



DRAFT REGIONAL POLICY STATEMENT

May 2016

Chapter 5

Natural Hazards

Whakahaere mōrearea taiao

I.5 Significant Resource Management Issues: Natural Hazards

Issue 5.1 There are significant risks from natural hazard events on individuals, communities, businesses, property, infrastructure, and the environment

A natural hazard includes any atmospheric, earth or water related occurrence (including earthquake, tsunami, erosion, volcanic, and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) which may adversely affect human life, property, or other aspects of the environment. On their own, natural processes do not constitute a hazard. Natural events become hazardous when they may adversely affect human lives.

The Nelson region has a physically diverse environment from the mountains to the sea. Its coastal focus and riverine environment means our community is affected by a wide range of natural hazards. With the exception of geothermal and volcanic activity, the region is subject to all types of natural hazard events. The majority of urban Nelson would be potentially impacted by one natural hazard or another. Commonly, there are two or more hazards associated with a given event. For example, a rainstorm may cause flooding and landslides.

The three most potentially damaging and costly natural hazards events that can occur in the region are:

- Earthquake: High magnitude earthquake (7.0+) from the rupture of a local fault (especially the Waimea/Flaxmore Fault). It is predicted that an event like this would have particular impacts across the fault hazard areas predominantly running across the Stoke foothills and Grampians, through the Wood and Atawhai and out to the Glen. There may also be particular liquefaction impacts through Tahunanui and port areas. Earthquake prone buildings will also be susceptible particularly the agglomeration of buildings in the central city.
- Flooding: Major river flooding in the Maitai River. Flooding is the most frequently occurring hazard event in the region.
- Tsunami: Large tsunami (particularly one that is locally generated) affecting a significant proportion of urban Nelson – Central City and Stoke, as well as all coastal settlements.

Other natural hazards have more localised impacts but occur more frequently. These include:

- Localised flooding and inundation from streams and stormwater overflow. This can occur throughout the region in low-lying areas such as Stoke and Wakapuaka, and around tributary streams of the larger rivers such as the Maitai River.
- Coastal erosion and inundation, often associated with storm surge, affects some seafront and low lying coastal areas in the region including the shoreline at Delaware Bay, the Boulder Bank, Tahunanui and Monaco. Some sections of the coastline are currently in a long term pattern of retreat – such as the Tahunanui Back-beach which results in the eastern migration of the Blind channel. Rising sea level will likely accelerate this problem.
- Landslips in the hill suburbs of Tahunanui and the Grampians and generally on slopes across the region that are greater than 12 degrees.
- Wild fire, particularly in hill suburbs on urban fringes near heavily vegetated slopes.
- High winds that can occur throughout the region and cause widespread damage to buildings, infrastructure and forestry.
- Sedimentation and erosion of rivers and streams, river mouths and tidal inlets, that can exacerbate the flood risk by raising bed levels and undermining banks.

People's actions, including mitigation measures and ongoing development in areas at high risk from natural hazards, can cause or increase the risk from natural hazards. Examples include seawalls or groynes that can cause localised erosion of the adjacent shoreline, and building on landslip prone slopes. Stopbanks and seawalls can also create a sense of security and encourage further development, increasing the extent and value of the assets at risk.

In the medium to long term, climate change effects have the potential to increase both the frequency and magnitude of natural hazard events that already occur in the region.

A major consequence of climate change is sea level rise. The sea level is expected to rise by between one half to one metre by 2100. The main natural hazards associated with a rise in sea levels are coastal erosion and inundation. Sea level rise will also put increasing pressure on the coastal margin. As the shoreline adjusts, sediment will be redistributed around the coast and may cause shorelines to form new orientations. Beaches that are currently stable may begin to erode as the shoreline

adjusts to a higher water level, while those that are currently eroding may experience an increased rate of retreat.

Climate change is expected to increase the intensity and duration of westerly weather systems and reduce easterly conditions. This will exacerbate differences in the regional climate, by bringing higher rainfall to the west and reducing coastal rains in the east. It will also bring longer periods of northerly gales to the entire region, particularly in the spring months. Western and southern areas of the region may also have higher rainfall in the winter, increasing the landslide risk during wet winters, particularly in extreme rainfall events. This will put pressure on stormwater systems and flood protection works. Higher rainfall may also result in higher rates of sedimentation in rivers, river mouths and in estuaries, increasing the flood risk in those areas by raising the base level of the river bed. Climate change will also potentially impact the regions terrestrial and aquatic biodiversity as temperatures and water levels change.

The risks to people, communities, their businesses, property, infrastructure and the environment from the effects of natural hazards need to be understood so that people are better prepared for the consequences of natural hazard events.

Issue 5.2 There is increasing pressure from urban growth to develop known hazard prone areas

Given the extensive nature of hazard risk, Nelson's continuing growth pattern will increase pressure to further develop areas susceptible to natural hazards. There may be conflict between where people want to live and where they can live safely, for example along the coastline, adjacent to streams and exposed ridgelines. Existing development and infrastructure are already located on land that is subject to natural hazards.

In centres, the majority of this risk is from flooding, coastal inundation or from earthquakes. These risks need to be managed so as to ensure risks to human life and the significant investment in property are acceptable.

Issue 5.3 Whakatu tāngata whenua Iwi cultural heritage areas are at risk from natural hazards

The Whakatu landscape and coastline is rich in Iwi heritage. These sites are connected to Iwi histories, traditions and tikanga much of which is described in the Statutory Acknowledgements for Te Tau Ihu. These sites, features and landscapes are collectively part of the cultural heritage of each of Whakatu's tangata whenua Iwi. The loss of cultural heritage

sites and access to features and landscapes of significance as a result of natural hazards is a matter which must be addressed.

R.5 Resource Management Responses: Natural Hazards

Objectives

Objective 5.1 Management of hazard risk will consider people’s health and safety, and the protection of lifeline utilities

Objective 5.2 Development should be managed in a way that ensures natural hazard risk is reduced or mitigated

Objective 5.3 The Nelson community is more resilient to natural hazards including the impacts of climate change, and they are aware of options adopted for managing natural hazards

Objective 5.4 Ensure all planning and development recognises the implications of climate change

Objective 5.5 Whakatu tāngata whenua Iwi cultural heritage areas are protected from natural hazards where appropriate

Policies

Policy 5.1 A risk based management approach will be adopted to control the use, development and protection of land. The focus will be on the presence and level of risk of the natural hazard occurring, including climate change, and the potential consequences.

Explanation

The vulnerability of any site to natural hazards is the sum of its vulnerability to one or several specific hazards. Risk is assessed by considering the probability of those hazards occurring and their potential effects on any proposed activity.

Understanding natural processes and how they have the potential to effect the environment expands over time. When this knowledge is incorporated into planning processes, it allows a better understanding of the risks involved and how, or if it is necessary, to manage potential effects on the built environment.

A risk management approach is important to ensure that land use is managed so that the level of control corresponds to the level of risk. Evaluation of risk indicates when and how much risk reduction is required, and when land use controls may and may not be needed. For example a risk based approach could involve Council deciding to apply a smaller flood scenario (Q20) to less significant development, such as playgrounds or carparks, and a greater flood scenario (Q100) to residential subdivisions. Another example might be deciding which flood event to apply to infrastructure design such as the stormwater network – In areas with less development and lower environmental values Council could upgrade its network to a lesser standard.

The approach ensures rational and consistent land use planning by applying the same framework irrespective of the type of natural hazard that may exist. It allows for the full range of risk mitigation measures (regulatory and non regulatory) to be taken into account in determining the level of risk that exists at a particular locality.

This approach focuses on the presence and level of the risk rather than the presence and likelihood of the hazard. It means, for example, that a low level of response may be taken even where a hazard is likely if the consequence would be low. Conversely, it means that land use control may be required in respect of a hazard with a relatively low level of likelihood if the potential consequences of that hazard event, left unmanaged, are high.

Policy 5.2 Avoid new subdivision, development and placement of regionally significant infrastructure and community assets in areas at high risk from natural hazards, unless:

- a) there is no reasonable alternative, in which case regionally significant infrastructure and community assets must be designed to maintain, as far as practicable, their integrity and function during natural hazard events; or**
- b) avoidance is impossible or impractical and adverse effects are mitigated to an acceptable level; or**
- c) subdivision is solely for the purpose of boundary adjustments.**

Explanation

It is important to avoid or exclude Greenfield subdivisions, new development and placement of critical infrastructure in areas at high risk from natural hazards unless there is no alternative, for example ports and wharves, or when the adverse effects can be completely mitigated. Some

forms of development, for example residential, will be more at risk, and less appropriate, than other uses, such as, agriculture or boundary adjustment subdivisions that merely reconfigures lot boundaries without changing the land use. For existing critical infrastructure to remain within these high risk areas, it must be suitably resilient and/or protected from reasonably anticipated natural hazard risk.

An example of a situation where avoidance of a risk might be impossible could be flooding within the Central City.

The extent of development and investment made in the Central City means that it is not practicable or even realistic to move development to higher ground. Even lifting whole streets and blocks of buildings – including heritage buildings unlikely to survive such structural changes – would be an immense and unsustainable cost to the community, as well as legally very challenging to accomplish given how many stakeholders would need to cooperatively act at the same time. There are however a number of development requirements that are practical and which must be taken.

Because of this, there is a need to adopt a risk tolerance approach that is based on understanding and accepting risks posed by flooding and coastal inundation. The Council must ensure that development in centres first does not exacerbate those risks, but secondly includes measures that will allow timely evacuation or safe occupation during an inundation event.

Policy 5.3 Mitigate the adverse effects of natural hazards on subdivisions and development in areas other than those in high risk areas

Explanation

In some areas it is impossible or impractical to avoid natural hazard risks altogether. Some forms of development are also less susceptible to risk than others, for example toilet blocks and sheds. In such areas hazard risks can be mitigated to tolerable or acceptable levels.

For flooding and some coastal inundation hazard risks the following measures can be implemented to reduce that risk:

- a) building platforms that utilise the highest ground
- b) minimum floor levels for dwellings, industrial and commercial buildings
- c) site or land filling/raising where this does not increase off site hazard risk
- d) lower density development
- e) elevation of flood sensitive equipment
- f) restrictions on the activities that take place on the land
- g) flood proofing

- h) removable structures

The degree to which the above measures are applied will depend on the type of development proposed and its susceptibility to natural hazard risks, the standard of flood protection provided by physical or structural flood alleviation activities and ultimately the extent to which an area is subject to actual or potential inundation. For other hazards such as land instability, liquefaction and coastal erosion, similar measures may be appropriate, especially the identification of building platforms and land use restrictions.

Policy 5.4 Ensure that on any land within the coastal environment that is potentially affected by coastal erosion or coastal inundation over at least the next 100 years:

- a) **no land use change or redevelopment occurs that would increase the risk from that coastal hazard; and**
- b) **land use change or redevelopment that reduces the risk from that coastal hazard is encouraged.**

Explanation

Policy 25 of the New Zealand Coastal Policy Statement 2010 (NZCPS) requires that in areas "potentially affected" by coastal hazards over at least the next 100 years land use change that would increase risk is avoided.

This requirement applies irrespective of the level of risk of the coastal hazard. It is also specific that the risk should not be increased above the level of risk that existed pre-development. Mitigation or management actions can be undertaken to maintain risk at the required level.

All areas are potentially affected by hazards over a 100-year period, although the likelihood of some events over such a period is very low. For that reason, the NZCPS limits the consideration to coastal erosion and coastal inundation to events of high likelihood or consequence over a 100-year planning period.

Options to address coastal erosion issues in Nelson, and in particular those experienced at Tahunanui, will be assessed, with appropriate responses reflected or incorporated into the Nelson Plan.

Policy 5.5 **Actively engage with property owners and the Nelson community to raise awareness of the natural hazard risks using the most up to date information available.**

Explanation

Council has a role to play in providing natural hazard information to inform both property owners and the wider community of the potential hazard risks. Public awareness aids in the understanding of the level of risk and any solutions adopted to reduce that risk. This helps to build resilient communities.

Policy 5.6 **Where appropriate protect, re-create or enhance natural features and landforms of regional significance and where they provide protection from natural hazards**

Explanation

Natural features and landforms, like sand dunes, beaches, wetlands and areas of native vegetation, often play an important role in mitigating natural hazards, and also often have additional values that include biodiversity, cultural, amenity and landscape values associated with them. The benefits of reinstatement, rehabilitation or re-creation of natural features to mitigate natural hazards should also be considered when hazard mitigation works are proposed.

Policy 5.7 **Whakatu tāngata whenua Iwi cultural heritage areas are protected from natural hazards where appropriate**

This policy reflects in part the requirements of the RMA in regard to matters of national importance - Section 6(e). It also acknowledges the special relationship that Whakatu's tangata whenua Iwi share with the environment and that these special relationships must be recognised when managing natural hazards.

Impacts on heritage areas need to be considered when designing solutions to natural hazards. Council could also consider undertaking physical works so that heritage features are not compromised by future events.

Methods

Regulatory methods	Who	Policy link
Nelson Plan		
Land use zoning and policies	Council	Policy 5.1 Policy 5.2 Policy 5.3 Policy 5.4
Natural hazard controls	Council	Policy 5.1 Policy 5.2 Policy 5.3 Policy 5.4
Assess options for responding to coastal erosion issues and include provisions in the Nelson Plan that address both those issues, and agreed responses to them.	Council	Policy 5.4
Policies, standards and plans		
Preparation and implementation of a Natural Hazard Risk Management Action Plan	NCC and TDC	Policy 5.1 Policy 5.2 Policy 5.3 Policy 5.4
Provide in the Land Development Manual standards for determining the minimum ground and floor levels required to avoid, remedy or mitigate effects of flooding and coastal inundation hazards.	NCC/TDC	Policy 5.1 Policy 5.2 Policy 5.3 Policy 5.4
Asset Management Plans take a risk based approach in identifying appropriate responses to natural hazards	Council	Policy 5.1
Other Legislation		
Land Information Memoranda	Council	Policy 5.5
Building consent process	Council	Policy 5.1 Policy 5.2 Policy 5.3
Civil defence and emergency management plans	NCC and TDC	Policy 5.1 Policy 5.5
Non-regulatory methods		
Advocacy and education		
Public education and community awareness of natural hazards across the region	Council	Policy 5.5
Work with the community to identify acceptable risk. This will involve investigating and identifying where protection works maybe required for example for coastal inundation and flooding	Council	Policy 5.5

Non-regulatory methods	Who	Policy link
Work with Whakatu's tangata whenua Iwi to manage sites, features and landscapes that form part of the cultural heritage which are at threat from natural hazards	Council/iwi	Policy 5.7
Monitoring and information		
Provide information and guidance on natural hazards including climate change effects to property owners	Council	Policy 5.5
Where hazard mitigation protection measures are proposed (eg seawalls, groynes, stopbanks etc), a greater range of soft engineering measures are included	Council	Policy 5.6
Develop Practice notes and model solution guides for responding to significant natural hazard risks, particularly for town centre areas	Council	Policy 5.5
Review hazard and risk information regularly to keep information accurate and up to date	Council	Policy 5.5
Put in place a monitoring and accounting regime to understand adaption measures being undertaken across the region	Council	Policy 5.1
Earthquake prone building database and assessments	Council and landowners	Policy 5.5
Funding and assistance		
Target non regulatory programme funding (such as Nelson Nature and Project Maitai) to protect and/or help biodiversity adapt in the face of potential climate change impacts	Council	Policy 5.6
Support seismic strengthening of buildings that contribute to the city's character, amenity or historic heritage	Council and Landowners	Policy 5.1

Anticipated Environmental Results

Anticipated Environmental Result	Link to policy	Indicator	Data Source
Risk Based approach to hazard management	Policy 5.1 Policy 5.2 Policy 5.3 Policy 5.4	Any new buildings or developments within the flood overlay across Nelson are built with an adequate ground and floor height to prevent inundation of living areas in a 1 in 50 year event for the life of the building. Greenfield subdivision developments are avoided in high risk areas or future proofed for the year 2100 for a 1 in 100 year flood event. Any natural hazard risk associated with new development is at a low level after risk mitigation has been taken into account.	Asset Management Plans Building consent data Resource consent data
Raise awareness of natural hazard risk	0	Provide hazard risk information to the community	Practice notes Media CDEM communications Residents surveys
Reduced hazard risk in the coastal environment	Policy 5.4	The degree to which building and development occurs within coastal hazard areas	Building consent data
Enhanced natural landforms that provide protection from natural hazards	Policy 5.6	The degree to which soft engineering options are used to address natural hazards	Review Asset Management and Reserve Management Plans Resource consents
Whakatu tāngata whenua Iwi cultural heritage areas are protected from natural hazards where appropriate	Policy 5.7	Te Tau Ihu Iwi are involved in natural hazard management of cultural heritage areas	Review Asset Management and Reserve Management Plans Resource consents

Principal Reasons

When natural hazard events occur they can cause adverse effects on the social, economic and cultural wellbeing of people and communities. Infrastructure and property may be damaged, economic and cultural activity can be disrupted and human health can be put at risk. The Nelson Plan provisions seek that people, communities and businesses understand the potential natural hazards and associated risk. Managing these risks involves either avoiding these risks (where practicable) or using various mitigation measures to reduce their likelihood or their impact.

Natural hazards require spatial and emergency planning to manage potentially harmful events. There is a need to locate and design new development and infrastructure to address the effects of natural hazards and impacts of climate change.

Flooding has significant effects on people, property and the environment. Flood hazards include flooding of river and stream valleys, overland flow of stormwater and inundation in areas where the drainage system can become blocked during storm events. Flood peaks can be heightened by an increase in impermeable surfaces in urban catchments. Risk associated with these hazards is often exacerbated by the inappropriate location of buildings and infrastructure.

Nelson's geology is a key contributor to land instability hazards. Some of the region is comprised of soft, weak, and poorly consolidated rock that is prone to failure through rainfall or earthquake events. Residential properties and physical infrastructure such as water and wastewater mains are most vulnerable to damage from land instability. They can also cause land instability if constructed inappropriately.

In Nelson, coastal hazards arise from the erosion of beaches, and inundation of low-lying areas from storm surges and tsunamis. Future rises in sea levels have the potential to worsen all coastal hazards. These natural hazards may occur individually, or in combination to create a more significant hazard. Managing land use and development in a way that takes account of these factors can reduce risk to people and the environment.