



Progress toward achievement of
Environment Waikato's Regional Policy
Statement objectives:

NATURAL HAZARDS

Documents in this Series:

- Policy effectiveness paper No.1: Biodiversity and natural heritage: 2007
- Policy effectiveness paper No.2: Natural hazards: 2008
- Policy effectiveness paper No.3: Energy and Structures (infrastructure): 2008

This document is the second of a series of reports prepared to assess the extent to which Environment Waikato is achieving its Regional Policy Statement objectives. Such assessments are to be repeated at five-yearly intervals. The reports are in response to the Resource Management Act (RMA) requirement to monitor the efficiency and effectiveness of policies, rules or other methods (RMA, Section 35(2)). As well as assessing progress toward achievement of objectives, the reports are to make recommendations concerning future implementation, development and monitoring of the Regional Policy Statement and regional plans.

This report has been prepared by Brendan Morris with assistance from Robin Britton, Urlwyn Trebilco and Annabelle Giorgetti. We wish to express our appreciation to the many Environment Waikato staff members, District Council staff members and external parties who have contributed to this report.

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Executive summary

This report assesses the extent to which the objectives relating to natural hazards in the Waikato Regional Policy Statement (RPS) are being achieved. The two primary objectives are as follows.

Objective 3.8.3: the roles of all relevant agencies for the management of natural hazards in the Waikato region clearly identified and their responsibilities consistently implemented.

Objective 3.8.4: the adverse effects associated with natural hazards minimised, the resilience of the community and public awareness of the causes and potential effects of natural hazards events increased.

A third objective has a direct relationship with the management of coastal hazards.

Objective 3.5.4: preservation of the natural character of the coastal environment, including the physical and ecological processes which ensure its dynamic stability.

The Waikato region is potentially vulnerable to a range of significant natural hazards. All significant natural hazards have the potential to threaten human life and safety, disrupt communities, damage property and adversely affect the environment.

Implementation methods

Environment Waikato has undertaken a wide range of activities and committed significant resources towards the management of natural hazards. These methods include development of regional hazard management policies, strategies and plans, provision of information, advice and advocacy, regulatory mechanisms, community liaison, support and partnerships, physical works, hazard warning and response, public awareness and education and research support.

This report reviewed the extent to which the RPS methods are being implemented, and concludes that all of the methods within the current RPS are being implemented to some extent. The majority of the natural hazard management work is being undertaken via development of policies, strategies and plans, provision of information and advice and physical works programmes.

Context of natural hazard management

This report provides an overview of international, national and regional trends that are influencing natural hazard management. In general terms, the risks from natural hazards are increasing due to a combination of more frequent and intense weather events, population growth and land use changes (including upper catchment vegetation clearance and development within hazard-prone areas). Within the Waikato region, these trends are further influenced by a growing awareness of the importance of land use planning in hazard management and a growing public expectation of comprehensive and integrated hazard management.

Achievement of objectives

In general, the extent to which these objectives have been achieved is unclear. Despite this, there is evidence of progress towards achieving all three objectives, and it is likely that all three have been achieved in part. The key difficulty with assessing the extent to which the objectives have been achieved is the lack of consistent monitoring and evaluation of baseline and ongoing trends. Without this, an objective assessment of risk reduction is very difficult to undertake.





The following summary briefly summarises the achievement of each objective.

Objective 3.8.3: the roles of all relevant agencies for the management of natural hazards in the Waikato region clearly identified and their responsibilities consistently implemented.

With respect to roles clearly identified, the objective has largely been achieved for both regional and territorial authorities at the strategic level. It is less likely that other agencies with hazard management responsibilities are as well informed by this objective.

With respect to responsibilities consistently implemented, it is less clear whether the objective has been achieved, despite considerable work programmes at both the regional and territorial authority levels. The integration of other agencies into hazard management issues has generally been poor.

In summary, this objective has been achieved in part. The environmental results anticipated appear to have been achieved in part, but a significant part of this achievement is due to other mechanisms such as existing river and catchment programmes and the Waikato Civil Defence Emergency Management Group (CDEMG).

Objective 3.8.4: the adverse effects associated with natural hazards minimised, the resilience of the community and public awareness of the causes and potential effects of natural hazards events increased.

With respect to adverse effects associated with natural hazards minimised, it is almost certain that this objective has not been met. The main reason for this is related to land use planning – new development and intensification of existing development is continuing to occur in hazard prone areas.

Despite the above, it is very likely that the adverse effects of some hazards have been and continue to be mitigated by the work of Environment Waikato and other stakeholders.

The objective has not promoted hazard avoidance, and it is unclear whether public

awareness of natural hazards is increasing.

Objective 3.5.4: preservation of the natural character of the coastal environment, including the physical and ecological processes which ensure its dynamic stability.

It is unclear whether this objective has been achieved. It is noted that the specific policy relating to natural hazards is only one contributor to achieving this objective. Despite this, the trends within the coastal environment since the RPS was developed have been increasing pressure for subdivision, increased usage of hard engineering structures and decreased preservation of natural character.

Recommendations for policy development.

The report concludes that there is a need to improve policy provisions due to significant changes in natural hazard management since the development of the RPS. The key recommendations include:

- an increased emphasis on risk reduction
- consider recognition of and alignment with the 'all hazards' management approach
- adoption of a risk management basis for hazard management
- increased focus on integration with local and regional policies, strategies and plans
- a stronger priority for avoidance policies via land use planning provisions
- a greater recognition and emphasis on climate change adaptation.

A number of other general and hazard-specific policy development recommendations are made in the report.

Recommendations for policy implementation

The report identifies the need to improve implementation methods, and provides recommendations for implementation guidance.

The key recommendations for Environment Waikato include:

- expansion of a national policy advice and assistance role
- advocating for greater recognition of hazard management principles through territorial authority strategies and plans

- greater promotion of cross-regional and cross-district hazard management initiatives
- increased utilisation of the Waikato CDEMG for hazard reduction
- establishing strategic direction for natural hazard management as part of the 2009/19 Long-Term Council Community Plan (LTCCP)
- reviewing the purpose, intent and expected outcomes of the hazard risk mitigation strategies and plans
- establishing a regional hazard risk management baseline and monitoring programme.

A number of other policy implementation recommendations are made in the report.





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1 Introduction

1.1 Purpose and scope

The purpose of this report is to assess the extent to which the natural hazards objectives in the Waikato Regional Policy Statement (RPS) are being achieved.

This report covers chapter 3.8 (natural hazards) and relevant parts of chapter 3.5 (coast) of the RPS.

This assessment is undertaken in response to the Resource Management Act (RMA) section 35 requirement which states:

s35(2) Every local authority shall monitor – ... (b) the efficiency and effectiveness of policies, rules, or other methods in its policy statement or its plan;...

The Act also states that:

s35 (2A) Every local authority must, at intervals of not more than 5 years, compile and make available to the public a review of the results of its monitoring under subsection (2)(b).

To fulfil these requirements, the approach taken by Environment Waikato is to focus on the RPS objectives, as these represent the key RMA matters which the regional council is seeking to influence. Assessing the extent to which the objectives are being achieved will provide a good indicator of the efficiency and effectiveness of the regional council's policies, rules and other methods in its RPS and regional plans. As well as assessing the changes that have occurred within the topic areas since the RPS was drafted, it is also important to consider the current and anticipated pressures on these resources.

The analysis for natural hazards therefore includes:

- the background context for the RPS chapter and a brief overview of natural hazards within the region
 - a description and discussion of the relevant RPS objectives
 - an analysis of the extent to which the relevant methods have been implemented
- an overview of the broad context for hazard management and key changes that have occurred since the development of the RPS
 - a description of significant hazard risks within the region, the response methods used and implementation gaps and issues
 - an assessment of the extent to which the objectives have been achieved
 - recommendations for future policy development and implementation of methods, both in general and hazard-specific terms.

This report builds on and is complementary to the information provided in the report 'Evaluation of the Waikato Regional Policy Statement' Enfocus, 2007, which provides an overall evaluation of the performance and continued relevance of the Waikato RPS.

Chapter 3.8 of the RPS describes the Waikato's issues, objectives, policies and implementation methods for natural hazards, while chapter 3.5 describes an issue, objective, policy and methods for managing coastal hazards.

The importance of hazard management has increased via changes to Section 7 (other matters) of the RMA which requires councils to have particular regard to managing the effects of climate change. It is also significant to note that Section 55 of the RMA was amended to require subordinate RMA planning documents 'to give effect to' the RPS.

1.2 Methodology

The following methodology was used in preparing this report.

Background scoping

Initial conversations were held with key Environment Waikato policy staff members who had been involved in the development of the RPS. These conversations had two purposes.

- To identify thoughts on the reasons behind the development of the RPS provisions, in order to help clarify the intent of the objectives.

¹ Future reports will focus on other RPS objectives.

- To ascertain any matters occurring at the time that may have influenced the development of the policy.

Interviews

Interviews were held with three key groups:

- Environment Waikato staff
- district council staff
- external stakeholders.

A representative from each of the key groups within Environment Waikato was identified and subsequently interviewed. The groups covered included: policy development, policy implementation, land transport, social and economy, rivers and catchment services, and resource use (consents and environmental education).

This project was introduced to territorial authorities at a Forum for Integrated Resource Management meeting (these 'FIRM' meetings are held to facilitate flow of information between the councils within the region). Email questionnaires were sent out to Forum participants. Replies were received from Matamata-Piako District Council, South Waikato District Council, Taupo District Council, Thames-Coromandel District Council and Waikato District Council.

A range of external stakeholders were interviewed by phone, email or in person.

Desk top research

A wide range of hard copy and website literature relating to the topic areas was reviewed.

Analysis and preparation of the report

The findings from the previous steps were subsequently analysed and the results presented within this report. The draft report was peer reviewed.

1.3 Reflections on methodology used

This section of the report reflects on the methodology used for this report and records some comments and recommendations in respect of the policy effectiveness assessment undertaken of the two chapters of the RPS covered by this report.

1. The general approach followed that taken in Policy effectiveness paper No.1: Biodiversity and natural heritage: 2007. This enabled a level of consistency to be achieved between the documents.
2. The range of comments generated during the assessment of the two chapters has enabled the report to assess the extent to which the objectives have been achieved and to note areas where improved policy development or implementation could take place.
3. The methodology provided for a series of targeted interviews and email questionnaires with various Environment Waikato staff, some territorial authority staff and other external stakeholders. This mix provided a reasonable overview of comments on the effectiveness of the RPS objective. The pressure/state/response model enabled particular specific natural hazards to be identified and considered. This was considered to be important for looking forward to the RPS review. The questionnaires provided a basis for an open flow of information from participants.
4. Given the significance of land use planning to the management of natural hazards, it would have been helpful to have had more input from territorial authorities. However it is recognised that there is an on-going tension between respective council's workloads and associated timeframes. While some council staff considered the email approach to be more efficient, it may have been more useful to have held individual interviews with other staff members.
5. This process did not include any iwi consultation or consultation with the Ministry for the Environment or the Department of Conservation (DOC). This could strengthen future reviews of other RPS chapters.
6. Overall it was considered that the methodology used worked well for assessing the natural hazards chapter of the RPS.

2 Natural hazards

2.1 Historical legislative context

This section outlines the legislative context at the time the RPS was developed. The RMA is a core legislative driver for the management of natural hazards.

Natural Hazards are defined in section 2(1) of the RMA as:

“any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire or flooding) the action of which adversely affects or may affect human life, property, or other aspects of the environment.”

Natural hazard management is specified as a function of both territorial authorities and regional councils under sub-sections 30(1)(c)(iv), 30(1)(d)(v) and 31(1)(b)(i).

The contents of the RPS must state (s62(1)(ha)):

**For the region or any part of the region, which local authority shall have responsibility within its own area for developing objectives, policies, and rules relating to the control of the use of land for –
(i) the avoidance or mitigation of natural hazards.**

If these matters are not stated, the regional council retains the responsibility.

The Waikato region is potentially vulnerable to a range of significant natural hazards including those defined in Section 2 of the RMA. All significant natural hazards have the potential to threaten human life and safety, disrupt communities, damage property and adversely affect the environment.

Natural hazards management has been a function of local authorities for many years. The RMA 1991 provided a focus for requiring territorial authorities and regional councils in particular to be clear about which agency was managing which aspects. This was reinforced by an amendment to the RMA in 1993, which

required the RPS to state these matters (s62(1)(ha)).

Land use planning is primarily controlled by territorial authorities. It was considered that this could have resulted in potentially overlapping responsibilities if the regional council was to retain land use planning controls other than within the beds of lakes and rivers and within the coastal marine area. Therefore, the RPS sought to identify territorial authorities as having key responsibility for land use decisions with respect to natural hazards.

Regional councils have additional responsibilities under other pieces of legislation directly related to the management of natural hazards such as the Soil Conservation and Rivers Control Act 1941, which requires the regional council to minimise and prevent damage from flooding and erosion. In addition, both regional and territorial authorities had responsibilities under the now repealed Civil Defence Act 1983. Both pieces of legislation have a strong ‘operational’ or ‘response’ focus in comparison to the RMA focus on land use planning and decision-making.

Territorial authorities also have responsibilities under the Building Act (primarily dealing with building standards and location in hazard prone areas). The implementation of the Building Act and the RMA has not always been complementary. At times, the decisions taken under the Building Act have undermined planning outcomes under the RMA – often because of a site-specific focus that does not take cumulative effects into consideration.

In spite of the years of involvement that local authorities have had in managing this issue, natural hazard events continue to impact on communities, and often in an increasingly severe manner. The risks from hazards are closely linked to the increasing severity of natural events and land use decisions, in particular the location of communities in hazard zones and the intensification of development within hazard areas. Therefore, the RPS chapter was focussed

on clarifying the roles of the respective local authorities.

2.2 A snapshot of natural hazards in the Waikato region

The Waikato region is subject to a wide variety of natural hazards. The primary hazards of significance² to the region include river flooding, earthquakes, volcanic activity, tsunamis and coastal erosion and flooding³. In addition, the region is impacted to a lesser extent by landslides and debris flows, rural fire, drought, subsidence, sedimentation, severe storms and geothermal ground subsidence and hydrothermal activity.

Centred around 38 degrees south, the region is exposed to prevailing west and southwest winds from the Tasman Sea, and has an average annual rainfall of 1,250mm. There are numerous rivers and streams within the region, including New Zealand's longest river – the Waikato. The topography and geology within the region make the region highly susceptible to the impacts of heavy rainfall events and the subsequent impacts of high intensity floods and river levels.

The Waikato region is located over the most seismically active area of New Zealand, and has three significant active volcanic centres as well as hundreds of active fault lines that give rise to earthquakes. In addition, the nature of the geology combined with the earthquake effects can lead to subsidence and liquefaction of soils.

The region has 1,150km of coastline. The western coastline is exposed to high winds and wave conditions that lead to a dynamic shoreline and significant erosion. By contrast, the eastern coastline is a relatively low wave environment, but has been subject to significant development that has resulted in coastal erosion and flooding hazards. In addition, the eastern coastline has a high level of vulnerability to locally generated tsunami hazards.



Waikato River flood August, 2008

² For the purposes of this report, 'significant' refers to natural hazards that have risks categorised as either 'very high' or 'high' within the Waikato region Civil Defence Emergency Management Group plan 2005, are identified as 'hazards of national significance' within the Civil Defence Emergency Management Group plan, or require management due to their widespread nature and significant impacts on other values (such as coastal erosion).

³ Drawn primarily from the hazard and risk assessment within the Civil Defence Emergency Management Group plan.

3 Understanding the objectives

3.1 Introduction

In order to assess the extent to which the objectives are being achieved, it is important to have a clear understanding of what the objectives mean. This section of the report therefore seeks to interpret more specifically what the objectives are seeking to achieve. The section aims to discuss important assumptions and definitions, and to describe what success would look like for each of the objectives.

3.2 Objectives for natural hazards

Chapter 3.8 of the RPS provides the primary objectives, policies and methods for managing natural hazards. Chapter 3.5 also provides a policy and methods that contribute towards the management of coastal hazards.

Each of the three objectives are discussed below:

3.2.1 Management of natural hazards

Objective 3.8.3: the roles of all relevant agencies for the management of natural hazards in the Waikato region clearly identified and their responsibilities consistently implemented.

This objective is supported by one policy.

Policy one: consistent management of natural hazards

Ensure that natural hazards are managed in a consistent manner throughout the Waikato region and roles and responsibilities of agencies are defined.

One issue gives rise to this objective.

The roles and responsibilities of local authorities and other agencies for the management of natural hazards in the Waikato region have not been agreed or clearly identified. Until this is done,

inefficiencies and/or a duplication of functions may occur.

This objective is clearly about defining who is responsible for what aspect of natural hazard management. This was required as a result of the way the functions were allocated within the RMA. However, it is also fundamentally about avoiding duplication or inefficiencies in the management of natural hazards and promoting an integrated management approach. The policy rewords the objective, but doesn't really add any further direction.

There was also a concern in the early 1990's at the territorial authority level that Environment Waikato might 'take over' certain territorial authority functions, unless these were clearly identified. This may reflect the reason why the demarcation of responsibilities was not embedded into policy, but was instead identified as the main method for achieving the policy direction of role definition and consistent implementation of responsibilities under objective 3.8.3.

This objective also incorporates the responsibilities of agencies other than local authorities that provide essential services, thereby drawing linkages to network utility operators, neighbouring regional councils and emergency readiness and response via civil defence. In the early 1990's, the role of civil defence was very focused on 'response' to any natural hazard events, with Environment Waikato taking the lead role for preparation, response and recovery from emergencies.

The RPS stated Environmental Results Anticipated for this objective as:

1. decreasing inefficiencies and duplications of services or regulation with respect to natural hazards
2. quick and efficient response to natural hazard events
3. an increase in the use of partnership agreements and memoranda of understanding to formalise agreements between agencies as to their role in the management of natural hazards

4. the identified roles and responsibilities of district and regional councils for the management of natural hazards implemented within three years of the RPS becoming operative through the district plans, regional plans, civil defence plans, annual plans and strategic plans of the regional council and territorial authorities
5. an increase in public awareness of the roles and responsibilities of local authorities and agencies for managing natural hazards.

These outcomes are focused on agencies recognising, agreeing on and formalising roles and responsibilities for the management of natural hazards, to ensure efficient and consistent management regimes. It was expected that these roles and responsibilities would be specified in RMA plans and other relevant plans within a 3 year period of the RPS becoming operative – effectively by 1 October 2003.

The intended outcomes clearly anticipate that an increase in public awareness about roles and responsibilities would lead to an increase in the efficiency of responses to natural hazard events.

3.2.2 Adverse effects

Objective 3.8.4: the adverse effects associated with natural hazards minimised, the resilience of the community and public awareness of the causes and potential effects of natural hazards events increased.

This objective is supported by three policies.

Policy one: adverse effects of natural hazard events avoided and mitigated. Ensure the occurrence of natural hazard events are prevented or the associated adverse effects are avoided or mitigated.

Policy two: new settlements and structures. Ensure new subdivisions and developments are built in a manner designed to avoid or mitigate the adverse effects of natural hazards.

Policy three: public awareness. Raise public awareness of the causes and effects of natural hazard events (and the

means by which their effects can be avoided or mitigated) and ensure that the community are prepared for civil defence emergencies.

One issue gives rise to this objective.

A lack of public awareness of the causes and potential effects of natural hazard events increases the likelihood of adverse effects when these events occur.

This objective is focused on community awareness of hazards, increasing community resilience to events and minimising the potential adverse effects from hazard events.

At the time the RPS was developed, community awareness of the causes and effects of natural hazards and the precautions to be taken was generally considered to be low. 'Resilience' was not a term commonly used in the early 1990's, but has since been strengthened through the introduction of the Civil Defence Emergency Management Act 2002.

The RPS was raising awareness that land use decisions can exacerbate the potential effects of a natural hazard event and that public awareness of the potential hazards was a critical factor. In this respect a strong linkage was drawn with the objectives of the Civil Defence Act 1983.

Fundamental to this objective was the recognition that 'natural hazards' events defined in Section 2 of the RMA are natural phenomenon and that they are only a 'hazard' when there is an interaction with people and property. Therefore, there was also a focus on avoiding new subdivisions and development in areas where the risk from hazards would be increased, or mitigating the potential adverse effects of the hazards through for example, design.

Implementation of the policy directions were to be by:

- identifying areas at risk
- managing them through planning documents
- reinforcing preventative methods already in place such as warning systems and flood protection and drainage schemes
- advocating for re-vegetation of catchments
- raising awareness through environmental education.

The RPS stated the Environmental Results Anticipated for this objective as:

1. increased community understanding of the risk from natural hazards and the relationship that exists between people and the effects of natural hazards
2. reduced risk to the community from natural hazards
3. reduced disruption and damage to communities from natural hazard events.

The combined intent of the three outcomes was to increase community understanding of risk and hazards, reduce the level of risk and to reduce damage to communities.

These outcomes provide guidance to local authorities in their RMA and other hazard management roles such as civil defence and river management. The outcomes also recognise that the communities potentially affected are key stakeholders in reducing the impacts of natural hazard events.

It is noted that the emphasis on risk identification and understanding was not specifically included into the objective or policies. It is also noted that the term 'minimised' is subjective, and can be interpreted in different ways such as minimised to a level required under a rule or policy, to community satisfaction or another level such as 'as low as reasonably practicable.'

3.2.3 Natural character and coastal processes

Objective 3.5.4: preservation of the natural character of the coastal environment, including the physical and ecological processes which ensure its dynamic stability.

This objective is supported by four policies in the RPS. Policy four is directly related to the management of natural hazards.

Policy four: coastal hazards.

Promote the use of 'soft-engineering' or non-engineering solutions to avoid or mitigate the adverse effects of natural hazards in the coastal environment.

One issue gives rise to this objective.

Inappropriate subdivision, use and development within the coastal environment results in loss of natural character.

The basis for this objective is the major focus on the preservation of natural character of the coastal environment as stated in the New Zealand Coastal Policy Statement. Underlying this is the wide range of factors that can contribute to the degradation of coastal areas, including those factors such as subdivision, developments, coastal structures and infrastructure that have strong impacts on the management of coastal hazards.

Policy four contributes to achieving the preservation of natural character outcome, and hence cannot be taken in isolation from the other policies that refer to protection of significant areas, recognition of natural processes and adopting a precautionary approach. 'Soft-engineering' or non-engineering options include beach nourishment and setback zones that do not interfere with natural processes in the way that 'hard-engineering' options such as sea walls do.

The RPS stated the Environmental Results Anticipated for this objective as:

1. significant coastal areas, features and processes protected
2. no further inappropriate subdivision, use or development
3. reduced use of hard engineering solutions to coastal erosion and hazards.

Reduced use of hard engineering solutions is the primary anticipated outcome relating to policy four. No further inappropriate development, use or subdivision would assist in achieving this goal, and in turn, this would lead to the preservation of natural character.

4 What Environment Waikato has done about natural hazards

4.1 Introduction

In order to understand how effective and efficient the natural hazards methods have been in achieving the objectives for these chapters of the RPS, it is important to know the extent to which they have been implemented.

In the RPS, the methods for achieving the objectives fall broadly into the following categories:

- development of regional hazard management policies, strategies and plans
- provision of information, advice and advocacy
- regulatory mechanisms
- community liaison, support and partnerships
- physical works:
 - soil conservation
 - river management
 - flood protection
 - pest control
- hazard warning and response
- public awareness and education
- research support.

This section of the report outlines the implementation actions undertaken by Environment Waikato for the categories outlined above.

4.2 Implementation methods supporting the natural hazards objectives

4.2.1 Development of regional hazard management policies, strategies and plans

Waikato Regional Plan.

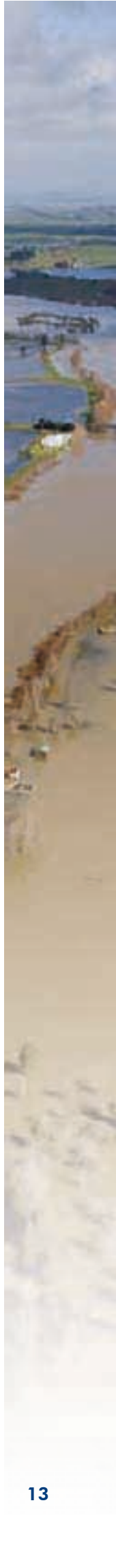
As the RPS gave responsibility for controlling land use for the avoidance or mitigation of natural hazards to territorial authorities, this matter is not covered by the Waikato Regional Plan. The Waikato Regional Plan does however have a number of provisions to prevent aggravation of river flood and land instability hazards by the management of earthworks, discharges to land, damming and other similar activities. These are outlined in the regulatory mechanisms Section 4.2.3 below.


Waikato Regional Coastal Plan.

There are many objectives, policies and methods within this plan that specifically seek the avoidance or mitigation of natural hazards. The primary objectives, policies and methods of relevance to natural hazards management are outlined in the regulatory mechanisms Section 4.2.3 below.

Hazard Risk Mitigation plans.

These are hazard-specific, non-statutory guidance and implementation documents. Plans have been developed between 1997 and 2000 for river flooding, coastal erosion, coastal flooding, volcanic, earthquake and water shortage (drought) hazards. The plans are primarily designed to confirm roles and responsibilities of Environment Waikato and territorial authorities





and to implement the directions and achieve the outcomes of the RPS and Regional Coastal Plan, while seeking linkages with other relevant legislation. In general, the plans include the following:

- an overview of the key issues related to the hazard
- setting broad principles for management under the RMA framework including:
 - recognition of the primacy of the RMA
 - recognition of the importance of the provision of high quality hazard information
 - promotion of a strategy of avoidance in preference to mitigation
 - promotion of sustainability of avoidance or mitigation options and outcomes
 - the importance of developing and maintaining strong partnerships between Environment Waikato and territorial authorities
 - the importance of community input into decision-making
- the overriding importance of community safety as a key in hazard management decision-making
 - an outline of the broad strategies and options for hazard management planning – usually with an emphasis on clarifying roles and responsibilities of Environment Waikato and territorial authorities
 - arrangements for response to and recovery from hazard events
 - an implementation plan
 - provisions for monitoring and review of the plan.

Long-Term Council Community Plan.

The LTCCP outlines Environment Waikato's input into achieving community outcomes over a 10-year timeframe, and is a requirement of the Local Government Act 2002. The 2006/16 LTCCP flagged a change in the approach to regional hazard management along the following lines:

- a greater emphasis on managing river flood hazard risks in light of the 2004 floods and subsequent flood risk management work at the national level
- a greater emphasis on setting clear strategic direction for flood risk management by:
 - developing strategic flood risk management directions for the region with anticipated

outcomes of recognising natural systems and reducing hazard risks

- working alongside territorial authorities during district plan reviews and variations to proactively encourage improved district plan provisions for managing hazard risks.
- influencing the direction of central government and national-level flood risk management initiatives
- provision of robust and targeted river flood risk information to territorial authorities in the first instance, to enable the development of robust district plan provisions.
- developing a clear understanding of regional hazard risks over time and establishing a risk monitoring and review programme to enable measurement of outcomes
- in the long-term, work towards provision of all-hazards information being widely available to communities to enable communities to make informed decisions regarding risk reduction and preparation for emergencies
- providing a foundation for closer coordination of regional hazard management, river and catchment and policy development work.

Civil Defence Emergency Management Group plan.

The purpose of this plan is to enable the effective and efficient management of regionally significant hazards and associated risks to the community. The plan is a requirement of the Civil Defence Emergency Management Act 2002, and was jointly developed by the Waikato CDEMG – a joint committee of 11 local authorities from across the Waikato region, including Environment Waikato. The Civil Defence Emergency Management Act 2002 and CDEMG plan have a very high level of significance for management of regional hazards due to the following.

- The Civil Defence Emergency Management Act 2002 requires the identification, assessment and management of all hazards and risks – this moves beyond the focus on natural hazards under the RMA.
- Goal two of the CDEMG plan is 'to reduce the risks from hazards.' This collective goal lends weight to the directions for natural hazard management under the RMA and places greater weight on risk identification and management.

- The CDEMG plan provides in depth assessment and evaluation of regional hazard risks, a high level prioritisation of significant regional hazard risks, identification of hazard risks of national significance and direction on management and treatment of risks. An additional outcome of the plan is the development of a joint regional hazard risk management programme designed to promote comprehensive and integrated risk reduction across the region.

River flood risk management strategy.

Environment Waikato has developed a draft River Flood Risk Management Strategy. The strategy is aimed at facilitating a more integrated, region-wide approach to managing the risks associated with river flooding, which is the most widespread and frequently occurring natural hazard within the Waikato region.

The risks to people, property, infrastructure and the environment associated with this hazard are increasing over time because of factors such as population growth, land use change, and more frequent extreme weather events.

The primary purpose of the strategy is to pull together all existing river flood risk management work into a clear and agreed framework. The strategy will provide regional guidance on the management of river flood risks and guidance on implementation for all key stakeholders. The overall expected outcome for river flood risk management is that the management framework leads to recognition of rivers as natural systems and a reduction in river flood hazard risks.

Development and implementation of the strategy is a key work target for Environment Waikato under the 2006-16 LTCCP, and complements work at the national level. There is a significant amount of work underway at the national level to address flood risk management issues including a central

Hazard risk	Emergency operating area	Priority**	
Tsunami (Local)	Thames Valley	VERY HIGH	* Does not include major hazards that would be dealt with at the national level as identified in Section 3.3.9.
Earthquake (Kerepehi Fault, ML 6.8***)	Thames Valley		
Earthquake (Ngangiho Fault, ML 6.3***)	Southern		
River/Stream Flooding (Lower Waikato/ Waipa)	Waikato Valley		
River/Stream Flooding (Waihou/Piako)	Thames Valley		
Tsunami (Distal)	Thames Valley		
Services/Infrastructure	Southern		
Electricity Failure	Thames Valley		
Human Pandemic	All		
River/Stream Flooding (Waihou/Piako)	Thames Valley		
Electricity Failure	Southern	HIGH	** Based on the final rating score as outlined in the supporting document titled 'Hazard and Risk Analysis: Explanatory Notes 2004' (Annex C) where: 4 to 5 = Very High 3 to 4 = High 2 to 3 = Moderate 1 to 2 = Low, and 0 to 1 = Very Low.
Ashfall Ruapehu (or other)	Southern		
Mayor Island Activity	Thames Valley		
Animal Epidemic	Waikato Valley		
Landslip/Hipaua	Southern		
Earthquake (Kerepehi Fault, ML 5.5***)	Thames Valley		
Earthquake (Wairoa North fault, ML 7.1***)	Waikato Valley		
Animal Epidemic	Thames Valley		
Geothermal Ground	Southern		
River/Stream Flooding (Coromandel Peninsula)	Thames Valley		
		MODERATE	***Richter (local) magnitude.

List of hazard risks (including significant hazards) in priority order, Waikato region Civil Defence Emergency Management Group plan, 2005.



government review of flood risk management and the development of the New Zealand Standard for managing flood risk. The draft strategy builds on and is complementary to work at the national level.

Site-specific hazard mitigation plans.

Non-statutory site-specific mitigation plans have been developed for numerous sites across the region that are subject to a range of different hazards. There have been various drivers behind the development of these plans, but generally they are a response to community-driven demand, a pressing mitigation requirement or concern from Environment Waikato regarding the risks associated with the hazard. Examples of site-specific hazard mitigation plans include:

- Thames and Te Puru Flood Hazard Management plans developed in the 1990's
- coastal erosion strategies including Cooks Beach, Buffalo Beach and Aotea Harbour
- local flood risks associated primarily with river and catchment scheme areas such as the Tongariro River.

River and Catchment Services Zone Management plans.

While the emphasis of the zone management plans is on river and catchment management, river flood hazard management issues are considered as important management issues within each zone. In addition to this, the draft river flood risk management strategy provides a strategic framework and outcomes for river and flood risk management within each zone. At the

time of writing, development of the first zone management plan for the Waihou/Piako Zone was in progress.

Input into sustainable development initiatives.

Environment Waikato has had proactive involvement in the hazards aspects of sub-regional initiatives such as Shore Futures around the Kawhia and Aotea Harbours and the Coromandel Blueprint Project. These initiatives are seeking to achieve a common direction for integrated planning between local government and key stakeholders over a 50-year period.

Cross-regional hazard mitigation.

Environment Waikato has also had a co-leadership role in the Central Plateau Volcanic Advisory Group – a multi-agency, cross-regional forum seeking integrated management of research, planning, response and public education and awareness for volcanic hazards in the central North Island.

Coastal erosion.

Environment Waikato has developed coastal erosion policy options for managed retreat and emergency works.



Coastal erosion at Buffalo Beach, Whitianga in 2001.

4.2.2 Provision of information, advice and advocacy

Regional-scale information: baseline assessments of all significant natural hazards within the Waikato region have been completed including:

- river flooding
- coastal erosion and flooding
- volcanic ash fall and lahar hazard zones
- earthquake ground shaking risk zones and active fault lines
- landslides
- geothermal areas
- tsunami.

In addition to the above, progress is underway towards achieving comprehensive topographic coverage of the region's flood hazard areas via the Light Imaging Detection and Range (LIDAR) project.

Development of detailed site-specific and hazard-specific information includes the following.

- River flood.
Provision of regional river flood level information, modelling and mapping such as Thames Coast, Eastern Coromandel, Tauranga-Taupo, Tongariro and Lake Taupo erosion and flooding, provision of updated and improved regional flood hazard maps (aerial photo overlays and improved hazard zones), development of flood hazard GIS layers and risk assessments such as Thames Coast.
- Coastal erosion.
Coromandel erosion setback lines and recommendations and west coast erosion hazard assessment.
- Tsunami.
A four-stage hazard assessment for the Eastern Coromandel.
- Debris flow.
Advocacy for recognition of this hazard as a part of the Thames hospital redevelopment project.

- River stability management strategy development within the central river and Catchment Management Zone.
- Advocacy on hazards identification, assessment and policy development for key stakeholders.
 - Central government: involvement in the central government flood risk review and direct participation in the development of the flood risk protocol and New Zealand Standard for managing flood risk. Also, national flood risk management development through involvement on the Regional Affairs Committee of Local Government New Zealand.
 - Territorial authorities: information provision, district hazard assessments and policy development support, and participation in the Forum for Integrated Regional Management.
 - The Waikato CDEMG via leadership of hazard risk reduction initiatives, the regional risk management programme, administering the Waikato Engineering Lifelines Group and participation on the Central Plateau Volcanic Advisory Group.
 - The Waikato farming community. Liaising with organisations such as the Rural Support Trust and Metservice for drought and flood hazards respectively.

Proactive advice has been given to territorial authorities, developers, communities and individuals regarding flood hazard information and policy directions.

4.2.3 Regulatory mechanisms

Waikato Regional Plan.

This is Environment Waikato's primary regulatory tool for helping to achieve the purpose of the RMA. Rules and methods that assist in achieving river flood and land instability hazard management outcomes from land use activities include the following.

- River and lake bed structures (section 4.2)
 - includes rules on erosion control (4.2.15), channel training (4.2.16) and gradient control structures (4.2.19), and maintenance of access (4.2.18). These rules and methods assist in stabilising river beds and banks, reducing



erosion, increasing river and stream flow efficiency and maintaining community flood protection standards.

- River and lake bed disturbances (section 4.3) – includes methods on river and lake bed disturbance (4.3.4), disturbance associated with maintenance of structures (4.3.5), sand and gravel extraction (4.3.7) and planting of vegetation (4.3.8). These methods help achieve channel stability and prevention of increased flood impacts.
- Accelerated erosion (section 5.1) – includes rules to prevent an increase in flooding and land instability from soil disturbance, roading, tracking, vegetation clearance and riparian vegetation clearance.
- Discharges onto land (section 5.2) – includes rules to prevent an increase in flooding and land instability from overburden disposal, cleanfilling and other discharges to land.

Waikato Regional Coastal Plan.

There are a number of objectives, policies and methods within this plan that seek the avoidance or mitigation of natural hazards. The primary objectives, policies and methods of relevance to natural hazards management include the following.

- Protection of coastal processes (3.4).
The objective of this section is 'the integrity, functioning and resilience of coastal processes protected from the adverse effects of use and development.'

The relevant policy is recognising coastal processes (section 3.4.2): avoidance of adverse effects on coastal processes. This policy is supported by three methods:

- avoiding adverse effects from Environment Waikato works and services (17.2.6)
- management of coastal processes – ensuring the importance of these is recognised by territorial authorities and appropriate provisions are made for sea level rise (17.2.13)
- information provision by Environment Waikato for the community on coastal processes, how developments are affected and design requirements (17.12.18).

- Natural hazards (section 8).

The objective of this section is 'coastal hazard risk to people and property avoided or mitigated.' The relevant policies are:

- identify areas of coastal hazard risk and develop integrated hazard management strategies for these areas (8.1.1)
- adopt a precautionary approach in the assessment of coastal hazard risk and in the assessment of potential risks for coastal permit applications (8.1.2)
- promote the protection of natural features that provide a buffer against natural hazards (8.1.3)
- ensure that any use of structures to control coastal erosion is necessary and avoids or remedies any adverse effects on other coastal processes and on natural character (8.1.4).

These policies are supported by a number of methods as follows:

- consultation with other agencies (17.7.1)
- guidance on assessment methodology (17.7.2)
- development of hazard management strategies (17.7.3)
- appropriate management options – proactive management, use of district plans for rules, use of measures that protect or enhance natural buffers and avoidance of options that adversely affect public access and coastal values (17.7.4)
- consultation with territorial authorities – provision of technical and policy support and advice (17.7.5)
- natural hazards awareness – raising awareness of coastal hazards and community involvement in protecting buffer zones (17.7.6)
- assessment of areas vulnerable to coastal hazards (17.7.7)
- adoption of a precautionary approach to assessing risks hazards when developing within the coastal marine area (17.7.8)
- protection of natural features (17.7.9)
- placement of short-term structures for hazard management (16.7.1).

Monitoring and review (section 15)

There is an ongoing requirement within the plan to undertake regular monitoring and review to determine whether the objectives and outcomes are being met. There are two specific monitoring and review requirements for natural hazards.

- Monitoring of the state of the coastal marine area (15.1).
Once the plan becomes operative, baseline investigations will be completed and a monitoring programme (with repeatable methodology) developed, capable of detecting changes and trends relevant to coastal hazards.
- Monitoring of processes (15.4).
Information will be gathered on meetings or activities undertaken by Environment Waikato in conjunction with tangata whenua, communities and local, regional and central government agencies relating to coastal hazards.

Resource consent conditions related to hazard management

Environment Waikato staff regularly provide comment and advice to territorial authorities on appropriate resource consent conditions for development where the land is subject to the effects of natural hazards. During the 2007/08 financial year, around 100 resource consents were assessed and commented upon for a wide range of hazard management-related issues. Environment Waikato also applies consent conditions to activities that affect water levels or flows.

Statutory processes advocacy

Environment Waikato regularly submits on changes to the natural hazard provisions of:

- proposed National Policy Statements and strategies
- neighbouring regional councils policies and plans
- district and city plans when reviews or variations are proposed
- the LTCCP's, growth strategies and structure plans of territorial authorities
- the policies and plans of other organisations such as Transit New Zealand, the Department of Conservation, Landcare Research and Mighty River Power.

Use of the Environment Court and formal legal processes

Used occasionally to challenge land use decisions in cases where extreme hazard risks could otherwise be avoided.

Property Information Memoranda

Provision of reports for dam safety purposes as required under the Building Act 2002.

Waikato River High Flow Management Plan

Environment Waikato is working with Mighty River Power on the ongoing review and update of the plan provisions. The plan seeks to ensure that high flood flows within the Waikato River system are managed to prevent structural damage to the dams, and to minimise damage from flooding to people and infrastructure throughout the entire river system.

4.2.4 Community liaison, support and partnerships

River and Catchment Liaison and Land Drainage Subcommittees

The purpose of these subcommittees is to provide the primary connection between river and catchment management work and local communities. Liaison with subcommittees is regular and ongoing. Maintenance of strong working relationships with communities is critical to effective river and catchment management, and therefore hazard management.

Site-specific community hazard response support

Environment Waikato works directly with communities to resolve site-specific hazard issues following hazard events. Examples include the Thames Coast communities of Tararu, Te Puru, Waiomu, Tapu and Coromandel following the 'weather bomb' of July 2002, Lake Taupo erosion and flooding issues and coastal erosion issues through time at Buffalo Beach, Cooks Beach, Aotea and Mokau.

Partnerships

The use of community partnerships that contributes either directly or indirectly to hazard management is widespread and includes the following.

- Beachcare groups: Environment Waikato works with 16 community groups to stabilise coastal hazard areas by providing advice, educational resources, plants and equipment for dune stabilisation work for groups on both the west coast and the Coromandel Peninsula.
- Landcare groups: These are partnerships where farmers work together to take action on local environmental issues including river and stream management, riparian protection and flood protection – all of which contribute to river flood risk reduction.

4.2.5 Physical works and services

Environment Waikato undertakes considerable physical works and services that contribute significantly to hazard management outcomes within the river and catchment management work area as follows.

Soil conservation

The primary methods include tree plantings on hills and stream banks, fencing of gullies and waterways and the permanent retirement of unstable marginal land. Environment Waikato uses these methods to reduce accelerated erosion, river instability and flooding through large scale soil conservation schemes.

River management

These activities involve managing natural processes that adversely affect rivers and streams causing increased erosion and flooding, and include:

- clearing of blockages
- protecting and stabilising riverbanks and erosion control
- undertaking river training works – ensuring the flow paths of rivers are kept on course
- undertaking gravel and sand management.

Flood protection

Environment Waikato is responsible for the

provision and maintenance of the three major flood control schemes throughout the Waikato region – the Lower Waikato, Waihou and Piako schemes. The schemes include large-scale works that aim to reduce flood risks to people, property and infrastructure such as stopbanks, pump stations, floodgates and detention dams.

Pest control work programmes

These are undertaken by Environment Waikato, and also help to minimise sediment loss from catchments and reduce the impacts of flooding. The Peninsula Project is a good example of integrated management between river and catchment management and pest control. The project aims to improve the health of the environment and reduce flood risks across the Coromandel Peninsula.

4.2.6 Hazard warning and response

Flood warning and management

Environment Waikato is responsible for minimising damage by floods and employs the following warning and management methods.

- Maintenance and monitoring of regional rainfall and river flood levels via a hydrometric monitoring system.



River management works in the Tongariro River, 2005

- The provision of 24/7 Emergency Management Officers to monitor the rainfall and flood conditions, and respond to flood events as required. Examples of major responses include the 1998 Lower Waikato flood, the 2002 'weather bomb' on the Thames Coast and the February 2004 floods in the Taupo zone.

Response plans

Provision and maintenance of response plans for a variety of hazards including river flooding and lahar.

4.2.7 Public awareness and education

Regional hazards website

Environment Waikato has an extensive web presence for natural hazards. Topical pages such as the river levels and rainfall pages are among the most commonly viewed Environment Waikato web pages and add to public awareness and education about natural hazards.

Hazard-specific public information

Environment Waikato provides substantial public information related to specific hazards projects such as the Thames Coast flood summary document, the Coromandel coastal erosion summary and support for the Taupo district natural hazards map. Information relating to contributing activities is also widely available such as the river management guidelines.

Public awareness surveys

These are conducted on a regular basis by Environment Waikato, and include recognition of and preparedness for natural hazard emergencies.

4.2.8 Research support

Environment Waikato undertakes and supports research projects related to natural hazard management such as:

- Waikato River hydrology: a technical assessment of likely changes to flood flows in the Waikato River as a result of land use changes in the Upper Waikato area.
- Climate change adaptation as it relates to increased flood flows and sea-level rise, and support for sub-regional climate change

modelling for the Thames Coromandel district.

- Support for tsunami modelling and debris flow research work in partnership with universities.
- Research on Hipaua landslide and ongoing monitoring of changes in support of Taupo District Council.

4.3 Summary of implementation methods

Section 4.2 shows that a very large amount of work is being undertaken by Environment Waikato that contributes either directly or indirectly to achieving the natural hazards objectives within the RPS.

All of the methods within the current RPS are being implemented to some extent. The majority of the natural hazard management work is being undertaken via development of policies, strategies and plans, provision of information and advice and physical works programmes. The recommendations for improving implementation are outlined in section 6.3 of this report.



5 Overview and description of natural hazards

This section provides an overview of the national and international context for natural hazard management. It also describes the regional context for hazard management, including:

- the state of natural hazards within the Waikato region
- broad trends and pressures for significant natural hazards that have occurred since 1991 when the RMA was introduced
- gaps and issues with the response methods
- overall trends for each significant natural hazard.

This section then provides an assessment of what is working and what is not, and recommendations for improvement.

5.1 Natural hazards context – international and national

Climate change and the corresponding rise in temperature and sea level is now a generally accepted concept amongst the international scientific community and governments worldwide. Globally, the number of recorded disasters has risen steadily since the 1970's and sharply since 1990, related largely to flood, cyclonic and drought hazard events⁴. The costs of global property and business interruption losses have also risen significantly since 1990, again resulting from weather and climate related hazards⁵.

At the national level, climate change will impact upon hazards – temperature, rainfall and wind are the key influences on climate related hazards. The general indications are that New Zealand could experience more climatic extremes in the future. This could include:

- more intense rainfall, and associated flooding, in most parts of New Zealand
- more frequent and more intense droughts in

eastern areas

- more damaging windstorms
- more heat waves
- increased wildfire risk in drier eastern areas⁶.

At the national level, the importance of hazard management has increased since 1991 when the RMA was introduced. There are several primary drivers for this.

Changes to legislation

The passage of the Civil Defence Emergency Management Act 2002, and the change in emphasis placed on the identification and management of risks from all hazards. The requirement to identify and manage the risks from all hazards was intended to be complementary to other hazard management policies such as the RPS, and expand upon the avoidance and mitigation approach of other statutes such as the RMA and the Soil Conservation and Rivers Control Act 1941.

The RMA amendments in 2004 and 2005, that led to a greater emphasis on climate change adaptation as well as changes that now require regional and district plans to 'give effect to' the RPS.

4 According to the United Nations International Strategy for Disaster Reduction. Figures are drawn from the number of natural disasters recorded between 1900 and 2005 in the International Emergency Disasters Database. See www.unisdr.org/disaster-statistics/introduction.htm.

5 According to Swiss Re – the world's largest reinsurer. Swiss Re recognises that the ramifications of climate change will be widespread and that climate change may accelerate the trend of rising insurance losses. See www.swissre.com/resources/b843078049b9aa88ade6ff2504c23c6a-Swiss_Re_M_Way_6_May_2008.pdf.

6 National Hazardscape Report, Officials Committee for Domestic and External Security Coordination, Department of Prime Minister and Cabinet, September 2007.



Recent hazard events and response

The 2004 flood events in Manawatu-Wanganui and the Bay of Plenty highlighted river flooding as an issue of national importance. The 2004 flood events led to the central government review of flood risk management including the development of a National Policy Statement for flood risk management, and the development of a New Zealand Standard for managing flood risk⁷. The 2004 South-east Asian tsunami similarly raised awareness and led to significant work within government. The successful response to the Eastern Ruapehu lahar and extensive planning for a potential human pandemic are other examples of the increasing importance of hazard management.

Increasing costs to government from recent events

This refers particularly to river flooding in areas that remain prone to ongoing hazards.

Increasing public and media interest in hazard events

This applies to both national and international media and perceptions about how the response was handled. This was highlighted in 2005 by the perceived poor response from New Zealand to a tsunami threat from the Solomon Islands.

A lack of integration at the national level

The production of the National Hazardscape Report by the Department of Prime Minister and Cabinet illustrates recent moves towards improving integration.

A perceived lack of Civil Defence Emergency Management capability and capacity

A wide-ranging review of the Ministry of Civil Defence Emergency Management in 2006 resulted in a restructure of the Ministry, a doubling of staff capacity and much closer integration with the Department of Internal Affairs.

5.2 Natural hazards – regional context

To varying extents, the Waikato region is subject to the same national and international issues and trends as outlined above. Like any region within New Zealand, the regional issues and trends influence the importance or otherwise of the broader context and trends.

Similar to the national picture, the importance of effective hazard management within the region has increased since the RPS was developed. The key emerging hazard management issues⁸ and trends within the region are:

- population growth and increased pressure for development, particularly in hazard prone areas in the Thames Coromandel, Hauraki, Waikato and Taupo districts
- land use changes including increased pressure for development of hazard-prone land and large-scale catchment changes such as the deforestation of the Upper Waikato catchment
- increasing importance of river flood risk management and the need for a comprehensive and integrated approach to management
- growing public awareness of and expectations for improved risk reduction and emergency management response, and linkages to broader community outcomes
- an increasing focus on the prioritisation and management of significant hazard risks as a result of the CDEMG plan
- climate change impacts on existing hazards and requirements for adaptation to the effects of climate change (increased frequency and intensity of storm events)
- increasing expectations for robust hazard information from both local communities and central government.

5.3 Significant hazard risks within the Waikato region

The following hazards have been identified in the current Waikato CDEMG plan that was approved in May 2005 (refer to section 4.2.1). The CDEMG plan identified significant hazard risks to the region following an extensive hazard and risk

⁷ Developed by a stakeholder working group including local government, central Government, utilities and river management professionals.

⁸ See Overview of Regional Hazards and Emergency Management Group of Activities, Report to Catchment Services Committee, 15 November 2007



assessment that covered the entire region.

The only natural hazard risks of significance not explicitly identified by the CDEMG plan are coastal erosion and flooding, and this is due to the relatively low risks to human life and safety from these hazards. Coastal erosion and flooding have therefore been added to this section of the report due to their regional significance, widespread nature and the level of work that has been undertaken by Environment Waikato.

5.3.1 River flooding hazards

5.3.1.1 State, pressures and trends

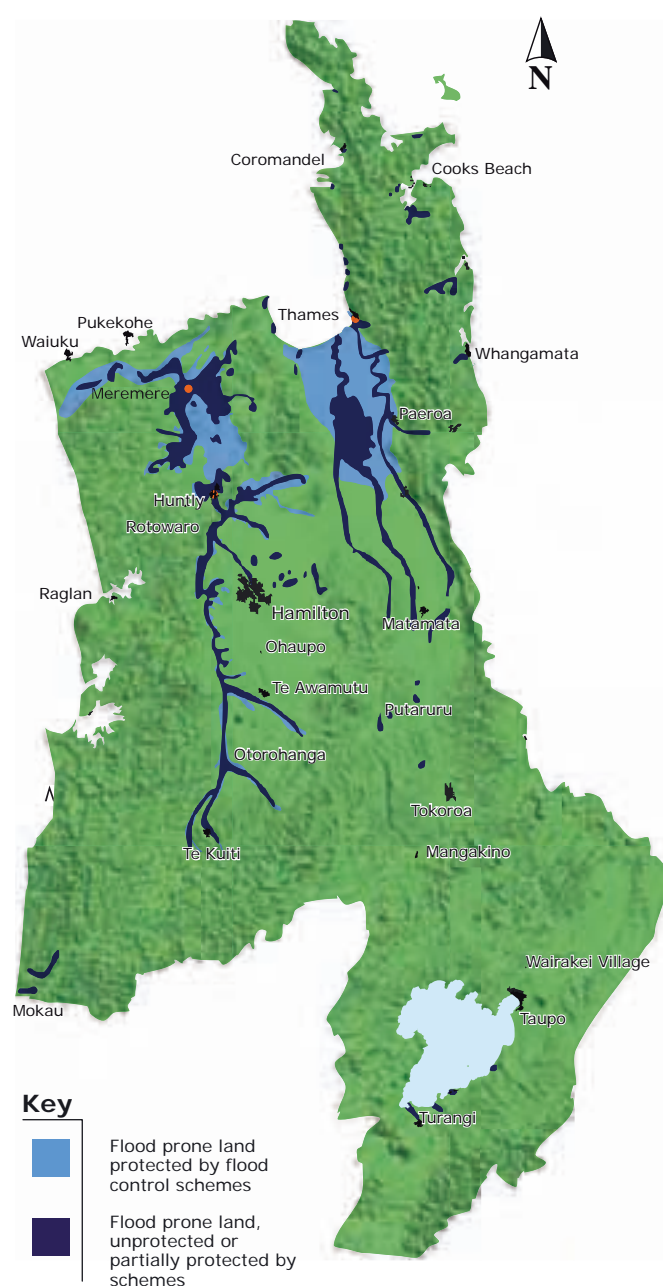
The Waikato region has 20 major rivers and over 1,400 streams, which means flooding is a major natural hazard within the region. Frequent, heavy rain and the steep gradient of many rivers means the region is prone to flooding from severe weather patterns, especially tropical cyclones and depressions⁹.

The topography and geology within the region makes it highly susceptible to the impacts of heavy rainfall events and the subsequent impacts of high intensity floods and river levels. River flooding is therefore the most frequent and widespread natural hazard within the region.

Over the last 30 years, many floods have been recorded that have impacted both rural and urban communities, the most significant of which are given below:

- Ohinemuri River (1976)
- Ohinemuri River – Paeroa township (1981)
- Kauaeranga River – Thames (1985)
- Lower Waikato River (1995)
- Cyclone Fergus – Thames and Tairua (1997)
- Lake Taupo and tributaries, Waipa and Lower Waikato Rivers (1998)
- ‘weather bomb’ – Thames Coast (Coromandel) and South Waikato District (2002)
- Lake Taupo and tributaries and Waipa River (2004).

River flood hazards are subject to all the pressures outlined in section 5.2 – especially the impacts of more frequent and severe weather systems, population growth, pressure for development in areas prone to flood hazards and significant land use changes in the upper catchments of the Waikato River system.



River flooding hazards in the Waikato region

⁹ State of the Environment Report (1998), Environment Waikato.

Recent work on river flood trends in the region has shown a rapid increase in development proposals within flood hazard areas over the past five years¹⁰. Anecdotal evidence suggests that the overall level of risk in the region is rising despite the large amount of mitigation work undertaken by Environment Waikato and other organisations.

5.3.1.2 Environment Waikato response methods

Environment Waikato uses almost all of the response methods outlined within the RPS as follows.

Development of regional hazard management policies, strategies and plans

- regional plan (to a very limited extent)
- development of the Flood Risk Mitigation Plan
- LTCCP
- CDEMG plan
- draft river flood risk management strategy
- site-specific hazard mitigation plans
- River and Catchment Services Zone Management Plans
- input into sustainable development initiatives.

Provision of information, advice and advocacy

- regional-scale flood hazard information
- development of detailed site-specific and flood hazard-specific information
- advocacy on hazards identification, assessment and policy development for key stakeholders such as central government, territorial authorities and the Waikato CDEMG
- proactive advice to all key stakeholders.

Regulatory mechanisms

- Waikato Regional Plan
- statutory processes advocacy

- occasional use of formal legal processes including the Environment Court
- Waikato River High Flow Management Plan.

Community liaison, support and partnerships

- River and Catchment Liaison and Land Drainage Subcommittees
- site-specific community hazard response support
- partnerships with key stakeholders
- landcare groups.

Physical works

- soil conservation – management of numerous schemes with a total land retirement of more than 11,000 ha
- river management – keeping channels clear
- flood protection – minimising damage to urban and rural communities
- pest control – contributes to catchment stability.

Hazard warning and response

- flood warning and management
- provision and maintenance of response plans.

Public awareness and education

- regional hazards website
- public information provision
- public awareness surveys.

Research support

- Waikato River hydrology
- climate change adaptation.

The key response methods used by Environment Waikato include non-statutory policies and plans, provision of information, advice and advocacy, community liaison and support, physical works and flood warning and management.

¹⁰ Indicated by the number of consent applications for new development, intensification of existing development and an increase in the number of proposed large subdivision development areas within flood hazard areas



5.3.1.3 Gaps and issues

The key issue for river flooding hazards is that despite the amount of work undertaken to mitigate this hazard by Environment Waikato and other stakeholders, the risks to both people and property appear to be increasing through time. However, it is important to note that the range and depth of response methods utilised by Environment Waikato such as flood protection and river management works programmes have a major ongoing positive impact to the safety and protection of many communities, individuals and strategic assets.

The following gaps and issues are noted under each of the relevant response methods.

Policy

- Regional and territorial authority policies and plans do not currently provide a strong basis for land use activity decision-making within flood hazard areas.
- Non-statutory documents such as risk mitigation plans and flood management plans provide a good management framework, but are not widely utilised in RMA decision-making.
- The Waikato Regional Plan does not provide guidance with respect to land use in flood hazard areas.
- There is a lack of a clear and consistent national policy framework that supports flood hazard risk reduction.
- There is no climate change adaptation policy for the region to guide river and catchment management or territorial authority infrastructure planning.
- There is a lack of clear policy and consistent advice to territorial authorities on 'avoidance' with regard to the reestablishment of properties following hazard events.
- The links to community outcomes are poor – neither hazards nor emergency management appears in the range of regional community outcomes at present.
- While improving, the links between growth strategies and hazard management response methods are not particularly strong.
- Hazard management work priorities are sometimes not targeted at significant hazards and high population growth areas.

- The links between hazard management and river management could be improved, especially with regard to utilising risk management as a key driver for river management.
- There are poor linkages between the RMA and other key legislative drivers – the Civil Defence Emergency Management Act, the Building Act and the Soil Conservation Rivers Control Act.
- The importance of catchment management, cumulative effects and residual risk management are often not properly taken into account when RMA decisions are made.
- The Civil Defence Emergency Management Group Plan philosophy and direction on hazard reduction is not well integrated into flood hazard planning.
- There is a lack of a consistent and integrated approach to managing flood hazards across the region.

Information, advice and advocacy

- On a regional scale, there is a lack of understanding about the total amount of risk from flood hazards and the relative risks from various flood hazard areas across the region. Gaining an understanding of this is important due to the wide range of river systems across the region and differences in their characteristics and associated risks.
- There is a lack of guidance on what impacts climate change will have across the region, and no guidance on the specific actions required to avoid or mitigate the potential effects.
- District Plan reviews take a long time, and can be susceptible to ongoing delays or inaction due in part to an ongoing demand for more and/or better quality information.
- Information provided to territorial authorities is not always considered to be at a useful scale for land use planning. An example of this is the 1:50,000 scale regional flood hazard maps.
- The natural systems components of rivers are often poorly understood, including sediment transport, morphology and broad catchment trends.
- Interpretation guidance for territorial authorities on some regional information is lacking, such as the classification of river channels, ponding zones and high velocity

zones on most of the regional flood hazard maps.

- Within Environment Waikato, flood hazard information is not managed from a single source, but drawn from a variety of sources and databases.

Physical works

- River and catchment work is not always driven by 'risk management', and proposed Zone Management Plans do not place a strong emphasis on risk management at present.
- There is no comprehensive and consistent methodology for regional risk assessments, and there is no consistent basis for risk management within the physical works programmes.
- Complementary work programmes such as pest control are not always linked to hazard management outcomes.

Public education and awareness

- Flood hazard information is not always readily available to the public.
- There is no way at present to measure public awareness of or resilience to flood hazards.
- The uncertainties inherent in flood risk management are not always understood or made explicit to communities.

5.3.1.4 Summary and recommendations

River flooding is the most frequent and widespread hazard within the region, and anecdotal evidence suggests that over time, the risks from river flood hazards are increasing. The region has experienced the impacts of serious flood events over time, and the increase in hazard risks is driven by the increasing frequency and intensity of severe weather events, population growth, pressure for development in flood hazard areas and large-scale land use change.

Environment Waikato utilises a wide range of response methods for managing river flooding, and in general, has a good understanding of the hazards – especially in the major river systems, where the organisation has decades of management experience. There is little doubt that many of the response methods, and particularly the physical works, flood warning management and hazard information provision have had a significant influence of reducing risks.

In the last few years, there has been a major effort applied to setting new regional policy directions, influencing government, working alongside territorial authorities while district plan reviews are being undertaken and investing in improved information resources such as LIDAR within flood hazard areas.

It is recommended that the RPS needs to be strengthened to provide more specific guidance on how river flood hazards should be managed. This should include guidance for regional and district plans, particularly in relation to land use activities. Considerable work has been done over the past three years to develop new policy directions, and these directions should be incorporated within the statutory framework.

It is recommended that territorial authorities should take a more proactive role in limiting potential for development in areas that are subject to natural hazard risks. Growth strategies, structure plans, catchment management plans and district plan provisions should be used to direct development away from such areas.

The existing flood hazard risk mitigation plan provides good coverage of the issues and options for flood hazard risk management. It provides guidance on issues such as incorporating climate change assumptions, reestablishment of development in hazard areas, incorporating links to sustainable development strategies, linking the various statutory drivers and providing linkages to community outcomes. This guidance material should be used as a basis for the RPS review.

From an information perspective, there is a clear need to assess regional flood risks and develop a standard means of assessing risk. Without this step, monitoring and measurement of trends and outcomes will be problematic. An assessment of regional risks will also help with prioritisation for risk management, and enable work priorities to be driven to a greater extent by objective costs and benefits.

Information development should generally be targeted at high population growth and high risk areas as a matter of priority, and where possible





should be aligned to broader strategic initiatives such as growth strategies. It is recommended that increasing our understanding of natural systems, and in particular sediment transport and catchment land use trends be given a high priority. There is a need to increase the accessibility of information to the regional community over time to enable greater individual and community responsibility for hazard risk avoidance.

It is recommended that physical works programmes should be underpinned by risk management principles and sustainable development, in accordance with the emerging national directions for river flood risk management.

5.3.2 Earthquake hazards

5.3.2.1 State, pressures and trends

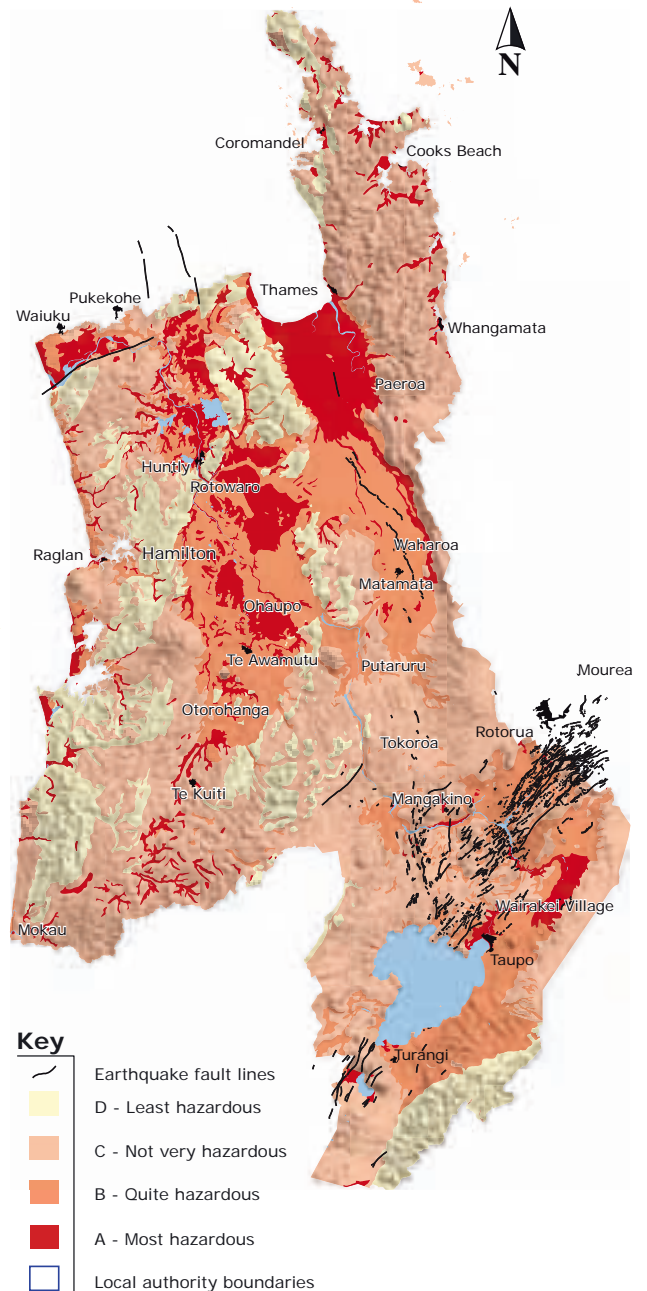
The Waikato region has many active fault lines that cause earthquakes. Hundreds of fault lines running in a north–east direction between Taupo and Rotorua, lead to high earthquake susceptibility in the southern part of the region. Fault lines also exist in the northern part of the region. The largest of these include the Kerepehi Fault on the Hauraki Plains and the Port Waikato fault near the mouth of the Waikato River¹¹.

The amount of shaking during an earthquake and the subsequent effect of that shaking depends on the geology of the area. For example, hard rock shakes less than weaker substrate in the same sized earthquake. Liquefaction, where weaker substrate can be shaken to the extent that it begins to act like a liquid, can occur in areas such as flood plains and coastal areas. Across the Waikato region, approximately 200 km of State Highways, 120 km of railways, 400 km of

stopbanks and 20 percent of the population are threatened by liquefaction in larger earthquakes¹².

The primary pressures relate to population growth and the ongoing development of land that is situated in areas close to fault lines and prone to liquefaction – mainly within historic river flood plains. Taupo and the immediate environs is a good example of such pressures – the district population having grown 70 per cent more than the regional average between 1996 and 2006¹³.

The risks from earthquake hazards are therefore directly related to the number and location



Earthquake faults and ground-shaking hazards in the Waikato region

¹¹ State of the Environment Report (1998), Environment Waikato.

¹² State of the Environment Report (1998), Environment Waikato.

¹³ Evaluation of the Waikato Regional Policy Statement, September 2007, Enfocus.

of settlements in relation to the centre of an earthquake, the construction standards of buildings and infrastructure, and the level of community resilience¹⁴.

Public expectations surrounding response management is the other pressure of key relevance to earthquake hazards, due to the fact that damage in large events is often severe.

5.3.2.2 Environment Waikato response methods

Environment Waikato uses very few response methods in relation to earthquake hazards.

Development of regional hazard management policies, strategies and plans

- earthquake risk mitigation plan
- CDEMG Plan.

Provision of information, advice and advocacy

- regional scale information
- district hazard assessments.

Public awareness and education

- regional hazards website.

5.3.2.3 Gaps and issues

The key issue is that the level of work undertaken to identify and mitigate earthquake hazard risks does not align with the level of significance in terms of regional risks¹⁵. The CDEMG Plan states that 'earthquake events continue to pose a high risk to communities in the Thames Valley and Southern Emergency Operating Areas', but there is little guidance in any current policy or plan on what further work should be undertaken.

The regional-scale consequences of major earthquakes are not well understood beyond the brief assumptions contained within the CDEMG Plan. In addition, the regional scale of earthquake information is often insufficient for land use planning purposes. Where more detailed earthquake information is available at the district

level, the information may not be linked to the CDEMG Plan or regional information database.

Notwithstanding the above, it should be noted that the Building Code under the Building Act 2004 provides a consistent baseline for design requirements to mitigate the impacts of earthquake hazards. It is possible that the apparent success of the Building Code and the relative infrequency of earthquake hazards has led to a reliance on the Building Code, and a subsequent lack of RMA planning and awareness for mitigating the effects of the wider impacts of large earthquakes.

5.3.2.4 Summary and recommendations

The Waikato region is located on the most seismically active area in New Zealand, and has significant earthquake hazards. While there is some regional-scale information on the hazards, there is little detailed understanding of the consequences and risks other than what is contained within the CDEMG Plan. It is unlikely that any of the response methods have contributed to a reduction in earthquake risks since the RPS was developed.


Public awareness of earthquake hazards is generally low, and there is no firm indication of the level of community resilience to earthquake hazards.

Successful management of earthquake hazard risks is likely to involve both emergency management and land use planning.

It is recommended that future response methods focus in the first instance on understanding the consequences and risks from earthquakes at a regional level, and developing a regional risk profile. Assessment of mitigation options and work programmes would be best undertaken collectively utilising existing hazard reduction forums such as the CDEMG.

¹⁴ State of the Environment Report (1998), Environment Waikato.

¹⁵ Earthquake hazard risks rank second and third on the list of significant hazard risks within the Civil Defence Emergency Management Group Plan (2005) – see section 4.2.1.



From a land use planning perspective, there is a policy gap at present with respect to the management of development that is on or close to active fault lines. This gap exists across New Zealand at present, with few local authorities identifying and planning for seismic hazards. Proactive earthquake hazard planning can help local authorities minimise risks, and the time it takes for individuals, communities, and the government to recover from a fault rupture¹⁶.

It is recommended that Environment Waikato consider a policy response to development on or close to high earthquake hazard risk areas (such as near active fault lines and areas susceptible to liquefaction), and that consideration be given to utilising and implementing the risk-based approach outlined within the national planning guidance available for this hazard¹⁷.

It is also recommended that a key response method that is likely to be of high value is public awareness and education. This should be targeted to particular areas based on risk and implemented locally.

5.3.3 Volcanic hazards

5.3.3.1 State, pressures and trends

The Waikato region has more volcanic hazards than any other region in New Zealand, because a large part of the Taupo Volcanic Zone lies in or near its boundaries. Volcanic hazards include ash fall, lava flows, lahars and pyroclastic flows¹⁸. As well as potentially threatening lives and property, any of these hazards may also damage the following:

- lifeline facilities, such as electricity supplies, rail networks and road access
- economy, affecting agriculture and tourist attractions, such as fishing and skiing
- air carrier network, if 'no-fly' zones are put in place¹⁹.

The region has three potentially active volcanic centres – Tongariro, Taupo and Maroa.

The Tongariro Volcanic Centre is the most frequently active, with 18 significant eruptions from Mt. Ruapehu alone since 1861, the most recent of which occurred in 1996. The hazards usually include ash fall and lahars, and are a major threat to farming, forestry, urban and rural infrastructure and tourism.

The Taupo Volcanic Centre is an area of intense rhyolitic volcanism, producing tephra (ash and pumice) rather than lava. In the past, it has produced very large eruptions that have devastated much of the Waikato region, but the chance of such eruptions occurring in the future is very low. Smaller eruptions have the potential to occur more frequently, producing widespread ash fall, floods down the Waikato River and seiching²⁰ in Lake Taupo.

The Maroa Volcanic Centre is still potentially active, but the probability of an eruption occurring there is very low.

The Waikato region is also threatened by potential volcanic eruptions from areas outside the region. This includes five active or potentially active volcanic centres located at Auckland, Mayor Island, White Island, Okataina and Taranaki²¹.

The primary pressures relate to population growth and the ongoing development of land that is situated in areas in close proximity to volcanic centres. Taupo township is the main example of such pressures. The town is situated on the edge of the largest volcanic centre in the region, has two thirds of the district's population and will account for the majority of the population growth in the district by 2050²².

16 www.mfe.govt.nz/publications/rma/planning-development-active-faults-dec04/html/page1.html.

17 Planning for Development of Land on or Close to Active Faults: A guideline to assist resource management planners in New Zealand. Ministry for the Environment, December 2004.

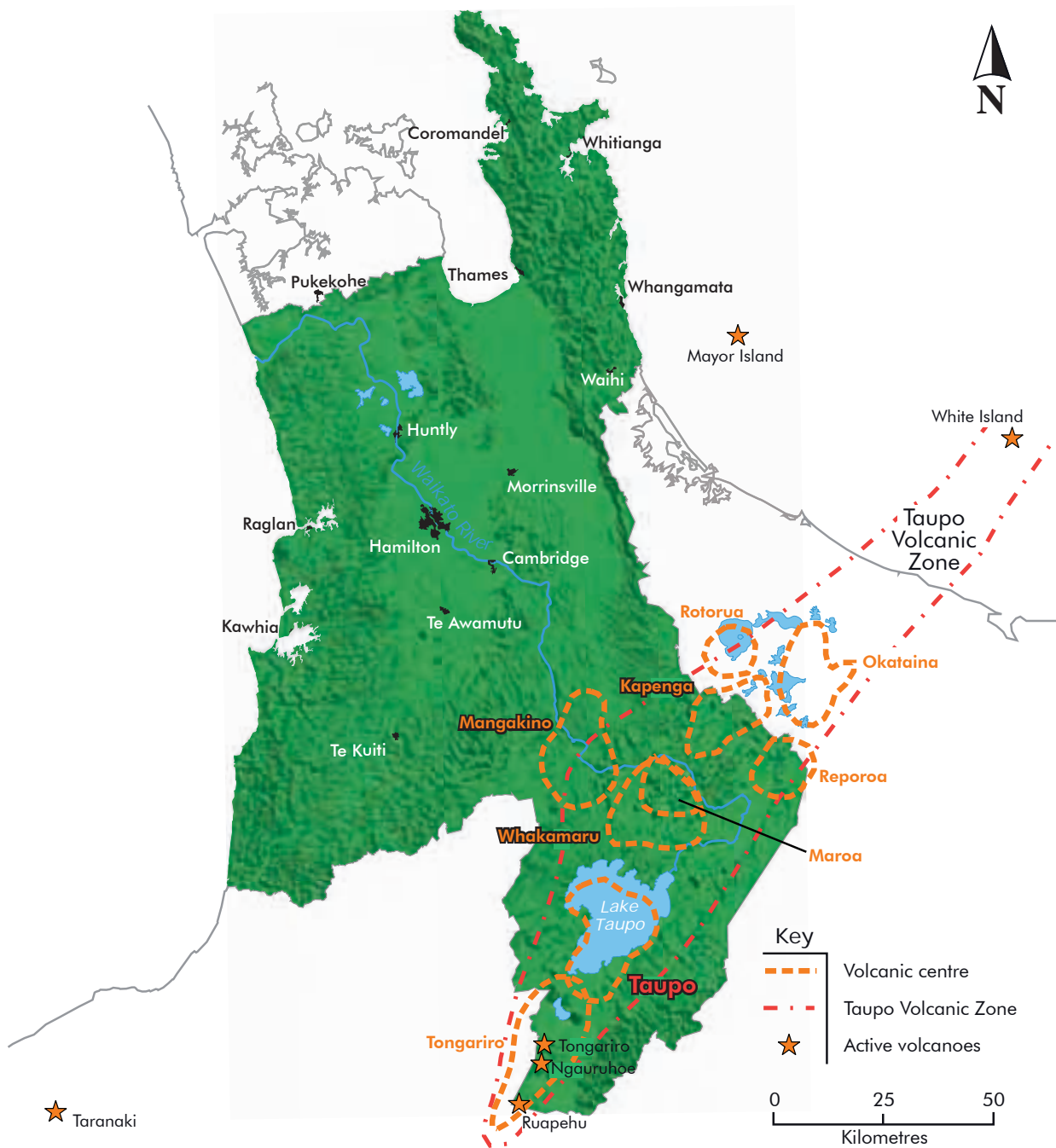
18 See www.ew.govt.nz/enviroinfo/hazards/naturalhazards/volcano/index.htm for an explanation of these terms.

19 See www.ew.govt.nz/enviroinfo/hazards/naturalhazards/volcano/index.htm.

20 A wave that oscillates in lakes, bays, or gulfs from a few minutes to a few hours as a result of seismic or atmospheric disturbances (www.answers.com/topic/seiche?cat=technology).

21 State of the Environment Report (1998), Environment Waikato.

22 See Taupo District 2050 – Growth Management Strategy www.taupodc.govt.nz/policiesplans/.



Waikato region volcanic centres

The risks from volcanic hazards are directly related to the number and location of settlements in relation to the volcanic centres – as well as the construction standards of buildings and infrastructure, and the level of community resilience²³. Public expectations surrounding response management is the other pressure of key relevance to volcanic hazards, due to the fact that damage in large events would often be widespread.

5.3.3.2 Environment Waikato response methods

Environment Waikato undertakes very few response methods in relation to volcanic hazards.

Development of regional hazard management policies, strategies and plans

- volcanic hazard risk mitigation plan
- CDEMG Plan
- Central Plateau Volcanic Advisory Group.

23 State of the Environment Report (1998), Environment Waikato.

Provision of information, advice and advocacy

- Regional scale information.

Hazard warning and response

- Lahar response planning.

Public awareness and education

- Regional hazards website.

5.3.3.3 Gaps and issues

The key issue is that while the scientific information on the frequency and severity of volcanic events is relatively good, the consequences of major volcanic eruptions are not well understood beyond the brief assumptions contained within the CDEMG plan. The level of work undertaken to identify and mitigate volcanic hazard risks does not align with the level of significance in terms of regional risks²⁴.

There is a lack of focus on the importance of some volcanic hazards. The hazards arising from the Taupo Volcanic Centre are identified as a hazard of national significance under the CDEMG plan, but this hazard was specifically excluded from the significant hazard risks within the Plan²⁵. Subsequent to the development and implementation of the CDEMG plan, there has been little progress in planning for or developing mitigation options for the consequences from this hazard.

There has been very limited use of land use provisions in district plans to manage volcanic risks since the RPS was developed. While the volcanic risk mitigation plan has a very high level of detail on response issues and actions, the guidance for land use planning is very limited.

Due to the unpredictability of volcanic hazards, one of the key mitigation mechanisms is public education and awareness that leads to community readiness. Currently, there is no consistent and reliable means of assessing community readiness or resilience to volcanic hazards.



Eruption from Mount Ruapehu, 2006.

- 24 The major volcanic risk in the region (Taupo Volcano) is not addressed within the Civil Defence Emergency Management Group Plan.
- 25 An eruption from the Taupo Volcanic Centre was deemed to be above the 'maximum credible event' level during development of the Civil Defence Emergency Management Group Plan, and therefore not included. It is highly likely that this hazard will be considered as part of the hazard risk assessment in the second generation plan.

5.3.3.4 Summary and recommendations

The Waikato region has more volcanic hazards than any other region in New Zealand. In the past, the region has been subject to the impacts of numerous, and sometimes severe volcanic events, especially from the Taupo volcanic centre.

Very few response methods are utilised, and there is limited understanding of the regional consequences and risks from volcanic hazards. Outside the Eastern Ruapehu lahar and recent Central Plateau Volcanic Advisory Group work, little has been done to reduce hazard risks through land use planning guidance.

It is recommended that future response methods focus in the first instance on understanding the consequences and risks from volcanic hazards and developing a regional risk profile. Assessment of mitigation options and work programmes would be best undertaken collectively utilising existing hazard reduction forums such as the Central Plateau Volcanic Advisory Group. Cross-regional, multi-agency forums such as this help integrate all facets of hazard risk reduction such as research, agreement on roles and responsibilities, emergency planning and public education and awareness.

It is unlikely that land use planning provisions will provide a significant benefit to the mitigation of volcanic risks within the region. This is largely due to the low level of development of areas that are highly susceptible to impacts from the most active volcano's in the region – Ruapehu and Ngaruahoe within the Tongariro Volcanic Centre. A possible exception to this is development that is directly adjacent to the Taupo Volcanic Centre. It is recommended that Environment Waikato undertake further work to develop and assess the feasibility of land use planning for volcanic hazard risks, and utilise emerging national research to inform work in this area.

A key response method that is likely to be of most value is public awareness and education. This should be targeted to particular areas based on risk and implemented locally.

5.3.4 Tsunami

5.3.4.1 State, pressures and trends

The east coast of the Waikato region is subject to tsunami risks, similar to the rest of New Zealand's eastern coastline. Studies indicate that there have been:

- seven tsunamis recorded in the past 85 years that have generated wave heights of up to 1m
- five events since ~1700 generating wave heights of 1-3m
- six events over the past 3,000 years that have generated wave heights greater than 5m²⁶.

The tsunami hazard on the east coast of the Waikato region has a regionally significant level of risk. The level of risk has been defined within the Waikato CDEMG Plan.

Local tsunami (less than one hour's warning) risk ranks as the highest single risk within the region. This is due to the high potential for death and injury – particularly over summer, in areas that are subject to high use or growth and development pressures. The level of risk within the plan also reflects the relative lack of information and warning systems available at that time (2004).

Distal tsunami (12-14 hours warning) ranks as sixth highest when compared to all other significant hazards across the region. The risks of this event are lower primarily due to the longer warning time.

Tsunami hazards are subject to similar pressures and trends to river flood hazards, but of particular note are:

- increased pressure for development and land use change in areas such as Whitianga and Whangamata, which are key growth areas and both subject to significant tsunami risks
- increasing public awareness and expectations of mitigation actions from local authorities – including the provision of hazard risk information
- the impact of sea-level rise will exacerbate the impacts of tsunami hazards in the long term.

26 Tsunami Hazard for the Bay of Plenty and Eastern Coromandel Peninsula: Stage 2 – see www.ew.govt.nz/publications/technicalreports/tr0432.htm.



Primary tsunami hazard areas in the Waikato region

5.3.4.2 Environment Waikato response methods

Environment Waikato uses the following response methods outlined within the RPS as follows

Development of regional hazard management policies, strategies and plans

- LTCCP
- CDEMG plan.

Provision of information, advice and advocacy

- regional-scale tsunami hazard information
- development of detailed site-specific and tsunami hazard-specific information
- advocacy on hazards identification, assessment and policy development for key stakeholders such as territorial authorities and the Waikato CDEMG.

Regulatory mechanisms

- Waikato Regional Coastal Plan (to a limited extent).

Community liaison, support and partnerships

- site-specific community hazard awareness and mitigation support (to a limited extent).

Public awareness and education

- regional hazards website
- public information provision.

Research support

- tsunami modelling.

5.3.4.3 Gaps and issues

The key issue is the ability to implement comprehensive and integrated community-driven mitigation actions particularly across the wide range of communities on the Coromandel east coast. This issue is strongly driven by the very high risk level of the local tsunami hazard, the ongoing growth and development within areas subject to tsunami hazards, high public expectations for action by local authorities and statutory obligations.

While there is significant work being undertaken at the national level on this hazard, there is as yet no comprehensive national guidance available on issues such as development of a national standard for warning sirens. It should be noted however that recent work on signage and tsunami evacuation planning standards goes some way towards filling this gap.

One major gap in tsunami hazard mitigation is in the area of land use planning. Virtually all of the widely employed mitigation methods are targeted specifically at the protection of human life and safety, and while this is of key concern and priority, land use issues are an important component of long-term hazard avoidance when considering future development, including the location of critical infrastructure. This is particularly the case for local tsunami hazards, where the warning time is often less than one hour.

There is a low level of knowledge about the impacts of tsunami hazards within other parts of the region – particularly the west coast.

There are no specific provisions for the mitigation of tsunami hazards within regional plans and policies, and it is unclear whether the policy framework at the national level will provide clarity on tsunami hazard management via the New Zealand Coastal Policy Statement.

5.3.4.4 Summary and recommendations

Tsunami hazards are a major potential threat to communities within the Waikato region – particularly those along the east coast of the Coromandel Peninsula. The CDEMG plan ranks the impacts of a local tsunami as the single highest risk within the region, due to the previous lack of hazard information and the relative lack of preparedness of communities at the time the plan was developed.

Significant work has been undertaken since 2002 to define the impacts of tsunami events along the east coast of the Coromandel Peninsula.

The lack of a national management framework and guidance for this hazard has not assisted mitigation progress.

It is recommended that given the current state of hazard knowledge, the focus should move towards implementation of tsunami hazard risk mitigation. It is recommended that Environment Waikato place appropriate emphasis on and provide organisational support for this work in light of its regional significance. Tsunami mitigation work should focus on comprehensive (considering all mitigation options), integrated (involving all stakeholders) and sustainable outcomes.

It is recommended that options for strengthening regional policy should be considered for tsunami hazards – particularly in relation to land use planning provisions. Land use planning provisions should address at minimum five of the seven key principles²⁷ related to land use planning when considering long-term mitigation options for tsunamis.

1. Avoid new development in tsunami run-up areas to minimize future tsunami losses (via long-term growth planning).
2. Locate and configure new development that occurs in tsunami run-up areas to minimize future tsunami losses (direction of roads, floor levels).
3. Design and construct new buildings to minimize tsunami damage (reinforced concrete foundations, use of materials that are resistant to damage).
4. Protect existing development from tsunami losses through redevelopment, retrofit, and land reuse plans and projects (retiring land, structures to slow or divert wave impacts).
5. Take special precautions in locating and designing infrastructure and critical facilities to minimize tsunami damage (such as hospitals, rest homes, emergency services and other critical infrastructure).

It is also recommended that partnerships with territorial authorities be reinforced, and public education and awareness and building upon existing community liaison work at the local level will be key implementation methods.

²⁷ Designing for Tsunamis - Seven Principles for Planning and Designing for Tsunami Hazards, National Tsunami Hazard Mitigation Program, 2001. National Oceanic and Atmospheric Administration, United States Geological Survey, Federal Emergency Management Agency, National Science Foundation, State of Alaska, State of California, State of Hawaii, State of Oregon, State of Washington.

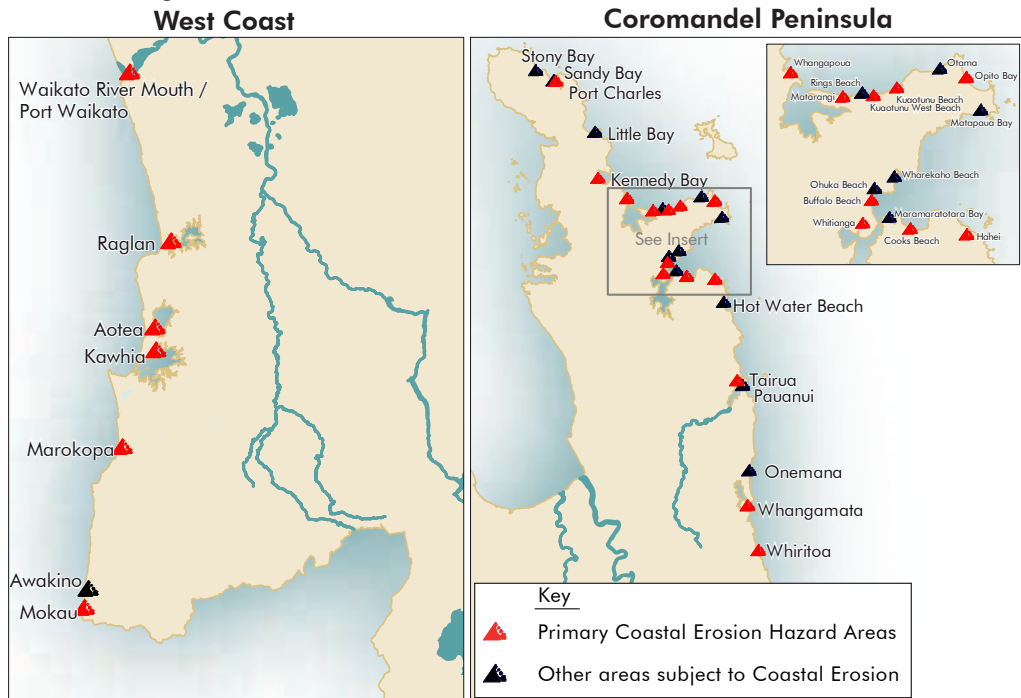


5.3.5 Coastal erosion and flooding

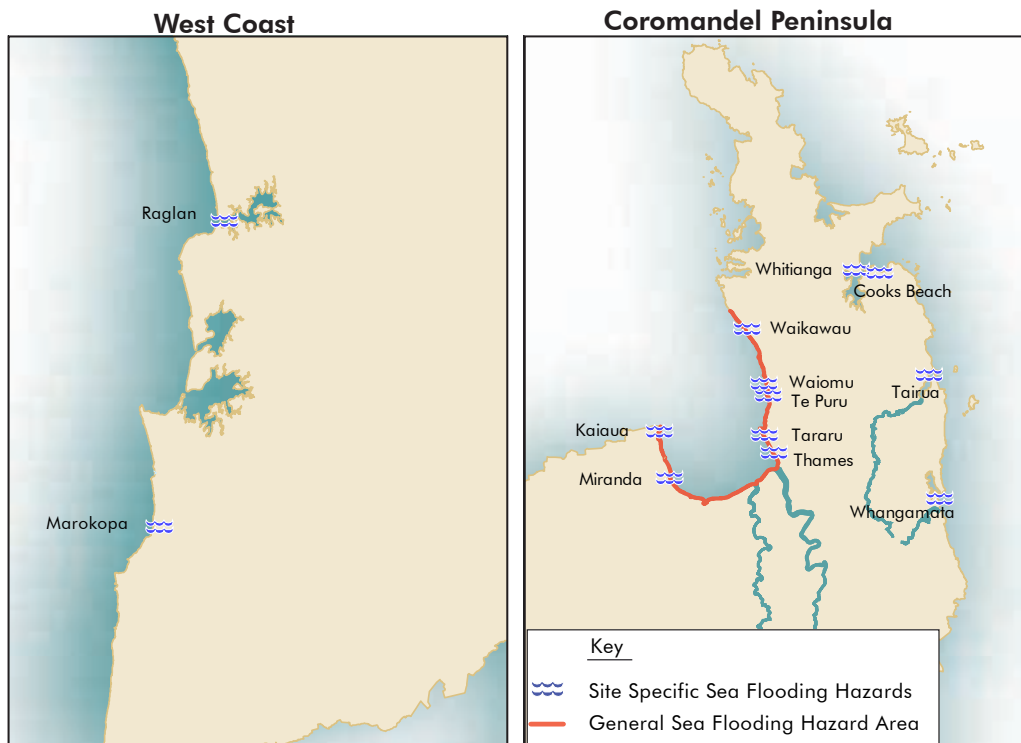
5.3.5.1 State, pressures and trends

The primary coastal hazards affecting the Waikato region (other than tsunami) are coastal erosion and flooding. Coastal erosion hazard problems are widespread, particularly along the eastern Coromandel Peninsula, the Firth of Thames and the west coast of the region.

The areas most prone to coastal flooding are the low lying areas around the Firth of Thames and some eastern Coromandel Peninsula settlements. Coastal flooding is linked to river flood levels, high tides and storm surges. In total, there are 24 settlements in the region where subdivision has extended into dynamic coastal margins, and houses are at risk in at least 13 of these settlements²⁸.



Coastal erosion hazards in the Waikato region



Coastal flooding hazards in the Waikato region

28 State of the Environment Report (1998), Environment Waikato.

Coastal hazards typically occur when subdivision and other development is placed too close to the shoreline. Coastal erosion and flooding are both natural processes – the hazards generally arise from inappropriately placed development.

The pressures and trends associated with coastal erosion and flooding have changed little since the RPS became operative. The primary pressures arise from increased development, and there are more developments within active coastal margins now than in 2000²⁹. In most coastal areas, the impacts of sea level rise will exacerbate coastal erosion and flooding hazards into the future.

5.3.5.2 Environment Waikato response methods

Environment Waikato's response methods are as follows.

Development of regional hazard management policies, strategies and plans:

- Waikato Regional Coastal Plan – numerous policies and methods
- hazard risk mitigation plans for both coastal erosion and flooding
- site-specific hazard mitigation strategies for Cooks Beach and Buffalo Beach
- coastal erosion policy options for managed retreat and emergency works.

Provision of information, advice and advocacy:

- regional-scale information provision
- detailed site-specific and hazard-specific information – Coromandel coastal hazard setback recommendations³⁰.

Regulatory mechanisms:

- Waikato Regional Coastal Plan provisions
- resource consent conditions
- statutory processes advocacy.

Community liaison, support and partnerships:

- Site-specific community hazard response support for Cooks Beach, Buffalo Beach, Aotea and Mokau
- Beachcare groups.



Coastal erosion at Aotea on the west coast, 2002

Public awareness and education:

- Regional hazards website.

5.3.5.3 Gaps and issues

The key issues involve the ongoing trends of increasing risk from coastal erosion and flooding hazards, combined with a lack of implementation of land use planning tools. Since the RPS came into effect, there are more structures in the coastal marine area, an increase in new development and increased intensification of existing development within areas that are subject to these hazards.

The provisions within the Regional Coastal Plan and the non-statutory hazard risk mitigation plans do not appear to have made a significant difference to mitigating coastal erosion and flooding hazards. Site-specific work with communities that have significant coastal erosion

²⁹ Evaluation of the Waikato Regional Policy Statement, September 2007, Enfocus.

³⁰ Coromandel Beaches: Coastal Hazards and Development Setback Recommendations Summary Report, 2002 – see www.ew.govt.nz/enviroinfo/hazards/naturalhazards/coastal/summary.htm.



issues does not appear to have greatly influenced the outcomes since the RMA came into effect in 1991. Examples of this include Buffalo Beach and Cooks Beach on the Coromandel Peninsula, and Aotea and Mokau on the west coast. Despite this, site-specific work where dune restoration and enhancement has been undertaken, has contributed to risk reduction.

The focus of some policy development work such as the options for managed retreat has been largely reactive and has questionable value in influencing the achievement of RPS outcomes.

5.3.5.4 Summary and recommendations

Coastal erosion and flooding pressures and hazard risks have increased since the development of the RPS. Environment Waikato utilises a number of methods to seek coastal erosion and flooding hazard reduction. These methods are mainly community liaison, and where significant issues exist, provision of information and advice and regulatory mechanisms. Despite this involvement, the primary contributors to coastal erosion and flooding hazard risks are currently land use decisions taken at the territorial authority level.

It is recommended that Environment Waikato continue its information provision and advisory role, but revisit and clarify the purpose for its involvement in the management of chronic site-specific erosion hazards. Currently, it is unclear whether Environment Waikato becomes involved in these site-specific coastal erosion issues for hazard mitigation purposes or for the protection of natural character and public access. Clarification of the grounds for involvement would enable the response methods to be reviewed, clarified and amended as required.

It is anticipated that the New Zealand Coastal Policy Statement will provide further policy guidance in this area, and that the following directions will guide land use planning provisions within the RPS:

- integration of policy and implementation across mean high water springs

- assessment and consideration of the cost of loss of public access and amenity versus the cost to property owners
- avoidance of development or redevelopment that increases the risks from coastal erosion and flooding
- further provision for the protection or restoration of natural features in the coastal environment that protect land uses from coastal hazards
- promotion of alternatives to hard protection structures in response to coastal hazard risks.

It is recommended that greater emphasis be placed on more proactive planning measures via growth strategies, structure plans and district plan provisions, and that the RPS strongly drive these requirements.

It is also recommended that greater proactive efforts be applied to marginal coastal erosion areas (those that have not yet become significant but have the potential to do so) by the increased use of dune restoration and other community initiatives. Regional policies should become more enabling for desirable proactive mitigation measures, and less enabling for individual landowners where chronic, significant erosion issues have occurred.

5.3.6 Other hazards – severe storm, drought, landslides, geothermal ground and subsidence

5.3.6.1 State, pressures and trends

Centred around 38 degrees south, the region is exposed to prevailing west and southwest winds from the Tasman Sea, and has an average annual rainfall of 1,250mm. Heavy rainfall, high winds and storm surges are the primary impacts from severe weather patterns, especially tropical cyclones and depressions. Rainfall in cyclones can reach 300 to 400 mm in 24 hours – cyclones Fergus and Drena demonstrated the cyclonic hazard in 1996/97³¹. Severe storms contribute to the impacts of hazards such as river flooding, coastal erosion and flooding and landslides.

31 State of the Environment Report (1998), Environment Waikato.

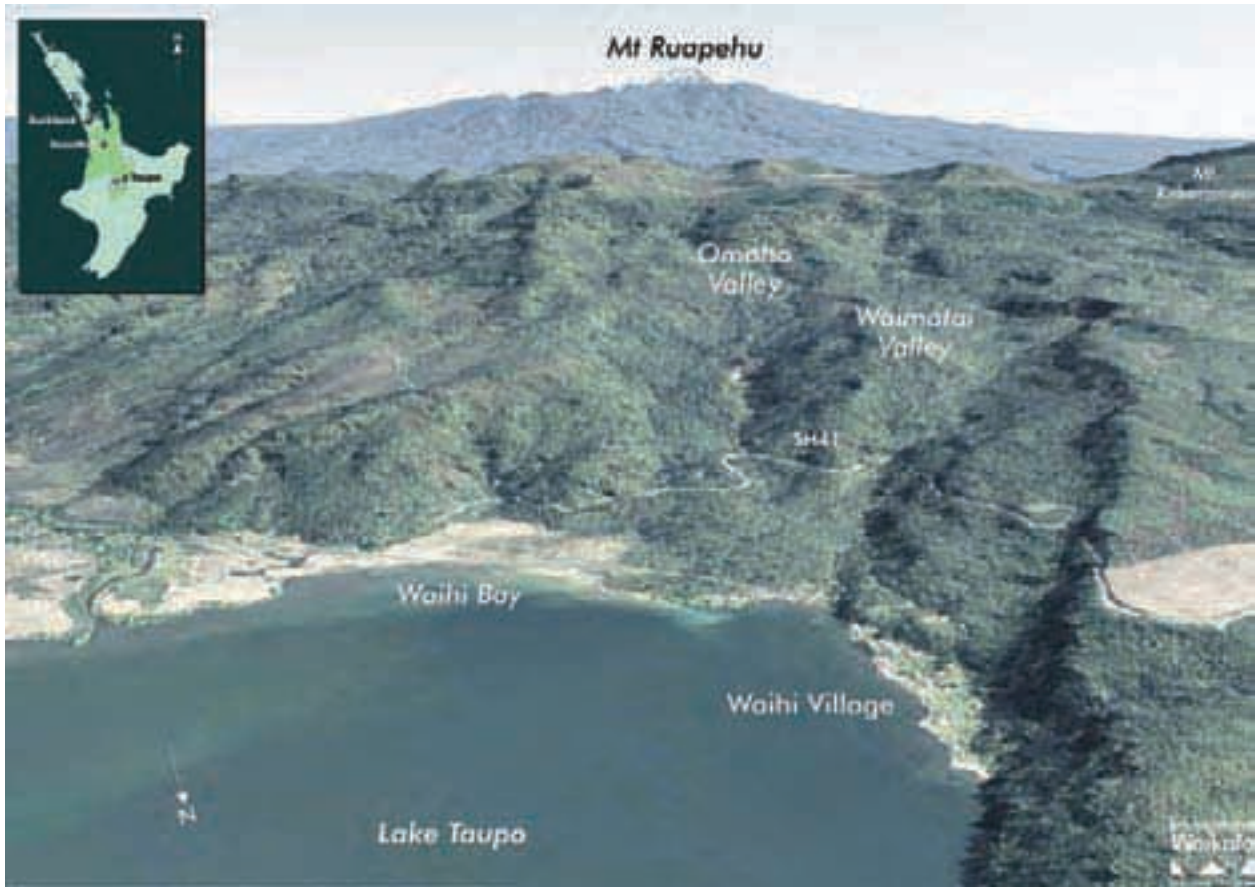


Image of Hipaua (Little Waihi) landslide in Taupo district

The Waikato region does not normally experience the extremes of water shortage that occur in the historically recognised 'drought' areas of New Zealand such as Central Otago, East Cape and Marlborough³² However, recent weather patterns in early 2008 led to extreme water shortage having significant impacts on both rural and urban communities, with associated significant economic impacts.

Landslide hazards are widespread throughout the region, with 43 per cent of the land within the region classified as being at high risk from erosion³³. Areas particularly prone to landslides include the west coast south of Port Waikato, the King Country, the western side of the Coromandel and Kaimai ranges, and numerous other hill country districts. Two areas are of particular concern.

1. The Hipaua (Little Waihi) landslide on the south-western edge of Lake Taupo, where there have been several major landslides that have claimed dozens of lives over the past 150 years, and where the land continues to be unstable.

2. The western side of the Coromandel and Kaimai Ranges, which are prone to significant debris flow events that are on a similar scale to that experienced in the Bay of Plenty at Matata in 2005.

The Waikato region contains almost 80 per cent of New Zealand's geothermal areas, and these areas contain natural hazards such as hot springs, boiling mud pools, subsidence, unstable ground and the potential for hydrothermal eruptions³⁴. A geothermal area at Hipaua is a significant contributor to the landslide hazard.

Subsidence is not widespread throughout the region, but is occasionally an issue in the Waitomo district, around geothermal areas in the Taupo district, and in the Waikato and Hauraki districts as a result of mining activities.

5.3.6.2 Environment Waikato response methods

Environment Waikato undertakes the following response methods outlined within the RPS as follows.

³² State of the Environment Report (1998), Environment Waikato.

³³ See www.ew.govt.nz/enviroinfo/land/erosion/index.htm.

³⁴ See www.ew.govt.nz/enviroinfo/hazards/naturalhazards/geothermal.htm.

Development of regional hazard management policies, strategies and plans:

- water shortage (drought) hazard risk mitigation plan
- LTCCP.

Provision of information, advice and advocacy:

- regional-scale information
- support for development of site-specific information for landslide hazards at Hipaua and Karaka Stream in Thames
- advocacy on hazards identification and assessment for territorial authorities.

Regulatory mechanisms:

- Waikato Regional Plan (to a limited extent for land instability)
- resource consent conditions related primarily to land instability.

Community liaison, support and partnerships:

- rural drought support and liaison forum.

Physical works:

- soil conservation
- pest control.

Public awareness and education:

- regional hazards website.

Research support:

- support for debris flow research.

5.3.6.3 Gaps and issues

This group of hazards generally do not cause significant widespread damage to the region. Where severe storms do create significant and widespread effects, these effects are often dealt with via methods for dealing with river flooding and coastal erosion and flooding. However, an exception to this is the impacts of high winds that cause widespread damage, such as those experienced in the Thames-Coromandel and Hauraki districts in July 2007.

There is often a lack of specific information on these other hazards.

The water shortage mitigation plan has remained unutilised since it was produced in 2000, and the mitigation actions proposed are often response oriented and reactive.

Land subsidence in Taupo has been a significant land use issue for Taupo District Council.

In some known hazard areas such as Hipaua, there has been no reduction in existing levels of risk despite clear evidence of large potential impacts. It should be noted however that district plan rules have prevented further significant development within this hazard area. Some potentially significant 'companion hazards' may not be recognised, such as the potential for seiching³⁵ on Lake Taupo following a large scale Hipaua landslide.

It is probable that there is a low level of public awareness and preparedness for all these types of hazards.

5.3.6.4 Summary and recommendations

The Waikato region is subject to a wide range of natural hazards that while not commonly regarded as being significant, can have significant widespread or localised effects. Generally, knowledge and understanding of these hazards is low.

It is recommended that further targeted information development be undertaken for known hazards such as wind and debris flows. This work may be complemented by other work streams such as understanding more about the

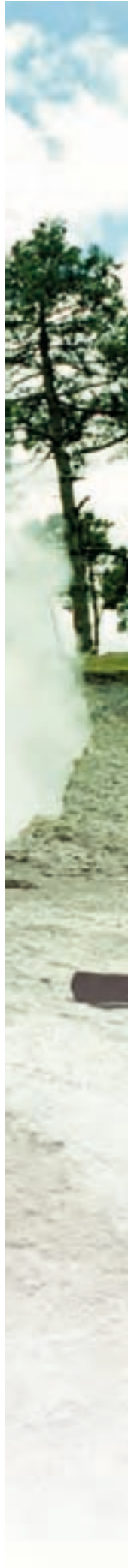
35 A wave that oscillates in lakes, bays, or gulfs from a few minutes to a few hours as a result of seismic or atmospheric disturbances (www.answers.com/topic/seiche?cat=technology).

frequency and intensity of severe storms. Existing regional landslide information should be made more readily available.

There are likely to be opportunities to align landslide and debris flow work with river flood management work in the context of understanding natural river and catchment systems, and opportunities to further align landslide and debris flow work alongside pest control and catchment management.

The potential for and importance of land use planning responses to these hazards is unclear, but there is likely potential for debris flows, significant landslides, geothermal ground and subsidence. It is recommended that Environment Waikato undertake further work to develop and assess the feasibility of land use planning for these hazard risks, and utilise emerging national research to inform work in this area.

It is also recommended that in the absence of specific information, land use decisions be precautionary, and that targeted public awareness and education based on local hazards be utilised to greater extent than at present.





6 Conclusions, observations and recommendations

6.1 Have the objectives been achieved?

As stated earlier in this section, the RPS objectives for natural hazards are as follows.

1. The roles of all relevant agencies for the management of natural hazards in the Waikato region clearly identified and their responsibilities consistently implemented (objective 3.8.3).
2. The adverse effects associated with natural hazards minimised, the resilience of the community and public awareness of the causes and potential effects of natural hazards events increased (objective 3.8.4).
3. Preservation of the natural character of the coastal environment, including the physical and ecological processes which ensure its dynamic stability (objective 3.5.4, and supported by a coastal hazards policy).

In general, the extent to which these objectives have been achieved is unclear. Despite this, there is evidence of progress towards achieving all three objectives, and it is likely that all three have been achieved in part. The key difficulty with assessing the extent to which the objectives have been achieved is the lack of consistent monitoring and evaluation of baseline and ongoing trends. Without this, an objective assessment of risk reduction is very difficult to undertake.

The following comments summarise the findings of this report in terms of each of these objectives in turn.

1. The roles of all relevant agencies for the management of natural hazards in the Waikato region clearly identified and their responsibilities consistently implemented (objective 3.8.3).

With respect to identifying roles clearly, the roles and responsibilities of Environment Waikato and territorial authorities are well covered by this objective, and in general, the 12 territorial authorities in the region are clear about their roles and responsibilities at a strategic level. The objective has therefore largely been achieved for both regional and territorial authorities at the strategic level. While there are many examples of successful projects such as the Thames Coast flood hazards and Lake Taupo foreshore erosion and flooding, there continues to be reluctance by some territorial authorities to control land use for hazard risk management purposes.

It is less likely that other agencies with hazard management responsibilities are as well informed by this objective. Network utility operators (Lifelines utilities) are generally well aware of their responsibilities, but this is likely to be driven more by requirements under the Civil Defence Emergency Management Act 2002 with respect to resilience requirements. Lifelines utilities usually become engaged in site-specific and hazard specific work under ongoing work streams such as the river and catchment management programmes – the Thames Coast flood hazards and Lake Taupo foreshore erosion and flooding work are two such examples. It is unlikely that other organisations with hazard management responsibilities such as government departments and emergency services are engaged as a result of this objective. The roles and responsibilities of tangata whenua have not been clarified.

With respect to implementing responsibilities consistently, the objectives have been achieved in part. The following observations are made on the implementation methods relating to Policy one:

- Environment Waikato has developed objectives, policies and, with respect to activities such as earthworks, structures in water bodies and discharges to land, rules for the avoidance or mitigation of natural

hazards. Environment Waikato has also taken the lead role in information collection, development and provision to territorial authorities – particularly for river flooding hazards. Six hazard risk mitigation plans have been produced and in some cases implemented, and recent regional guidance has been provided for river flood risk management. Risks from natural hazards have been prioritised, but due to the CDEMG plan rather than the RPS. It is noted that Environment Waikato no longer has a direct, individual response role for regional natural hazard events, except for river flooding, and the direct responsibility now lies with the Waikato CDEMG. The input into environmental education initiatives for natural hazard management has been low.

- Territorial authorities have developed some objectives, policies and rules within district plans, implemented relevant hazard-specific mitigation plans and provided site-specific hazard information to local communities. Territorial authorities have also worked in partnership with Environment Waikato on public education and awareness projects related to natural hazards and have responded to events in partnership with Environment Waikato. Despite this, the effectiveness and efficiency of implementation at the district level is unclear. The inclusion of effective district plan provisions is often hampered by long timeframes for district plan reviews and the perceived need for further information to be provided by Environment Waikato.
- The integration of other agencies into hazard management issues has generally been poor. The best examples of integration are the Waikato Engineering Lifelines Group involving regional utilities and the Central Plateau Volcanic Advisory Group for other regions, local utilities, territorial authorities, research providers, central government agencies and emergency services. Both of these groups have evolved as a primary result of the Civil Defence Emergency Management Act 2002.
- The level of implementation of local authority roles and responsibilities into plans and partnership agreements is unclear, and is assumed to be low.

In summary, this objective has been achieved in part. The environmental results anticipated appear to have been achieved in part, but a significant part of this achievement is due to other mechanisms such as existing river and catchment programmes and the Waikato CDEMG.

2. The adverse effects associated with natural hazards minimised, the resilience of the community and public awareness of the causes and potential effects of natural hazards events increased (objective 3.8.4).

With respect to minimising adverse effects associated with natural hazards, it is almost certain that this objective has not been met. The main reason for this is related to land use planning – new development and intensification of existing development is continuing to occur in hazard prone areas.

It is currently difficult to objectively judge the rate at which the risks from hazards are increasing across the region. There is no comprehensive baseline risk assessment for any natural hazard within the region, and consequently, no way of quantifying changes through time. As previously mentioned in this section, anecdotal evidence points to an increase in hazard risks across the region due primarily to population growth, land use change and the increasing frequency and intensity of severe weather events.

Notwithstanding the above comments, it is very likely that the adverse effects of some hazards have been and continue to be mitigated by the work of Environment Waikato. There is little doubt that river flood risks are mitigated on an ongoing basis – particularly by the physical works programmes, flood warning management, hazard information provision to territorial authorities and community-based programmes such as Beachcare. Mitigation is also apparent for other hazards such as lahar and tsunami. In addition, the work of territorial authorities and other agencies has assisted in the mitigation of a wide range of hazards, whether by physical works programmes, policy development or public awareness and education initiatives.





The objective appears to have been largely unsuccessful in promoting the avoidance of hazards through district plans. This is particularly apparent with river flooding, where there has been an ongoing and increasing trend to develop within river flood plains. This trend applies to both flood plains where there is no existing development, and the intensification of existing development areas which are protected by flood protection structures and schemes. The current policy framework appears to promote mitigation as the preferred option by default, even where the nature of the hazard is little understood.

With respect to increasing the resilience of the community and public awareness, it is unclear whether this has been achieved. Currently there is no monitoring of community awareness of natural hazards and preparedness other than the three-yearly public awareness surveys. The results of this survey have proved inconclusive over time, and there has been no ongoing monitoring of community preparedness or resilience by the Waikato CDEMG since its inception in May 2003. There is also a general lack of understanding of implementation and action by communities, even when the community awareness of the hazard is known to be increasing.

In summary, the environmental results anticipated by this objective have not been met, with the exception of some reduction of hazard risks via mitigation mechanisms primarily related to river flooding. It is unclear whether there has been reduced damage and disruption to communities as a result of the RPS, but it is likely that most 'reduction' would have arisen from mechanisms other than the RPS.

3. Preservation of the natural character of the coastal environment, including the physical and ecological processes which ensure its dynamic stability.

It is unclear whether this objective has been achieved. It is noted that the specific policy relating to natural hazards is only one contributor to achieving this objective. Despite this, the trends within the coastal environment since the RPS was developed have been increasing pressure for subdivision, increased usage of hard engineering structures and decreased preservation of natural character.

Despite the above, work such as the Beachcare programme and coastal hazard setback recommendations have almost certainly contributed to hazard risk mitigation, and consequently contributed to a degree of achievement of the objective. The focus and drivers for work on coastal erosion and flooding remains unclear, and there is little evidence that the policy framework has been successful in dealing with severe site-specific coastal erosion issues.

6.2 Comments and recommendations with respect to policy development

There have been significant changes in the approach to the management of natural hazards since the development of the RPS, and there is a need to improve the RPS provisions. The following comments and recommendations therefore seek to provide guidance for the development of natural hazards provisions within the second generation RPS in both general and hazard-specific terms.

6.2.1 General policy development comments and recommendations

The following recommendations are made with respect to policy development for natural hazard management.

- The second generation RPS should be focussed on risk reduction as the key objective or outcome. This emphasis will update and align the direction of the RPS with current and anticipated future approaches to hazard management at both the local, regional and national levels. The key drivers for risk reduction are the directives of the Civil Defence Emergency Management Act – this has changed from response-oriented to include a strong emphasis on hazard risk identification and management as part of the comprehensive approach to emergency management.
- There should be consideration of the 'all-hazards' approach, that has developed as a result of the Civil Defence Emergency Management Act 2002, being recognised



within the RPS. The introduction of an all-hazards approach to civil defence emergency management has broadened the scope of hazard management within local authorities well beyond natural hazards, to include biological hazards such as animal epidemic and human pandemic, and technological hazards such as electricity failure.

- Policies should reflect the adoption of a risk management process as the basis for hazard management. Risk management is a well known process, and involves the identification, assessment, evaluation, treatment and monitoring/evaluation of hazards. While this process is implicit within the current RPS, it should be explicitly stated. This will align the RPS with national developments and best practice. A risk management process will clarify the relative importance of hazards and help provide clearer management guidance.
- There should be better integration of Resource Management Act 1991 (RMA) planning with the hazard management policies, plans and strategies. This relates both to the integration of the RPS with District Plans, and with other key hazard management statutory drivers such as the Civil Defence Emergency Management Act 2002, the Building Act 2004, the Soil Conservation and Rivers Control Act 1941 and the Local Government Act 2002.
- Hazard management policies should be complementary to and closely aligned with regional and local sustainable development strategies.
- Policy directives should give priority to 'avoidance' of hazard risks. Mitigation should be regarded as a secondary priority if avoidance cannot reasonably and realistically be achieved over a long timeframe.
- Strong emphasis should be placed on establishing a regional risk baseline. The significance of this is that without such an assessment, monitoring and evaluation of progress will be difficult to achieve. This is fundamental to achieving effective assessments of environmental results.
- The primary reliance for achieving hazard risk reduction should be on stronger land use planning provisions. Non-statutory mechanisms should be improved to provide better guidance on how to achieve favourable hazard management outcomes within the stronger land use planning framework.
- Further clarification and updating of roles and responsibilities is needed, with a greater emphasis placed on integrating other stakeholders in addition to Environment Waikato and territorial authorities.
- A greater emphasis should be placed on climate change as a key driver for hazard risk management. Since the RMA Amendment Act 2004 and the inclusion of specific requirements for adaptation to climate change, the importance of understanding and managing the effects of this issue has greatly increased. Environment Waikato should develop an adaptation policy for climate change, and underpin this policy with a regional assessment of the likely impacts on all significant natural hazards.
- More focus and effort should be applied to public education and awareness where risk reduction programmes and results have proved successful, such as the Beachcare programme. Measurement of community resilience and preparedness should be included within the monitoring and evaluation programme.
- Methods should be updated within the RPS to reflect the new roles specified for both regional councils and territorial authorities within the Waikato CDEMG plan. This would ensure consistency and integration across the RMA and the Civil Defence Emergency Management Act.
- A stronger RPS framework for implementing the actions contained within the draft river flood risk management strategy should be developed. In addition to providing strategic direction, the strategy is very action-oriented, and outlines actions for both Environment Waikato and key stakeholders that will lead to comprehensive and integrated management.



6.2.2 Hazard-specific policy comments and recommendations

While the comments above relate to all natural hazards within the RMA, the analysis within this report points towards specific policy gaps and recommendations for individual hazards as follows:

6.2.2.1 River flooding hazards

- Stronger and more directive policy provisions are required within the RPS to better reflect national directions. The role of the regional plan should be reconsidered as a stronger method for assisting with the management of this hazard.
- The forthcoming National Policy Statement and New Zealand Standard for flood risk management should provide clear guidance on specific issues to be addressed such as recognising and incorporating natural systems components, understanding social systems, dealing with cumulative effects and residual risk management. As a consequence, further work on specific implementation guidance will be required.
- The draft River Flood Risk Management Strategy should be used as the basis for the development of second generation RPS and plan provisions. This strategy outlines principles, expected outcomes, goals and implementation methods for comprehensive and integrated management.
- The RPS should provide clarity on 'bottom-lines' or best practice for managing this hazard. The development of stronger provisions and clear guidance is justified due to the widespread and frequent nature of this hazard, land use changes, the large and increasing involvement in river and catchment management and the huge costs for Environment Waikato associated with retrospective flood management once development has become established.

6.2.2.2 Earthquake hazards

There is currently a policy gap for managing this hazard relating to the management of development that is on or close to high earthquake hazard risk areas such as active fault lines and areas prone to liquefaction. However, it is recommended that Environment Waikato consider a policy response to development on or close to active fault lines, and that consideration be given to utilising and implementing the risk-based approach outlined within the national planning guidance³⁶ available for this hazard.

6.2.2.3 Volcanic hazards

It is unlikely that land use planning provisions will provide a significant benefit to the mitigation of volcanic risks within the region. It is recommended that Environment Waikato undertake further work to develop and assess the feasibility of land use planning for volcanic hazard risks, and utilise emerging national research to inform work in this area.

6.2.2.4 Tsunami

There is currently a policy gap for managing this hazard. It is recommended that options for strengthening regional policy should be considered for tsunami hazards – particularly in relation to land use planning provisions. Land use planning provisions should address at minimum five of the seven key principles³⁷ related to land use planning when considering long-term mitigation options for tsunamis (refer to section 5.3.4.4 for a list of these principles).

³⁶ Planning for Development of Land on or Close to Active Faults: A guideline to assist resource management planners in New Zealand. Ministry for the Environment, December 2004.

³⁷ Designing for Tsunamis – Seven Principles for Planning and Designing for Tsunami Hazards, National Tsunami Hazard Mitigation Program, 2001. National Oceanic and Atmospheric Administration, United States Geological Survey, Federal Emergency Management Agency, National Science Foundation, State of Alaska, State of California, State of Hawaii, State of Oregon, State of Washington.

6.2.2.5 Coastal erosion and Flooding

The existing policies within the RPS and National Coastal Policy Statement provide a robust framework and direction for managing these hazards. Despite this, it is recommended that greater emphasis be placed on more proactive planning measures via growth strategies, structure plans and district plan provisions, and that the second generation RPS strongly drives these requirements.

6.2.2.6 Other hazards – severe storm, drought, landslides, geothermal ground and subsidence

The potential for and importance of land use planning responses to other hazards, such as debris flows, landslides, geothermal ground and subsidence, is unclear. It is recommended that Environment Waikato undertake further work to develop and assess the feasibility of land use planning for these hazard risks, and utilise emerging national research to inform work in this area.

6.3 Comments and recommendations with respect to policy implementation

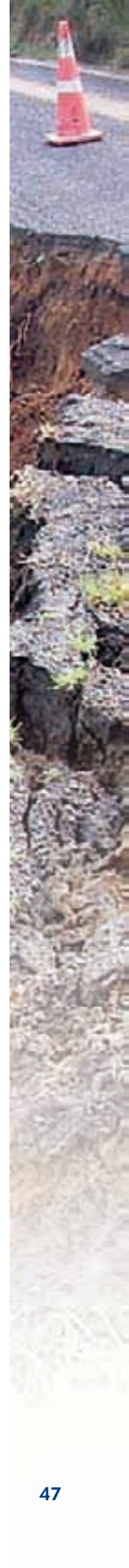
There have been significant changes in the approach to the management of natural hazards since the development of the RPS, and there is a corresponding need to improve on implementation methods outlined within section 4.2 of this report. The following comments and recommendations therefore seek to provide guidance for implementation of natural hazard provisions within the second generation RPS.

It is recommended that Environment Waikato undertake the following courses of action.

- Continue its national policy development and advice role with central government, and within other national forums. Where possible, this involvement should expand across the national hazard management arena. The organisation has been successful in working

at the national level with respect to flood risk management over the past three years, and will benefit from having influenced and shaped the forthcoming national guidance.

- Proactively align hazard management work programmes with Environment Waikato's growth management projects and other territorial authority strategies such as growth strategies and structure plans. Involvement in all facets of local hazard management is essential to achieving risk management of natural hazards.
- Promote cross-regional and cross-district hazard management initiatives, especially where a common hazardscape exists such as the central North Island volcanic and east coast tsunami hazards. This not only provides benefits in cost-sharing, but promotes comprehensive and integrated management for wider outcomes such as emergency planning and response.
- Utilise the Waikato CDEMG as the key forum for achieving the integration of regional risk management. While the current focus of the CDEMG is on readiness and response, a draft regional hazard risk management programme has also been developed. The CDEMG should be better utilised as a link to territorial authorities, to support hazard management under the RMA. Utilising this forum may help to overcome the current lack of consistency in hazard management implementation among territorial authorities.
- Establish strategic directions for the management of all significant natural hazards as a part of development of the 2009/19 LTCCP. The strategic direction for river flood risk management as part of the 2006/16 LTCCP has been enduring, and far greater implementation clarity will arise from developing strategic directions for other significant natural hazards.
- Update and reframe the purpose, intent and expected outcomes of the current hazard risk mitigation plans and strategies. The plans and strategies are the key implementation mechanisms within the RPS to manage the risks associated with natural hazards. The current plans are out of date, lack consistency and contain a mixture of general information, response options, policy and implementation guidance. The recommended role for future





hazard mitigation plans and strategies is guidance for comprehensive and integrated management. It is anticipated that hazard mitigation plans and strategies will capture strategic direction at the hazard-specific level, and provide implementation guidance for the directions arising from the RPS, LTCCP, CDEMG plan, regional hazard risk management programme and other strategic guidance documents.

- Establish a regional risk assessment and baseline that underlies all hazard management work. This reflects the national move to a risk management basis for hazard management.
- Prioritise hazard work based on the regional risk assessment and baseline. This applies to work across the significant natural hazards, and also within hazards such as river flooding, where priorities should be influenced by the risk level and potential growth of the risks. The outcome of clear prioritisation is more transparency and agreement on priorities.
- Focus on improving the value and understanding of existing information, and align the focus of new information development to territorial authority priorities and work programmes where possible. In addition, Environment Waikato should clarify the extent to which it will provide detailed hazard information to territorial authorities and other regional stakeholders.
- Align river and catchment management with hazard management work programmes. This is aimed at achieving improved alignment between river and catchment management via Zone Management Plans and the key drivers of hazard management such as new directions for flood risk management, including risk management.
- Utilise existing liaison forums to promote regional awareness of, and input into, hazard management work such as with river and catchment liaison subcommittees and Beachcare groups.
- Increase online targeted public education and awareness initiatives including:
 - updating and improving the regional hazards and emergency management website
 - providing detailed hazard information online (where available) such as regional flood hazard maps
 - improving of publicly available flood warning and management information.
- Develop and implement a monitoring and evaluation programme for assessing community resilience, and public education and awareness of hazard risks. The current monitoring mechanisms are inadequate.
- Review the role of the Waikato Engineering Lifelines Group in light of changes to the infrastructure provisions within the RMA and the CDEMG plan. There may be potential for this group to broaden its scope and relevance in light of recent changes and moves towards understanding regional risk.
- Re-evaluate the organisational approach to the management of coastal hazards and rationale for involvement in chronic site-specific issues. The implementation of solutions to chronic site-specific erosion issues needs to move beyond the approach outlined within the National Coastal Policy Statement and the RPS towards pragmatic, community-based solutions that are driven by social, cultural and economic outcomes as well as environmental outcomes.

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7.1 Planning documents reviewed

- Resource Management Act 1991 (including amendments)
- Civil Defence Emergency Management Act 2002
- Soil Conservation and Rivers Control Act 1941 (including amendments)
- Land Drainage Act 1908 (including amendments)
- Civil Defence Act 1983 (now repealed)

- Waikato Regional Policy Statement
- Waikato Regional Plan
- Waikato Regional Coastal Plan

- Waikato region Civil Defence Emergency Management Group Plan

- Franklin District Plan
- Hamilton City District Plan
- Hauraki District Plan
- Matamata-Piako District Plan
- Otorohanga District Plan
- South Waikato District Plan
- Taupo District Plan
- Thames Coromandel District Plan
- Waikato District Plan
- Waipa District Plan
- Waitomo District Plan

7.2 Key websites searched:

www.ew.govt.nz

www.mfe.govt.nz

www.civildefence.govt.nz

www.qualityplanning.org.nz

www.unisdr.org

www.swissre.com

www.qualityplanning.org.nz

www.answers.com



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