

## CHAPTER 13: NATURAL HAZARDS

### 13.0 INTRODUCTION

Natural hazards have the potential to damage property, infrastructure and ecosystems, and threaten health and safety. Remedying the damage can cost individuals and the community heavily in financial terms and loss of enjoyment of life.

There is a relatively high level of risk from flooding, earthquake, slope instability and river and coastal erosion hazards in Tasman District. The District has experienced moderate to severe levels of seismic activity relative to other parts of New Zealand, including the severe 1929 Murchison earthquake. Earthquakes cause ground shaking, ground rupture or other deformation (including landslides), that may result in major environmental and infrastructural damage, as well as loss of life. Surface fault rupture may be a significant hazard in the St Arnaud area (Alpine Fault), the Richmond foothills (Waimea-Flaxmore Fault system), and the Murchison area (Buller Catchment Faults). While large earthquakes are very damaging, they are less regular in occurrence than slope instability, flooding and coastal erosion hazard in Tasman District. Slope instability is a general hazard affecting a wide area of the Tasman District, especially on slopes greater than 20 degrees, with soil or rock subject to shear failure. Particularly unstable rock types include the Separation Point Granites and Marsden Coal Measures along the Waimea Fault system.

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Most of Tasman District experiences high rainfall intensities. The frequent, high intensity rainfall, combined with generally short, compact catchments, results in short warning times for areas subject to flooding. Flooding is a serious potential problem in valleys of the Aorere, Takaka, Motueka, Riwaka, Moutere, Wai-iti, Waimea, Wairoa and Buller catchments where several of the District's main settlements are located. Flooding causes damage to property and can threaten human safety.

Coastal processes include beach erosion, cliff and shoreline retreat, and inundation of low-lying areas. These processes are most active in Golden Bay and at Mapua/Ruby Bay. Expected global warming and associated sea-level rise could affect many low-lying parts of Tasman, causing inundation, a rise in groundwater levels, impeded drainage and saltwater intrusion into groundwater.

### 13.1 NATURAL HAZARDS

#### 13.1.1 Issues

- 13.1.1.1 Natural hazards can compromise human well-being and safety and cause damage to habitat, amenity values, property and infrastructure.
- 13.1.1.2 Hazards can be aggravated by inappropriate land use management practices and activities.
- 13.1.1.3 Where limited information exists about some natural hazards which could or do affect the District, a precautionary approach is appropriate.

#### 13.1.2 Objectives

- 13.1.2.1 Management of areas subject to natural hazard, particularly flooding, instability, coastal and river erosion, inundation and earthquake hazard, to ensure that development is avoided or mitigated, depending on the degree of risk.
- 13.1.2.2 Land development, including supporting network infrastructure asset services, is resilient against natural hazards.

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### 13.1.3 Policies

*Refer to Policy sets 5.1, 6.2, 6.4, 6.9, 6.10, 6.12, 6.14 – 6.18, 7.2, 7.3, 8.2, 11.1, 12.1, 21.4, 23.1.*

*Refer to Rule sections 16.2 – 16.4, 16.9, 16.10, 17.1, 17.5 – 17.8, 17.12, 18.5, 18.9, 18.11 – 18.13, 19.2.*

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|------------------|---|---------------------|
| <b>13.1.3.1</b>  | To avoid the effects of natural hazards on land use activities in areas or on sites that have a significant risk of instability, earthquake shaking, fault rupture, flooding, erosion or inundation, or in areas with high groundwater levels.  | C21 8/10<br>Op 1/15 |
| <b>13.1.3.2</b>  | When determining appropriate subdivision, use or development in the coastal environment to assess the likely need for coastal protection works and, where practicable, avoid those sites for which coastal protection works are likely to be required.  | C22 2/11<br>Op 1/15 |
| <b>13.1.3.3</b>  | To avoid developments or other activities that are likely to interfere with natural coastal processes including erosion, accretion, inundation, except as provided for in Policy 13.1.3.10.   |                     |
| <b>13.1.3.4</b>  | To avoid or mitigate adverse effects of the interactions between natural hazards and the subdivision, use and development of land.  |                     |
| <b>13.1.3.5</b>  | To avoid the construction of new habitable buildings in the Residential Closed Zone at Ruby Bay, other than on specified sites.   | C22 2/11<br>Op 1/15 |
| <b>13.1.3.6</b>  | To limit the reconstruction or replacement of an existing habitable building to a position that is no further seaward than the original habitable building in the Residential Closed Zone at Ruby Bay.  |                     |
| <b>13.1.3.7</b>  | On the coastal plain from Ruby Bay to Mapua, to limit further subdivision and habitable buildings in order to avoid their exposure to long term coastal inundation, flooding and erosion risks.   |                     |
| <b>13.1.3.8</b>  | To avoid, unless there is effective mitigation, the expansion of flood-prone settlements onto those parts of the surrounding flood plains where they might be subject to flood hazard.  |                     |
| <b>13.1.3.9</b>  | To prevent damage or interference with the functioning of the major overland flood flow paths of rivers in the District, except as provided for in Policy 13.1.3.10.  |                     |
| <b>13.1.3.10</b> | To maintain or consider the need for protection works to mitigate natural hazard risk where: <ul style="list-style-type: none"> <li>(a) there are substantial capital works or infrastructure at risk; or</li> <li>(b) it is impracticable to relocate assets; or</li> <li>(c) it is an inefficient use of resources to allow natural processes to take their course; or</li> <li>(d) protection works will be effective and economic; or</li> <li>(e) protection works will not generate further adverse effects on the environment, or transfer effects to another location.</li> </ul> |                     |
| <b>13.1.3.11</b> | To promote the maintenance and enhancement of coastal vegetation in areas at risk from coastal erosion.   |                     |
| <b>13.1.3.12</b> | To provide warnings and emergency response systems for areas at risk from or affected by natural hazards.   |                     |
| <b>13.1.3.13</b> | To regulate land disturbance so that slope instability and other erosion processes and inundation are not initiated or accelerated.   | C22 2/11<br>Op 1/15 |
| <b>13.1.3.14</b> | To avoid damage by land use activities to flood control structures or works for flood or erosion control.   |                     |

- 13.1.3.15** To prepare a hazard management strategy identifying hazards and hazardous areas, and management options for these areas.
- 13.1.3.16** To avoid new subdivision, use or development that would hinder the ability of natural systems and features (such as beaches, dunes, wetlands or barrier islands) to protect existing subdivision, use or development from natural hazards (such as erosion, inundation, storm surge, or sea level rise).
- 13.1.3.17** To mitigate natural hazard risks through the design and construction of network asset infrastructure. C69 6/19  
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- 13.1.3.18** To design and construct resilient network asset infrastructure.

## 13.1.20 Methods of Implementation

### 13.1.20.1 Regulatory

- (a) Pattern of zoning which emphasises containment of development away from areas of natural hazards, for example, Coastal Risk Area at Mapua and Ruby Bay. C22 2/11  
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- (b) Delineation of land at risk from ground rupture or deformation along active faultlines, actively eroding coastlines and areas prone to flooding and slope instability, on planning maps. C21 8/10  
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- (c) Rules limiting activities, including subdivision, building and land disturbance, in or adjacent to natural hazard areas (such as stopbanks, eroding coastlines, river margins, steepplands and unstable geological formations).
- (d) Rules requiring building setback from rivers, stopbanks, active faultlines and the coastline.
- (e) Conditions on resource consents and building consents recognising where hazards may be present, for example, requiring minimum floor height, particular foundation types, or that buildings be relocatable.
- (f) Standards of the Nelson Tasman Land Development Manual 2019 that can ensure appropriate location for development, management of hazard-related development effects, and a more resilient design, materials and construction of network infrastructure. C69 6/19  
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### 13.1.20.2 Investigations and Monitoring

- (a) Research into natural processes that may result in hazards for development, such as coastal processes and slope instability.
- (b) Identification of hazardous areas and features such as active faultlines, eroding coastlines, ground susceptible to earthquake shaking effects, slope instability, flooding and river erosion, within three years of this provision becoming operative.
- (c) Improving knowledge of past rupture timings, lengths and displacements of active faults and the magnitude of past earthquakes, to contribute to improved estimates of future earthquake risk. C21 8/10  
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### 13.1.20.3 Education and Advocacy

- (a) Advice and information through project information memoranda, land information memoranda and public enquiries. (b) Advice about erosion protection measures, including tree planting, rock work and structures, subject to the limitations of the New Zealand Coastal Policy Statement for coastal areas.

#### 13.1.20.4 Works and Services

- (a) Maintenance and provision of structural protection works such as stopbanks and groynes on rivers, coastal protection works, soil conservation plantings.
- (b) Early warning systems for flooding and responses to emergency events through the civil defence organisation.

### 13.1.30 Principal Reasons and Explanation

The District has a substantial length of coastline that is subject to coastal erosion. There is a relatively high risk of erosion affecting soft shorelines around the District, particularly at Pakawau, Rangihaeata, Mapua, Ruby Bay, Marahau, and to a lesser extent at Parapara and Pohara.

Significant new built developments in areas that have been identified as subject to coastal or river erosion and inundation are likely to require capital-intensive protective works so are best avoided in such locations. Rules seek to avoid the future demand for protection works and to avoid the effects of known hazards.

Council considers that the advice of the Ministry for the Environment given in July 2008<sup>1</sup> should be adopted in coastal planning. That advice was for a three-part approach for planning and decision timeframes out to 2090 – 2099:

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- A base value sea level rise of 0.5 m relative to the 1980 – 1999 average; plus
- An assessment of the potential consequences from a range of possible higher sea-level rises (for example: from the Greenland and Antarctic ice sheets, carbon cycle feedbacks, and other matters); and
- At the very least, assessment of the consequences of a mean sea level rise of 0.8 metres relative to the 1980 – 1999 average.

All three factors place low-lying coastal margins at risk of both flooding from the landward side and inundation from the sea, or transformation by the processes of erosion and deposition.

Activities that affect coastal processes include extraction of sand, dredging and dumping, reclamations and erection of buildings. Most of these activities except the latter, take place in the coastal marine area. In some parts of the District, coastal rock protection has already been undertaken and will need to be maintained. Pakawau, Totara Avenue, Mapua/Ruby Bay and Marahau foreshores have rock armouring works that are functional but mostly of little amenity value. Future maintenance of these works could investigate options for improving the visual amenity and access.

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As inundation and erosion are ongoing hazards along the Ruby Bay/Te Mamaku coastline, habitable buildings that are redeveloped are not permitted to locate further seaward than the existing building and new habitable and non-relocatable buildings are to be avoided. The Coastal Risk Area has been adjusted to account for current sea level rise projections and the continuing inundation and erosion hazard risk. The Council intends to maintain its rock revetments at Ruby Bay/Te Mamaku for up to the expiry of their consent (in 2044).

There is a need to recognise the relatively high probability of severe earthquake shaking at any of the main settlements in the District in the next 50 years. Major active faultlines at St Arnaud and on the Richmond foothills have been mapped and a restricted development corridor identified.

Soil loss through erosion is a significant risk when certain activities, such as tracking, subdivision, and earthworks that disturb the ground, are undertaken. Some parts of the District such as the shallow steeplands soils and the Separation Point Granite terrain from Separation Point/Te Matau to the Glenhope Scenic Reserve have a magnified risk of instability if vegetation or soils are disturbed.

<sup>1</sup> *Coastal Hazards and Climate Change – A Guidance Manual for Local Government in New Zealand*, 2<sup>nd</sup> Edition, July 2008, Ministry for the Environment

Flooding from rivers is a frequent occurrence in the District and periodically affects the townships of Takaka, Wakefield, Brightwater and Riwaka, which are located on flood plains. A flood warning system operates on the major rivers of the District. Plantings and structures in flood paths interfere with the flow of floodwater.

While the lower reaches of the Motueka River are protected from flooding by stopbanks, it is necessary to maintain existing floodways free of structures in the event that the stopbanks fail or are overtopped. Major floodways in the vicinity of Takaka and Riwaka should also be kept free of structures. Along all waterways, especially those without stopbanks, buildings should be set back to avoid damage by bank erosion. Excavations and tree planting on or near stopbanks can increase the risk of stopbank failure.

Council's Land Development Manual addresses risks associated with network infrastructure and natural hazards through the design of more resilient networks, particularly the mitigation of stormwater effects where they may contribute to flood hazards.

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#### **13.1.40 Performance Monitoring Indicators**

- 13.1.40.1 Number of incidents of harm or damage to persons or property from flooding, slope instability, erosion, earthquakes or other natural hazards.
- 13.1.40.2 Number of claims to Earthquake Commission.

#### **13.50 ENVIRONMENTAL RESULTS ANTICIPATED**

- 13.50.1 Reduced incidence of damage to property and infrastructure, or harm to people's health and safety on the District's floodplains.
- 13.50.2 Reduced incidence of damage or harm to people and property from coastal erosion, slope instability and other forms of natural hazard.
- 13.50.3 Development precluded from areas identified as being of significant risk from natural hazards.
- 13.50.4 More informed communities, prepared for the occurrence of natural hazards.

