



CHAPTER 10: Natural Hazards

Outlines the regionally significant issues for natural hazard management within the Region, and sets out the objectives, policies and methods that derive from these issues.



10 Natural Hazards

10.1 Scope and Background

This chapter establishes an overall framework for natural hazard management under the ~~Resource Management Act 1994~~ (RMA). It also sets out the division of responsibilities between the Regional Council and Territorial Authorities for natural hazard management under the ~~Act~~ RMA.

The Region is vulnerable to a number of natural hazards. The principal threat is from flooding. Other natural hazards include earthquakes, tsunami, volcanic eruptions ~~action and land subsidence, and the impacts of~~ Climate change ~~and erosion is likely to influence the frequency, scale or intensity of atmospherically influenced natural hazards such as flooding.~~ The vulnerability of the Manawatu-Wanganui Region to natural hazard events is increased because of human activity, such as:

- ~~soil~~ *land disturbance** and *vegetation clearance**, particularly on hill slopes ~~in a~~ *Hill Country Erosion Management Area**, which can increase the erosion risk and the amount of sediment in the flood channel, in turn increasing the intensity ~~of,~~ and effects from, floods and reducing the effectiveness of mitigation measures such as stopbanks.
- the increasing number of people living in hazard-prone areas (including associated infrastructure) such as along the coast and adjacent to rivers, which increases the damage potential from natural hazard events, putting lives at risk. It can also reduce the effectiveness of existing mitigation measures such as stopbanks.

Most of the Regional Council's operational work on natural hazard management is carried out under the Soil Conservation and Rivers Control Act 1941, which provides for the establishment of river and drainage schemes. Emergency response, ~~community readiness, and~~ recovery planning, and research into natural hazard risks, is carried out under the Civil Defence and Emergency Management Act 2002. ~~These roles are implemented through the Civil Defence and Emergency Management Group Plan rather than through the One Plan.~~ The role of the Regional Council and Territorial Authorities under the RMA is primarily one of risk reduction to ensure that resource use activities do not exacerbate natural hazard risks or impede natural hazard mitigation works, thereby ensuring that developments do not put people or property in places or circumstances of undue risk.

The approach to managing natural hazards in this Plan is to:

- (a) set out a clear regional framework for natural hazard management,
- (b) improve clarity around the respective roles of the Regional Council and Territorial Authorities under the RMA, ~~Resource Management Act 1994~~
- (c) discourage future residential development and placement of *critical infrastructure** in areas prone to natural hazard events, particularly areas at high risk of flooding, and
- (d) continue to provide information to Territorial Authorities and the general public with regard to natural hazards.



Flooding

Flooding occurs frequently in the ~~Manawatu-Wanganui~~ Region. The impacts of floods are mostly localised, but the likelihood of a major flood occurring in any year is high.

The February 2004 storm event caused widespread flooding. Recovery from that event will span many years. It showed only too well the problems that can arise from the combination of such a large storm event with vegetation clearance* on hill slopes and ~~from~~ residential settlements and infrastructure on flood-prone or unstable land. The resulting sedimentation in ~~waterways~~ water bodies and erosion on land has impacted on infrastructure*, people, land use and the natural environment.

Today over half of the Region's population lives on the floodplains of the major rivers. The establishment of river and drainage schemes (with the associated construction of stopbanks, floodgates, spillways and retention dams) has been an integral part of the development of the Region. Current schemes undergo regular review and assessments are undertaken for areas that could be included in these schemes or established as new schemes. More information on minimising the effects of erosion and ~~flooding~~ on the beds of rivers and lakes can be found in ~~the~~ Chapter 6.

Erosion

Hill country erosion and coastal erosion are both of concern, as human activity has the potential to greatly increase erosion risk and associated impacts on people and property. Hill country erosion is addressed in Chapter 5.

Other natural hazards

Other natural hazards that occur less frequently include earthquakes, ~~volcanism~~ volcanic action, land subsidence and coastal environment hazards (including tsunami, storm surge and sea level rise* hazards). Despite their low frequency, they have potential to put the Region at risk. ~~Factors such as climate change are likely to exacerbate the risk of climatic hazards.~~ Although little is known of the risks of these hazards, current research, such as Horizons' the Regional Council's tsunami hazards study, will enable better future planning. Due to limited knowledge of the influence climate change may have on some natural hazard events, a precautionary approach to establishing or intensifying land use activities in areas potentially subject to natural hazards is required. Potential impacts will continue to be dealt with by contingency planning, such as the regional civil defence response team and insurance schemes, until further research can be undertaken.

10.2

Significant Resource Management Issue

Issue 10-1: Effects of natural hazard events

Natural hazard events can adversely affect people, including their social, economic and cultural wellbeing, and the natural and physical resources they rely on, such as property and infrastructure*. In particular:

- (a) development can exacerbate the risks from natural hazards, particularly flooding and coastal hazards, by placing more people, property and infrastructure in hazard-prone areas and by reducing the effectiveness of existing hazard mitigation measures such as ~~stop banks~~ stopbanks,
- (b) climate change is likely to cause the hydrological cycle to become more extreme, resulting in an increase in the intensity and frequency of hazards such as droughts, heavy rainfall, cyclones and storm surges, and



- (c) predicted *sea level rise** is likely to increase the risk of inundation and damage to communities and infrastructure* in coastal areas during natural hazard events.

10.3

Objective

Objective 10-1: *Effects^ of natural hazard^ events*

The adverse *effects^ of natural hazard^* events on people, property, *infrastructure^* and the economic wellbeing of communities and infrastructure* are avoided or mitigated.

Whāinga 10-1: Ngā pānga o ngā mea mōrearea o te ao tūroa

~~*Ka parea, ka whakangāwaritia ngā pānga kōaro o ngā mea mōrearea o te ao tūroa ki te tangata, ngā rawa, me te oranga ōhanga o ngā hapori me ngā kaupapa o raro*~~

Ka parea, ka whakaitingia ngā pānga kino o ngā mea mōrearea o te ao tūroa ki te tangata, ngā rawa, ngā kaupapa o raro, me te oranga ōhanga o ngā hapori.

10.4

Policies

Policy 10-1: Responsibilities for *natural hazard^* management

In accordance with s62(1)(i) RMA, *local authority^* responsibilities for *natural hazard^* management in the ~~Manawatu-Wanganui~~ Region are as follows:

- (a) The Regional Council and *Territorial Authorities^* ~~shall~~ must be jointly responsible for:
- (i) raising public awareness of the risks of *natural hazards^* through education, including information about what *natural hazards^* exist in the Region, what people can do to minimise their own level of risk, and what help is available.
- (b) The Regional Council ~~shall~~ must be responsible for:
- (i) developing objectives and policies for Region-wide management of activities for the purpose of avoiding or mitigating *natural hazards^*,
 - (ii) developing specific objectives, policies and methods (including *rules^*) for the control of:
 - (A) all *land^* use activities in the *coastal marine area^*,
 - (B) erosion protection works that cross or adjoin mean high water springs,
 - (C) all *land^* use activities in the *beds^ of rivers^ and lakes^*, for the purpose of avoiding or mitigating *natural hazards^*, and
 - (iii) taking the lead role in collecting, analysing, and storing regional *natural hazard^* information and communicating this information to *Territorial Authorities^*.
- (c) *Territorial Authorities^* ~~shall~~ must be responsible for:
- (i) developing objectives, policies, and methods (including *rules^*) for the control of the use of *land^* to avoid or mitigate *natural hazards^* in all areas and for all activities except those areas and activities described in (b)(ii) above, ~~including~~ and



- (ii) identifying *floodways** (as shown in Schedule I¹) and other areas known to be inundated by a 0.5% annual exceedance probability (AEP) flood event on planning maps in *district plans*[^], and controlling *land*[^]-*use* activities in these areas in accordance with Policies 10-2, ~~and 10-4~~, ~~10-3 and 10-5~~

Policy 10-2: Development in areas prone to flooding

- (a) The Regional Council and *Territorial Authorities*[^] must not allow the establishment of any new *structure*[^] or activity, or any increase in the scale of any existing *structure*[^] or activity, within a *floodway** mapped in Schedule I unless:
 - (i) there is a functional necessity to locate the *structure*[^] or activity within such an area, and
 - (ii) the *structure*[^] or activity is designed so that the adverse *effects*[^] of a 0.5% annual exceedance probability (AEP) (1 in 200 year) flood event on it are avoided or mitigated, and
 - (iii) the *structure*[^] or activity is designed so that adverse *effects*[^] on the *environment*[^], including the functioning of the floodway, arising from the *structure*[^] or activity during a flood event are avoided or mitigated,
in which case the *structure*[^] or activity may be allowed.
- (b) Outside of a *floodway** mapped in Schedule I the Regional Council and *Territorial Authorities*[^] must not allow the establishment of any new *structure*[^] or activity, or an increase in the scale of any existing *structure*[^] or activity, within an area that is likely to be inundated in a 0.5% AEP (1 in 200 year) flood event unless:
 - (i) *flood hazard avoidance** is achieved or the 0.5% AEP (1 in 200 year) flood hazard is mitigated, or
 - (ii) the *structure*[^] or activity is on *production land*[^], or
 - (iii) there is a functional necessity to locate the *structure*[^] or activity within such an area and the *structure*[^] or activity complies with Policy 10-2(a)(ii) and (iii),
in any of which cases the *structure*[^] or activity may be allowed.
- (c) *Flood hazard avoidance** must be preferred to flood hazard mitigation.
- (d) When making decisions under Policies 10-2(a) to (c) regarding the appropriateness of any proposed *flood hazard avoidance** or mitigation measures, the Regional Council and *Territorial Authorities*[^] must:
 - (i) ensure that in a 0.2% AEP (1 in 500 year) flood event the inundation of occupied *structures*[^] and access from occupied *structures*[^] must be no greater than 0.5 m above finished ground level with a maximum water velocity of 1.0 m/s, or some other combination of water depth and velocity that can be shown to result in no greater risk to human life, *infrastructure*[^] or *property*^{*}.
 - (ii) ensure that any more than minor adverse *effects*[^] on the effectiveness of existing *flood hazard avoidance** or mitigation measures, including works and *structures*[^] within River and Drainage Schemes, natural landforms that protect against inundation, and overland stormwater flow paths, are avoided,
 - (iii) ensure that adverse effects on existing *structures*[^] and activities are avoided or mitigated,

¹ Schedule I is not a component of Part I – the Regional Policy Statement. It is a component of Part II – the Regional Plan.



- (iv) have regard to the likelihood and consequences of the proposed *flood hazard avoidance** or mitigation measures failing,
 - (v) have regard to the consequential *effects*[^] of meeting the requirements of (d)(i), including but not limited to landscape and natural character, urban design, and the displacement of floodwaters onto adjoining *properties**; and
 - (vi) have regard to the proposed ownership of, and responsibility for maintenance of, the *flood hazard avoidance** and mitigation measures including the appropriateness and certainty of the maintenance regime.
- (e) Within that part of the Palmerston North City Council district that is protected by the Lower Manawatu River Flood Control Scheme to a 0.2% AEP (1 in 500 year) standard, including the Mangaone Stream stopbank system, additional *flood hazard avoidance** or mitigation measures will generally not be required when establishing any new *structure*[^] or activity or increasing the scale of any existing *structure*[^] or activity.
- (f) This policy does not apply to new *critical infrastructure**.
- (a) ~~**Floodways** – The function of floodways, as mapped in Schedule I, shall be maintained by generally not allowing any new development or any increase in the scale of existing development within the mapped areas, except as provided for by Policy 10-3.~~
- (b) ~~**Floodable areas** – In other areas likely to be inundated by a 0.5% annual exceedence probability flood event (including those floodable areas mapped in Schedule I), any new development and any increase in the scale of existing development, including any increase in the number of dwelling houses, shall be avoided unless it can be shown that the activity will not cause any of the following effects, after taking into account both individual and cumulative effects:~~
- ~~(i) increased risks to human life~~
 - ~~(ii) increased risks to *infrastructure** or the property of another person~~
 - ~~(iii) a restriction or diversion of flow that is likely to cause a reduction in the effectiveness of existing works and structures, or natural landforms, which serve to mitigate the effects of flood hazards, or any other significant increase in flood risk~~
 - ~~(iv) a reduction in any other way of the effectiveness of existing works, structures, natural landforms or other measures which serve to mitigate the effects of flooding, including structures in River and Drainage Schemes~~
- ~~except as provided for by Policy 10-3.~~

~~**Policy 10-3: Activities that need to be located in areas prone to flooding**~~

~~An exception to Policy 10-2 may be made for structures and activities that cannot be located outside floodways and other areas likely to be inundated by a 0.5% annual exceedence probability flood event because of functional constraints, provided any adverse effects are avoided or mitigated.~~

Policy 10-4: New critical infrastructure*

The placement of new *critical infrastructure** in an area likely to be inundated by a 0.5% annual exceedence probability AEP (1 in 200 year) flood event (including floodways mapped in Schedule I), or in an area likely to be adversely affected by another type of *natural hazard*[^], shall must be avoided, unless there is no



~~reasonable—alternative~~ satisfactory evidence to show that the *critical infrastructure**:

- (a) will not be adversely affected by floodwaters or another type of *natural hazard*[^],
- (b) will not cause any adverse *effects*[^] on the *environment*[^] in the event of a flood or another type of *natural hazard*[^],
- (c) is unlikely to cause a significant increase in the scale or intensity of *natural hazard*[^] events, and
- (d) cannot reasonably be located in an alternative location.

Policy 10-5: Other types of *natural hazards*[^]

The Regional Council and *Territorial Authorities*[^] must manage future development and activities in areas susceptible to *natural hazard*[^] events (excluding flooding) ~~shall be managed~~ in a manner which:

- (a) ensures that any increase in risk to human life, property or *infrastructure*[^] from *natural hazard*[^] events is avoided where practicable, or mitigated where the risk cannot be practicably avoided,
- (b) is unlikely to reduce the effectiveness of existing works, *structures*[^], natural landforms or other measures which serve to mitigate the *effects*[^] of *natural hazard*[^] events, and
- (c) is unlikely to cause a significant increase in the scale or intensity of *natural hazard*[^] events.

Policy 10-6: *Climate change*[^]

The Regional Council and *Territorial Authorities*[^] must take a precautionary approach ~~when shall be taken for managing~~ assessing the effects of climate change and *sea level rise*^{*}, and any associated changes to on the scale and frequency of *natural hazards*[^], in particular for with regard to decisions on:

- (a) stormwater *discharges*[^] and effluent disposal,
- (b) coastal development and coastal *land*[^] use,
- (c) activities adjacent to *rivers*[^], and ~~streams~~
- (d) *water*[^] allocation and *water*[^] takes,
- (e) activities ~~on or near unsustainable hillcountry~~ in a *Hill Country Erosion Management Area*^{*},
- (f) flood mitigation ~~efforts~~ activities, and
- (g) managing storm surge.



10.5

Methods

The Regional Council is managing the environmental impacts of natural hazards from the following non-regulatory approach.

The following are non-regulatory methods to implement the policies of Chapter 10:

Project Name Method 10-1	Hazards Research
Project Description	This project method provides for the investigation, identification and mapping of those parts of the Region that are at risk from natural hazards, including seismic, volcanic, <u>land</u> subsidence, tsunamis, flooding and coastal erosion hazards. It includes including consideration of <i>sea level rise</i> * and climate change implications on those hazards. This information will be provided to Territorial Authorities for district planning purposes and to other interested parties, and maps will be updated as required.
Who	Civil Defence and Emergency Management Group, Regional Council, Territorial Authorities and research institutes.
Links to Policy	This project links to <u>method implements</u> Policies 10-1, 10-54 and 10-75.
Target	Hazards are mapped by 2010 and updated regularly as required.

Project Name Method 10-2	Floodable Areas Prone to Flooding Research
Project Description	A Region-wide study of <u>floodable areas prone to flooding, including consideration of sea level rise* and climate change implications</u> , will be carried out to update flood maps and information in order to assist Territorial Authorities in the development of district plans, and the Regional Council's advice service.
Who	Civil Defence and Emergency Management Group, Regional Council, and research institutes.
Links to Policy	This project links to <u>method implements</u> Policies 10-1, 10-2, 40-3, 10-4 and 10-6.
Target	Hazards are mapped by 2010 and updated as required.

Project Name Method 10-3	Natural Hazard Information and Advice
Project Description	The Regional Council will provide Territorial Authorities and other interested parties with up-to-date natural hazard information to assist in the assessment of land development consents <u>applications</u> , particularly subdivisions.
Who	Regional Council.
Links to Policy	This project links to <u>method implements</u> Policies 10-1, 10-2, 40-3, 10-4, 10-5 and 10-6 and 40-7.
Target	Ongoing advice to Territorial Authorities and other interested parties.

Project Name Method 10-4	Public Information – Natural Hazards
Project Description	Easily accessible information will be developed and provided to increase public awareness of the risks of natural hazards, including <u>seismic earthquake</u> , volcanic <u>action</u> , <u>land</u> subsidence, tsunamis, flooding, and <u>coastal</u>



Project Name Method 10-4 Public Information – Natural Hazards	
	<p>erosion, and climate change hazards including consideration of sea level rise* and climate change implications.</p> <p>Up-to-date natural hazard information will be provided to the general public and other interested parties (for example, advance warning flood and lahar systems and civil defence literature), together with advice on appropriate options for avoiding or mitigating natural hazards.</p>
Who	Civil Defence and Emergency Management Group, Regional Council, Territorial Authorities, research institutes and other relevant agencies.
Links to Policy	This project links to <u>method implements</u> Policies 10-1, 10-2, 10-3 , 10-4, 10-5, and 10-6 and 10-7 .
Target	Information provided via website and available in paper form by 2010.

10.6 Anticipated Environmental Results

Anticipated Environmental Result	Link to Policy	Indicator	Data Source
By 2017, the risk to people, property and <i>critical infrastructure*</i> will be the same as or less than before this Plan became operative.	<p>Natural Hazards Policies: 10-1, 10-2, 10-3, 10-4, 10-5 and 10-6-</p> <p>Land Policies: 5-1, 5-2A, 5-3 and 5-5</p> <p>Water Policies: 6-29, and 6-31, 6-33 and 6-34</p>	<ul style="list-style-type: none"> • Number of new dwelling houses in <u>floodable areas prone to flooding</u> consistent with Policy 10-2 • Number of incidents where activities are affecting schemes, especially <u>stop-banks stopbanks</u> • Natural hazard information shared with Territorial Authorities and interested parties • <u>District plans incorporating hazardous areas on planning maps and associated regulation of land use in those areas</u> 	<ul style="list-style-type: none"> • Territorial Authorities • <u>Regional Council's Operations Group maintenance records</u> • <u>Regional Council's compliance database</u> • <u>Regional Council's incidents database</u>
By 2017, people will be more aware of the risks of natural hazards in the Region and how to cope with them than they were before this Plan became operative.	<p>Natural Hazards Policies: 10-1, 10-2, and 10-3, 10-4, 10-5 and 10-6-</p> <p>Methods: 10-1, 10-2, 10-3 and 10-4</p>	<ul style="list-style-type: none"> • Public perception • Number of requests for information • <u>District plans incorporating hazardous areas on planning maps and associated regulation of land use in those areas</u> 	<ul style="list-style-type: none"> • Customer surveys • <u>Subdivision Enquiry Database (SED) database</u>

10.7 Explanations and Principal Reasons

Objective 10-1, Policies 10-1 to 10-6 and the methods above set out a regional framework for avoiding or mitigating the adverse effects of natural hazard events on communities, infrastructure and the natural environment.

Policy 10-1 clarifies the respective roles of the Regional Council and Territorial Authorities as required by s62 RMA. Policy 10-1 largely continues the delineation



of responsibilities under the former Regional Policy Statement. The Regional Council has taken on the role of setting a regional framework for natural hazard management, while allowing decisions on most land use activities to be made by Territorial Authorities.

Policy 10-2 targets floodways and ~~floodable~~ areas prone to flooding, as flooding is the most significant natural hazard in the Region. ~~Floodable Areas prone to flooding (including the “floodable area” as in Figure I:3A)~~ are defined as those areas that would be inundated by a 0.5% AEP annual exceedance probability (1 in 200 year) flood event. This is a change from the previously used standard for delineating ~~floodable areas prone to flooding~~ of a 1% ~~AEP annual exceedance probability (1 in 100 year)~~ flood event, in order to take into account the likely effects of climate change. Policy 10-2 generally seeks to avoid residential development and other new activities in areas likely to be affected by flooding, due to the risks to human life and property. It is recognised, however, that some activities have a functional ~~constraint~~ necessity to be located in ~~floodable areas prone to flooding~~ (Policy 10-32(a) and Policy 10-2(b)), or that ~~measures mitigation~~ for dwellings and other activities, (for example, access in or outside of floodable areas prone to flooding and building design) can be put in place to avoid any increase in impacts of floods (Policy 10-2(d)(i)).

Policy 10-5 sets up the general management regime for other types of natural hazards. Hazard avoidance is preferred to hazard mitigation because of the impacts on human life, property and infrastructure. Avoiding all hazards is difficult, however, because of their infrequency and the widespread nature of their effects.

Policies 10-2, 10-~~34~~ and 10-5 also include provisions seeking to ensure that the effectiveness of existing hazard mitigation measures is not undermined by future activities.

Policy 10-4 seeks to ensure that *critical infrastructure** is not disabled by natural hazard events, by avoiding the placement of *critical infrastructure** in areas prone to natural hazards. The policy recognises that in some cases this is unavoidable – for example, roading and gas supplies in coastal areas regardless of tsunami risk, and infrastructure in settlements located on liquefaction zones.

Policy 10-6 seeks to ensure that the implications of climate change are considered as appropriate.

