrease depending on climate and land use trends.

#### **4.2.1 Objective**

**Avoid loss of life, and avoid or mitigate damage to assets, infrastructure, natural and physical resources, or disruption to the District's community, from natural hazards.**

#### **4.2.2 Policies**

- 1 *To advise and inform the community of the potential risk of natural hazards.*
- 2 *To monitor the degree to which the long term trends in land use practices and patterns may increase the vulnerability of communities to natural hazards.*
- 3 *To ensure that subdivision or development is carried out in a manner which avoids or mitigates against the potential adverse effects of natural hazards.*
- 4 *To ensure that within the consent process any proposed developments have an adequate assessment completed to identify any natural hazards and the methods used to avoid or mitigate a hazard risk.*
- 5 *To require the Council's consent for subdivision within flood hazard areas and along the coast, so as to avoid or mitigate the likelihood of damage to future assets.*
- 6 *To discourage the development of new coastal protection works but recognise some existing protection works may require continuing maintenance in order to protect existing assets.*
- 7 *To encourage the protection of cliff edges and foreshore dune systems from inappropriate land management practices.*

#### **4.2.3 Implementation Methods**

To achieve policies 1 - 7 through:

- 1 the provision of rules on subdivision to control development along the coast, and in areas that have been identified as being at risk from flooding;
- 2 consultation with the Otago Regional Council, maintaining existing coastal protection works where this is considered to be a preferable option;

- 3 encouraging the protection of eroding sea cliffs and foreshore dune systems through the provision of information or advice to adjacent owners when required;
- 4 advising and informing the community of potential natural hazards and how to be prepared for civil defence emergencies;

and

- 5 ensuring that emergency response procedures are in place to mitigate the effects of a natural hazard, in conjunction with the Otago Regional Council and the Canterbury Regional Council.
- 6 collecting information during the resource or building consent process, and any other information obtained through research, and ensuring that it is included on the Council's hazards register;
- 7 ensuring that liaison with the Otago Regional Council and the Canterbury Regional Council continues to ensure that a co-ordinated monitoring approach can measure the degree to which the long term trends in land use practices and patterns may increase the vulnerability to natural hazards such as flooding, coastal erosion, fire, and earthquakes.

#### **4.2.4 Explanation and Reasons**

To avoid the loss of life or to avoid or mitigate damage to assets and disruption of the community, on-going research will be required to identify the extent and frequency of natural hazards and methods to mitigate "risks" to the community. Although this Council is not involved in primary research of this nature it is able to collate information continually and advise and inform the community of new findings. A hazards register is being continually updated which informs the community of the known hazard potentials of a given area. This is used both in the consent processes under the Resource Management Act 1991 and the Building Act 1991.

The Council also considers a co-ordinated approach is needed on methodology to monitor how the long term trends in land use practices and patterns may increase the vulnerability of communities to natural hazards. In addition, emergency response plans need to be refined to help the community in times of a disaster.

##### **River Flooding**

Over the years stopbanks have been constructed by the Otago Regional Council and the Canterbury Regional Council, riverbanks planted and stabilised, riverbed levels lowered by gravel extraction and channels re-aligned to reduce the potential for flooding. In addition, flood warning measures have been introduced by the Otago Regional Council for some catchments. While these operations do much to avoid or mitigate flood events, the Council recognises that some controls on subdivision and development in specific areas are required to limit or control the nature of development in floodable areas.

Areas that are subject to flooding, shown on Planning Maps, were identified by the former Otago Catchment Board and further refined by Otago and Canterbury Regional Council staff. However, as these are broad assessments of the likely flood potential site, specific information will be required for subdivision in these areas.

### **Coastal Erosion and Inundation from the Sea**

Building setback along the coast has been implemented to protect assets from coastal erosion, and in addition, to protect the wildlife and habitat of the coastline, and to preserve the natural character of the coastline generally. The width of the setback for buildings is 100m. Based on previous erosion trends plotted from maps, the land within the coastal policy protection area is potentially at risk from coastal erosion and inundation over the next 50 years. Limiting subdivision in the areas will limit future development, and hence the potential loss and damage to property from potential erosion and inundation from the sea.

Past experience indicates that once assets are threatened by erosion, there is pressure to provide physical protective works. The greater the value of the asset the greater the pressure for protective works. Therefore it is preferable that protection for assets from coastal erosion and inundation is achieved, where possible, by maintaining the coastal cliffs or the coastal beaches. Cliffs can be susceptible to collapse if saturated from, for example, the disposal of water or effluent near the cliff face. A beach ridge can also be de-stabilised if vegetation is damaged by vehicles.

## **4.3 ENVIRONMENTAL RESULTS ANTICIPATED**

- The collation and provision of clear information outlining the natural hazard risks to all sites with potential to be adversely affected by natural hazard occurrences in the District.
- Reduced risk to life, infrastructure, property and to the environment from natural hazards.
- The location of new subdivision away from areas at high risk from natural hazards.
- The protection of coastal cliffs and foreshore dune systems from land management practices which would accentuate their erosion rate.

