



Ministry for the
Environment
Manatū Mō Te Taiao

Meeting the Challenges of Future Flooding in New Zealand

Ministry for the Environment and
The Flood Risk Management and River Control Review Steering Group

Published in August 2008 by the
Ministry for the Environment
Manatū Mō Te Taiao
PO Box 10362, Wellington, New Zealand

ISBN: 978-0-478-33126-4

Publication number: 900

This document is available on the Ministry for the Environment's website:
www.mfe.govt.nz



Ministry for the
Environment
Manatū Mō Te Taiao

Contents

Executive Summary	v
1 Introduction	1
1.1 The Flood Risk Management Review	1
1.2 The Steering Group	1
1.3 What is flood risk management?	2
2 Flood Risk Management in New Zealand	4
2.1 Overview of current practice	4
2.2 Flood Risk Management Review findings and response	5
3 Local Government Position Statement	11
3.1 Steering Group comment	12
4 Steering Group Recommendations	14
Appendix 1: Cabinet Agreed Work Programme	18
Appendix 2: Flood Risk Management Review	20
Appendix 3: Central Government Context: Relevant Government Programmes	47

Executive Summary

Water shapes the New Zealand landscape, sustains the country's economic base, and feeds the rivers and lakes we drink from and play in, but when we have too much it poses a hazard. Flooding is part of life in New Zealand and is the country's most frequent natural hazard.

Over the years ways to manage this flood risk have been developed. After the large floods in 2004 the Government decided to review flood risk management to ensure the current framework is robust. The Ministry for the Environment led the review, and a Steering Group provided direction and guidance throughout the review.

The review covers three key topics:

- the **role(s) of central government, local government and communities** in ensuring good risk management practices are adopted in managing rivers and floods
- **funding and affordability**, essentially asking who benefits, who pays, and who can afford flood risk mitigation
- current **flood risk management practices** and whether these practices are appropriate, now and into the future, to meet the needs of New Zealanders.

This report presents the review's findings. Briefly, the review found that the current flood risk framework is not fundamentally flawed but that important issues need to be addressed. The current practices of central and local government need to improve to manage current flood risk and adapt to future climate change. Funding and affordability are very real concerns for smaller, less wealthy communities. The roles of communities, central and local government are broadly right, although central government could be more active in reducing flood risk.

Flood risk will increase with climate change. Central government currently spends most of its investment in flood risk management on the response and recovery phases. Investment in the reduction phase – to provide information, guidance and assistance, as well as resources – would help local government to more effectively manage flood risk and prepare for climate change.

The Flood Risk Management Review Steering Group included representatives from the following organisations:

Ministry of Agriculture and Forestry
Otago Regional Council
Ministry for the Environment
Department of Prime Minister and Cabinet

Department of Internal Affairs
Thames Coromandel District Council
Treasury
Ministry of Civil Defence and
Emergency Management

A vision for flood risk management in New Zealand

New Zealand needs to have the best possible flood risk management framework to minimise the distress and disruption that floods have on communities. We need to understand how the factors contributing to flood risk can best be managed by central and local government, in partnership with the community. Accordingly, the Steering Group's vision for flood risk management in New Zealand is:

Individuals, communities and New Zealand society will understand and take responsibility for actively reducing the consequences of flooding by:

- accepting that natural processes in the wider catchment determine long-term solutions
- managing our activities, lands and waters to reduce damages and losses to an acceptable level
- considering people's social, cultural, environmental and economic wellbeing
- integrating climate change and variability into decision-making.

Principles to guide future flood risk management policy

To reduce the consequences of flooding, decisions made on flood risk management need to:

- take a **long-term risk management perspective**, including climate change, residual risk¹ and having a '**no regrets**' precautionary approach to risk and uncertainty
- **respect environmental limits** and natural processes, including river and catchment processes, **and protecting the life-supporting capacity** of water, soil and ecosystems
- **integrate flood risk management with sustainable land management** and catchment management policies and decisions that affect the magnitude of flooding and/or the consequences of flooding
- consider the **consequences of flooding**, including the resilience and vulnerability of communities and infrastructure as well as the risk to life and property
- ensure **individuals and communities take primary responsibility** for their safety and livelihoods
- take a **partnership approach** with, and between, central government, local authorities, communities and Māori
- recognise that **local, regional and national perspectives** are different and may require different inputs with different goals and outcomes
- **be made at the appropriate level of government** that maximise the outcomes sought in flood risk and catchment management, and that are based on the robust evaluation of options, costs and benefits over time and across the community
- include **informed communities as part of decision-making** about levels of acceptable risk and mitigation measures for those communities
- take an **adaptive management** approach that is responsive to change over time and that optimises sustainable structural, non-structural and emergency management solutions.

¹ Residual risk is the risk that remains after an action is taken to manage that risk; for instance, the risk to a community that a stopbank is overtopped in a flood that is larger than the stopbank is designed for.

1 Introduction

Flooding is a natural process, and in New Zealand this process can be dramatic. As a group of small islands in the ‘roaring forties’, weather patterns mean that we experience high-intensity rainfall regularly. On average a major flood occurs every eight months. Climate change is likely to increase both the intensity and likelihood of rain and flooding occurring in the future.

With over a hundred cities and towns located on flood plains, New Zealand has a long history of living with floods. Making decisions on how best to protect life and property from floods has been ongoing since settlement. The challenge New Zealand now faces is how best to reduce the damages and losses from flooding as part of our everyday living and working lives.

This report has been prepared by the Ministry for the Environment and the Flood Risk Management Review Steering Group and provides recommendations on how the management of flood risk can be improved in New Zealand. The views in this report do not necessarily represent the views of individual organisations represented on the Steering Group.

1.1 The Flood Risk Management Review

New Zealand suffered major flooding in 2004, affecting the lower North Island and the Bay of Plenty. The floods led to major regional social, economic and environmental disruption, requiring substantial relief from central government. Following these events the Flood Risk Management Review and work programme was agreed, and a Steering Group was established.

The work programme (see Appendix 1) sets out 36 questions on three key topic areas:

- the **role(s) of central government, local government and communities** in ensuring good risk management practices are adopted in managing rivers and floods
- **funding and affordability**, essentially asking who benefits, who pays, and who can afford flood risk mitigation
- current **flood risk management practices** and whether these practices are appropriate, now and into the future, to meet the needs of New Zealanders.

The Flood Risk Management Review is now complete. The review focused on the processes, policies and institutional practices that influence flood risk management. In particular the review examined reduction and readiness, rather than the response and recovery aspects of flood risk management. The actual risk to each and every community within New Zealand was not examined.

The three key topic areas of roles, funding and practice are used to report the findings and recommendations of the Steering Group. A response to each of the questions in the work programme can be found in Appendix 2.

1.2 The Steering Group

The Flood Risk Management Review Steering Group’s role has been to:

- provide strategic oversight of the review

- ensure the policy and operational needs of central and local government were considered and addressed in the review work programme
- make links with other policy initiatives across government, including resource management and climate change policy implementation
- monitor the progress of the review and provide guidance, advice and direction to the programme manager and project team
- ensure appropriate people within the Steering Group's member organisations and sectors were informed of the work programme and review.

The Steering Group was convened in September 2004 and last met in July 2007. Membership of the Steering Group consisted of representatives from:

- Ministry for the Environment (Chair)
- Department of the Prime Minister and Cabinet
- Ministry of Civil Defence and Emergency Management
- Department of Internal Affairs
- Ministry of Agriculture and Forestry
- Treasury
- regional councils
- territorial authorities.

1.3 What is flood risk management?

Flood risk is a combination of the likelihood of a flood *and* the consequences (or effects) of that flood. A flood's consequences depend on how many people and assets are exposed to a flood, and how vulnerable those people and assets are to the flood. If the size or frequency of a flood increases, or the effects of a flood increase, then so too does the risk.

Weather systems, land forms, water courses, people, development and economic activity all determine flood risk. Ideally, flood risk management is responsive to local conditions, based on good information and sound decision-making by an informed community aware of the risks.

Comprehensive flood risk management, along with other hazard risk management approaches, encompasses the 4 Rs: reduction, readiness, response and recovery. Good flood risk management requires actions across the 4 Rs to be integrated to achieve the desired goal.

Flood risk management practices rarely eliminate the flood risk, but they may treat a significant component of the risk. Flooding that occurs beyond this treated component is called 'residual risk'. Where reduction and readiness fail to prevent losses during a flood, an emergency management response and post-flood recovery activities are required.

Management options to reduce flood risk include:

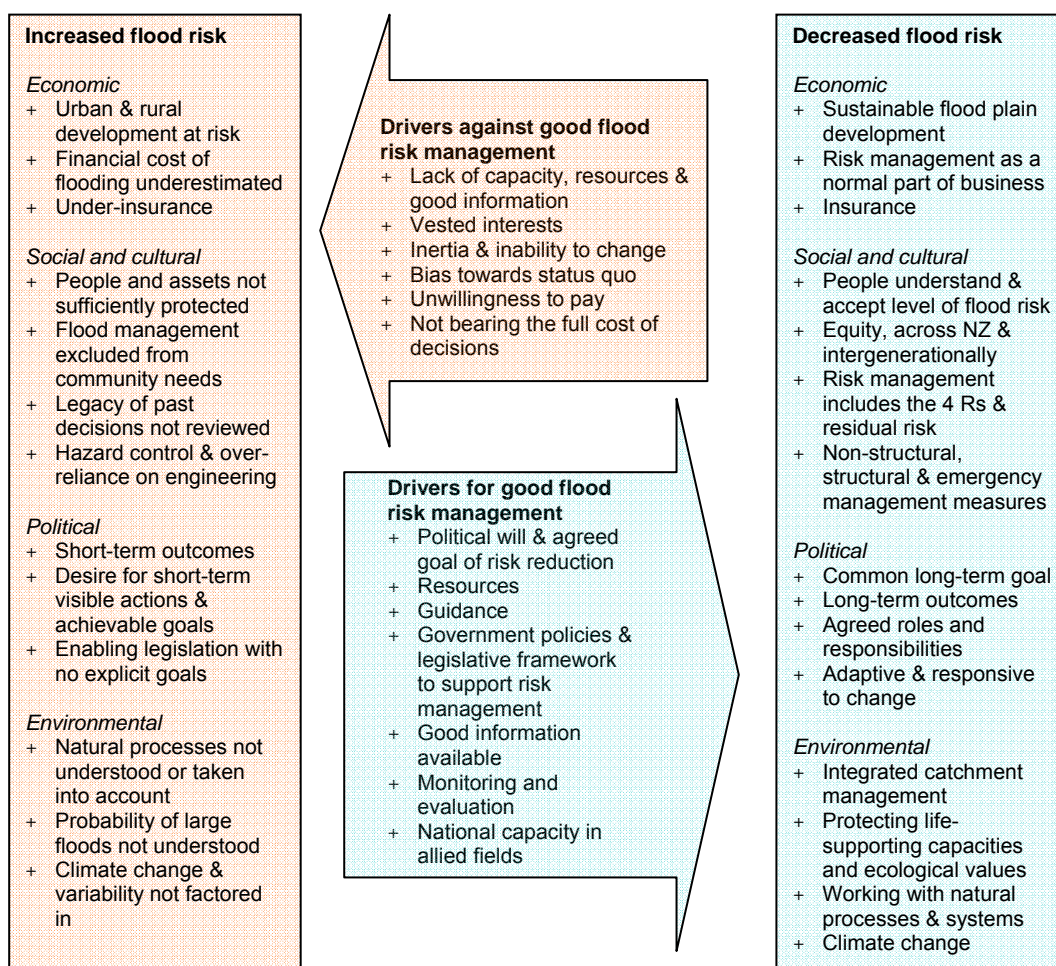
- structural measures, including stopbanks, groynes and other tools that seek to control rivers and flooding (keeping flooding away from people)
- policy and planning measures that seek to control land use and activities in areas that are subject to or contribute to flooding (keeping people away from flooding)

- emergency management planning to enable communities to respond to and recover from flooding effectively and efficiently
- designing and flood-proofing assets to withstand flooding (living with flooding).

Often a mixture of options is used to manage flood risk in an area. This means using measures to control flooding, as well as managing people and assets to reduce a community’s vulnerability to flooding. Decisions are often made within a political environment that seeks to balance competing needs and resources. The decisions made can affect the flood risk management outcomes in a number of ways.

To meet the challenge of future flooding and decrease the flood risk to New Zealand, the factors driving flood risk outcomes need to be addressed. The actions suggested in this report address the drivers below by improving current levels of information, guidance, resources and support, and by suggesting that the goal of reducing flood risk be adopted nationally.

Drivers of flood risk management



2 Flood Risk Management in New Zealand

2.1 Overview of current practice

Flood risk cannot be avoided in New Zealand. There will always be some risk, regardless of whether risk reduction measures are adopted or strengthened.

Flooding is New Zealand's most frequent natural hazard. Weather is the biggest contributing factor to flood risk, followed by development and population growth on flood plains. Land use and condition in the upper catchment are also important.

Flood plains are home to many of our larger towns and cities, and development continues to occur on these flood plains. Current risk management practice tends to be reliant on physical works, which may not be the best way to manage the increasing flood risk posed by climate change.

At any one time, the flood risk affecting New Zealand is much higher than the flood risk affecting individual communities. Unless a community is located in an area with more than one river, the community will only experience one large flood at a time, and often years apart. However, regionally or nationally, several floods can occur at the same time, affecting numerous communities. A flood event can also affect several catchments or regions, affecting several communities simultaneously.

Flood risk management in New Zealand has evolved over time, from ad hoc to centralised approaches last century, to the current devolved approach of management by local government. This devolved system is consistent with the Government's policy in relation to civil defence and emergency management policy: local risks are the responsibility of local authorities. Managing flood risk takes place within the wider context of emergency management and sustainability for central government, local government and communities. Appendix 3 outlines this wider context.

A suite of statutes allocate roles and responsibilities across central government, local government and communities. The Drainage Act 1908, the Soil Conservation and Rivers Control Act 1941, the Resource Management Act 1991 (RMA), the Local Government Act 2002, the Local Government (Rating) Act 2002, the Civil Defence and Emergency Management Act 2002, and the Building Act 2004 are the key Acts for managing flood risk.

Central government's current role focuses on assisting communities to prepare and recover from large events, providing local government with the necessary powers, funding the science system, and providing weather forecasts and warnings. Regional and territorial local authorities carry out the daily management and funding of flood risk management in consultation with the local community.

Local government uses a variety of methods to manage flood risk, including structural, non-structural and emergency management techniques. As part of the Flood Risk Management Review, a series of case studies was undertaken to understand how councils manage flood risk. This case study work had three important findings.

First, there is no one standard approach to managing flood risk, which makes comparison across the country difficult. The mix of tools reflects the local contexts and can be quite different in different areas. This can be both a weakness and a strength. Some councils have better resources, including information and funding, to achieve robust flood risk management that is responsive to the local conditions. Other councils experience difficulties.

Secondly, most of our larger cities and towns are protected by physical works, which work well up to the point they are designed for. Beyond this point, emergency management is the most often cited response to a larger flood. However, the age of some structures means that in some cases the reliability of the structures is unknown, but works are being maintained and often upgraded.

Finally, good information is critical to understanding the nature of the flood hazard and methods to manage flood risk. Good information is also crucial to withstand scrutiny in planning processes, including developing and implementing plans as well as assessing development proposals.

2.2 Flood Risk Management Review findings and response

2.2.1 Overall findings

The Flood Risk Management Review work programme has been completed by the Ministry for the Environment, and the detailed findings of the review are presented in Appendix 2. The Steering Group considers that the current flood risk management framework is not fundamentally flawed but that there are significant issues that need to be addressed.

The current level of flood risk across New Zealand cannot be stated with any accuracy, and neither can the impact of climate change or variability be meaningfully predicted on the level of flood risk. In addition, there is no way to assess or collate comparable information around the country to make this level of analysis possible. As a result, understanding the potential flood risk requires:

- broad-scale analysis using a consistent set of parameters and approaches so flood risk can be understood across the country and hot spots identified
- understanding climate change's future effects on weather patterns in different parts of the country
- determining and accounting for uncertainty in climate change and variability, hydrological, hydraulic and economic modelling analysis.

The review findings indicate that practice is variable across the country, with larger communities being able to afford better flood risk management. In some cases this does not reflect the actual level of risk faced by communities.

Ways forward

Improvements are needed to meet the challenge of future climate change and to satisfy communities and central government that an acceptable level of risk remains. Improving practice requires the **following actions**:

- an active and engaged risk management approach by central and local government in meeting their respective roles and responsibilities
- the goal of risk reduction being embedded within the policy framework
- appropriate resources, including sufficient information, guidance and funding, being made available to promote good practice in the daily management of flood risk
- central and local government monitoring to understand the levels of flood risk and inform future policy and management practices.

Expected outcome

- **The consequences of flooding are reduced in communities and across the country.**

2.2.2 Roles and responsibility

Central government, local government, communities and individuals all have a role and a responsibility to manage and reduce flood risk.

Central government emergency management policy is that local risks are a local responsibility.² Local government manages flood risks with the local communities at risk. Communities and individuals take responsibility for looking after themselves, families and neighbours before and after a flood. The private sector is responsible for business continuity, undertaking due diligence and managing risk to employees and business.

Currently, there are two parts to central government's role. First, it has an enabling role focused on the reduction and readiness aspects of risk management. Central government ensures that local government has the necessary powers to manage flood risk. Funding research, providing guidance, forecasting and warnings are also part of this enabling role. Secondly, central government has a response and recovery role in helping communities to prepare and respond to emergencies. When an event occurs beyond local government's ability to cope, central government will provide assistance – primarily financial. The greatest proportion of resources is directed towards central government's response and recovery role.

Local government's roles are set in legislation and councils comply with the requirements set out in the relevant Acts. Councils are responsible for sustainably managing land and water resources for communities' wellbeing as well as emergency management. The day-to-day management and monitoring of flood risk rests with councils.

Central government has not directed flood risk management outcomes for councils. In the absence of national guidance, local government fulfils its roles and discharges its

² Part 10, 89(2) National Civil Defence Emergency Management Plan Order 2005.

responsibilities in response to local priorities. This is appropriate for managing local risk, but managing and reducing the flood risk to New Zealand is a different goal.

National flood risk is more than the sum of local risks. National risk includes multiple events occurring with greater frequency across the country and depends on councils being able to manage flood risk effectively. A council's resources and ability to manage flood risk directly influence the potential costs central government may have to meet when a flood occurs. Climate change is very likely to increase the frequency of events across the country and therefore the impact and potential costs of flooding, which represent an increase in flood risk.

Managing national risk requires managing different factors from those associated with local risk, including the increased frequency of large events across the country, monitoring, and ensuring local government can undertake its roles.

Ways forward

Central and local government roles need to be complementary to reduce flood risk, and a number of **actions** are suggested.

- Central government's current role should be extended to provide direction, assistance and guidance to local government on acceptable outcomes and ways to reduce flood risk across the country. It is then up to each council and community to determine how this can be achieved locally. Central government should also take a more active interest in reducing flood risk by remaining engaged in the flood risk management area and monitoring flood risk nationally.
- Local government's role should be aligned to the national goal of reducing risk. Local government should take responsibility for using good practice, informing communities of flood risk, and making sustainable long-term decisions a priority.

The roles below enhance and clarify current roles rather than suggest new roles.

- **Individuals, communities and the private sector** should:
 - take responsibility for their family, personal safety and the decisions they make
 - take responsibility for business decisions
 - understand their level of flood risk (including any residual risk) and accept liability for their decisions
 - be informed and active in decision-making.
- **Territorial authorities** should:
 - show leadership locally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk
 - work together with communities, iwi, regional councils, beneficiaries³ and exacerbators⁴ in decision-making and agreeing on roles
 - sustainably manage the effects of land use and people's activities to reduce the flood risk

³ Beneficiary: A party, in terms of section 101(3)(a)(ii) of the Local Government Act 2002, that benefits from flood risk management activities.

⁴ Exacerbator: A party, in terms of section 101(3)(a)(iv) of the Local Government Act 2002, that contributes to the need to undertake flood risk management activities.

- use the Building Act and Building Code as part of a comprehensive approach to risk management, including flood-proofing buildings
- manage civil defence and emergency management locally
- build stakeholders' awareness of risk.
- **Regional authorities** should:
 - show leadership regionally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk
 - work together with communities, iwi, territorial authorities, beneficiaries and exacerbators in decision-making and agreeing on roles
 - sustainably manage water and land to reduce the flood risk
 - manage civil defence and emergency management regionally
 - build stakeholders' awareness of risk.
- **Central government** should:
 - show leadership and provide clear direction on reducing flood risk
 - adopt a risk management approach nationally and work with local government
 - ensure local government and communities have the necessary powers and tools to fulfil their roles and responsibilities
 - provide forecasts, weather warnings, science and research relevant to managing flood risk
 - contribute as a beneficiary towards reducing the flood risk, and be a 'good neighbour' by taking responsibility for Crown lands and assets
 - ensure the policy of reducing the flood risk is integrated across all relevant government programmes
 - provide relief when an event has overwhelmed a community's capacity to respond and recover from a flood.

Expected outcome

- **Individuals, communities, local and central government understand their roles and work together to reduce flood risk.**

2.2.3 Funding and affordability

Greater investment is needed now to reduce the flood risk now and into the future.

Reducing the flood risk and adapting to the challenges of climate change require an extended role for central government. This will involve increased funding for central government to:

- provide direction, assistance and guidance to local government
- monitor future progress towards reducing flood risk
- take an active part in reducing overall flood risk.

Individuals and communities that benefit from flood risk management are generally paying for that benefit, but there are inconsistencies and gaps. A wider mix of funding tools could be used by local government.

Beneficiaries that do not currently pay include some central government and local government owned lands and activities. Rating exemptions mean that education and health facilities, in particular, do not contribute to the full cost of flood risk management. When beneficiaries do not pay, other funding is needed to cover the shortfall. Generally this falls on ratepayers, which results in inequity. Some communities may also settle for a higher level of flood risk than if all potential beneficiaries paid their share.

Lower-income areas and areas with a smaller rating base also experience difficulties in affording good flood risk management. Councils with better resources, including better information and funding, are more likely to achieve more robust flood risk management. This results in an equity issue, as some communities may not be able to afford an acceptable level of flood risk management. Reducing flood risk across the country requires that all councils are able to manage the flood risk effectively.

Ways forward

More resources are required to reduce flood risk. Suggested **actions** are:

- ensuring all beneficiaries pay towards the cost of flood risk management, including:
 - central government, particularly the education and health sectors
 - local government assets that benefit from protection
 - some utility providers that do not pay rates
- addressing affordability issues in low-income communities by central government providing a contestable 'safety net' funding mechanism based on affordability using a similar model to the Sanitary Water Subsidy Scheme
- local government more fully using the mix of tools provided in the Local Government (Rating) Act 2002, including increasing rates, loans and targeted rates
- central government more actively funding science, research, guidance and forecasting systems to enable local government to achieve good practice.

Expected outcomes

- **Resources applied to flood risk management reflect the benefits received.**
- **Communities live with a level of flood risk that is acceptable and affordable to the community and New Zealand in the long term.**

2.2.4 Future flood risk management practice

Current flood risk management practice will need to improve to meet the challenges of increasing flood risk.

Flood risk management practice is variable across the country, and central government policy has focused on responding to and recovering from flooding. The Steering Group believes this situation needs to change. Local and central government need to ensure future actions are

complementary to achieve risk reduction. Integration is required across all levels of decision-making affecting flood risk management. If flood risk management is not improved, future generations may become more vulnerable, greater losses from flooding may occur, and greater spending will be required to respond to and recover from floods.

There is no comparable baseline information around the country, nor are there standard definitions of risk or methods to assess risk. Flood risk management is often restricted to areas of historical flooding rather than the risk being managed over a district or region. There is ongoing pressure to develop land, and development is still occurring in flood plains. In addition, there is a lack of good information on the economic, environmental and other applied aspects of flood risk management. Practitioners are looking for practical guidance and ways to benchmark performance.

Ways forward

Local government must have the resources, tools and information necessary to adopt good practice and ensure flood risk management is sustainable in the long term, particularly in relation to future climate change impacts.

Central government needs to understand and monitor flood risk across the country to effectively manage the risk to New Zealand, to ensure that local government is able to effectively manage local flood risk. Providing information on a national basis – including warnings, forecasts, climate change predictions and good practice guidance – is required.

Future practice will be improved by the following **actions**:

- individuals, communities, business, and local and central government adopting a risk management approach that is integrated across the 4 Rs
- central government enhancing its risk reduction role to show leadership, by:
 - strengthening the policy framework to enable flood risk to be reduced
 - providing clear guidance on flood risk assessment and good practice
 - producing better information on flood frequency estimates, climate change predictions, weather warnings and flood forecasts across the country
 - ensuring local government has the necessary tools and resources to adopt good practice
- local government adopting the latest good practice, as well as acknowledging and actively managing residual risk
- ongoing monitoring and dialogue between local and central government to ensure progress towards reducing the flood risk
- completing and implementing a national policy statement on flood risk management, and a New Zealand Standard to improve practice, as agreed by government.

Expected outcome

- **All communities and levels of government are able to make sustainable long-term decisions based on the best available information to reduce flood risk.**

3 Local Government Position Statement

The Local Government New Zealand Regional Affairs Sub-Committee on Flooding has developed a position statement on flood risk management for the Government. The position statement acknowledges that local government largely has the statutory tools necessary to achieve effective flood management, but notes that there is inconsistent implementation of those tools across the country. The position statement identifies solutions to improve flood risk management practice, and many of the solutions require central government action.

Local government's aim for flood risk management is:

Sustainable river and catchment management that achieves the particular level of flood hazard protection desired and accepted by each distinct community of interest, with residual risks fully understood and taken into account.

This aim acknowledges that communities and individuals must be responsible for deciding on their particular level of flood protection. It also recognises that a one-size-fits-all approach to flood management is unrealistic.

Local government acknowledges that residual risks could remain at a 'higher than desirable' level where the community decides, for affordability and other reasons, to accept a lower level of protection. Dealing with this residual risk will need to be addressed at the district or regional level.

The position statement outlines the following solutions that central government could address in a non-prescriptive and process-oriented national policy statement:

- make flood management a matter of national importance
- facilitate holistic catchment management that integrates flooding from all sources and the impacts of catchment land use
- require community-scale assessments of flood hazard risks to be undertaken in a nationally consistent manner, with appropriate avoidance and mitigation strategies being developed by local government for each community of interest
- include the impacts of climate change in flood hazard risks assessments
- require disclosure of residual risk to communities
- proactively plan for and manage residual risk and its consequences
- overtly consider the merits of relocation or staged retreat as opposed to the re-establishment of infrastructure, buildings and other assets
- require preference to be given to flood hazard avoidance in RMA documents
- balance private property rights with public interest matters in high flood-risk areas
- remove the presumption that former NWASCO⁵ and current Building Act flood protection standards are always appropriate values to use

⁵ National Water and Soil Conservation Organisation.

- require infrastructure to cater for known flood hazard risks and avoid exacerbating those risks
- require all Crown agencies and other national bodies to have an objective to reduce the impact of their activities on the flood risk in local catchments.

The position statement suggests that solutions for local government to implement are to:

- consistently implement hazard avoidance provisions in RMA documents
- undertake a better review of and develop a better response to land-use intensification.

The position statement also identifies other critical barriers outside a national policy statement. Local government suggests that solutions could be provided by central government to:

- provide funding assistance to under-resourced councils to boost their institutional capacity
- provide funding in recognition of the national interest nature of, and national benefit provided by, some flood management activities
- facilitate the training of flood management practitioners
- provide safety net funding to at-risk communities for flood avoidance, protection or warning systems
- properly consider the true cost of responding to flood events when assessing appropriate responses, and recognise who actually pays for remediation
- allow Crown land to be rated (or payments to be made in lieu of rates) in the same manner as private land for flood management purposes
- have the Crown and its agencies acknowledge their responsibilities as infrastructure owners, land owners and 'good neighbours'
- acknowledge that some infrastructure, buildings and other assets are simply located in inappropriate and high-risk floodable areas
- make the necessary hard decisions on asset relocation
- provide statutory tools to enable councils to require the relocation or retreat of infrastructure, buildings and other assets from high flood risk areas
- provide clear policies which persuade individuals to exercise self-responsibility regarding residual flood hazard risk
- require Crown agencies and other national bodies to contribute to flood avoidance or mitigation measures where they have an adverse impact on those measures or receive benefits from them.

3.1 Steering Group comment

The Steering Group supports the local government position statement in principle, with the following caveats.

- Balancing private property rights and public interests is complex and will need careful analysis before agreement can be reached on solutions.
- Further work on potential tools for councils to require the retreat of assets from high-risk areas is needed.

- All stakeholders, including central government agencies, should be required to reduce their impact on local flood risk equitably. How central government achieves this across the range of agencies affected requires further work.
- A separate funding mechanism recognising national benefit does not sit comfortably within the funding actions suggested by this report or the wider principles of current funding practices, because there may be duplication. However, this does not preclude applications being made on a case-by-case basis.

4 Steering Group Recommendations

The Steering Group has considered the findings from the Flood Risk Management Review and the group's recommendations are given below. The recommendations are set in the wider context of local and central government policy on sustainability and climate change.

Flooding will always be a part of living in New Zealand, and decisions will need to be made continually on the best ways to manage the flood risk in response to the weather and people's expectations. The challenge New Zealand faces now is how best to reduce the damages and losses from flooding as part of our everyday living and working lives.

Vision and decision-making principles

1. **The Steering Group notes** the findings from the Flood Risk Management Review, as set out in Appendix 2.
2. **The Steering Group suggests** the following vision to reduce the flood risk in New Zealand should be adopted by the Government:

Individuals, communities and New Zealand society will understand and take responsibility for actively reducing the consequences of flooding by:

- accepting that natural processes in the wider catchment determine long-term solutions
 - managing our activities, lands and waters to reduce damages and losses to an acceptable level
 - considering people's social, cultural, environmental and economic wellbeing
 - integrating climate change and variability into decision-making.
3. **The Steering Group suggests** that the following decision-making principles to reduce flood risk be adopted by central government to support the above vision. Decisions need to:
 - take a **long-term risk management perspective**, including climate change, residual risk⁶ and having a '**no regrets**' precautionary approach to risk and uncertainty
 - **respect environmental limits** and natural processes, including river and catchment processes, **and protecting the life-supporting capacity** of water, soil and ecosystems
 - **integrate flood risk management with sustainable land management** and catchment management policies and decisions that affect the magnitude of flooding and/or the consequences of flooding
 - consider the **consequences of flooding**, including the resilience and vulnerability of communities and infrastructure as well as the risk to life and property

⁶ Residual risk is the risk that remains after an action is taken to manage that risk; for instance, the risk to a community that a stopbank is overtopped in a flood that is larger than the stopbank is designed for.

- ensure individuals and communities take primary responsibility for their safety and livelihoods
- take a **partnership approach** with, and between, central government, local authorities, communities and Māori
- recognise that **local, regional and national perspectives** are different and may require different inputs with different goals and outcomes
- **make decisions at the appropriate level of government** that maximise the outcomes sought in flood risk and catchment management, and that are based on the robust evaluation of options, costs and benefits over time and across the community
- include **informed communities as part of decision-making** about levels of acceptable risk and mitigation measures for those communities
- use **adaptive management** that is responsive to change over time and that optimises sustainable structural, non-structural and emergency management solutions.

Roles and responsibilities

4. The Steering Group recommends the following community, local government and central government roles should be adopted to reduce the flood risk.

- Individuals, communities and the private sector should:
 - take responsibility for their family, personal safety, and the decisions they make
 - take responsibility for business decisions
 - understand their level of flood risk (including any residual risk) and accept liability for their decisions
 - be informed and active in decision-making.
- Territorial authorities should:
 - show leadership locally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk
 - work together with communities, iwi, regional councils, beneficiaries and exacerbators in decision-making and agreeing on roles
 - sustainably manage the effects of land use and people’s activities to reduce the flood risk
 - use the Building Act and Building Code as part of a comprehensive approach to risk management, including flood-proofing buildings
 - manage civil defence and emergency management locally
 - build stakeholders’ awareness of risk.
- Regional authorities should:
 - show leadership regionally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk
 - work together with communities, iwi, territorial authorities, beneficiaries and exacerbators in decision-making and agreeing on roles

- sustainably manage water and land to reduce the flood risk
- manage civil defence and emergency management regionally
- build stakeholders' awareness of risk.
- Central government should:
 - show leadership and provide clear direction on reducing flood risk
 - adopt a risk management approach nationally and work with local government
 - ensure local government and communities have the necessary powers and tools to fulfil their roles and responsibilities
 - provide forecasts, weather warnings, science and research relevant to managing flood risk
 - contribute as a beneficiary towards reducing the flood risk, and be a 'good neighbour' by taking responsibility for Crown lands and assets
 - ensure that the policy of reducing the flood risk is integrated across all relevant government programmes
 - provide relief when an event has overwhelmed a community's capacity to respond and recover from a flood.

Funding and affordability

5. **The Steering Group suggests** a contestable safety net mechanism based on affordability should be provided by the Government and considered in the next budget to help less well-resourced communities manage the flood risk now and into the future.
6. **The Steering Group suggests** the Ministry for the Environment should be directed to investigate if Crown contributions for rates on health and education lands are feasible, depending on the findings from the Rates Inquiry.

Future practice

7. **The Steering Group notes** the following actions agreed by Cabinet to improve future practice:
 - providing planning and technical guidance
 - investigating using 'targeted assistance' (guidance and professional help) to less well-resourced councils
 - developing a national policy statement
 - investigating updating the regional flood frequency estimates
 - supporting the draft New Zealand Protocol to become a New Zealand Standard, under the Standards Act 1988
 - developing a monitoring framework
 - setting up a central government-led forum on flood risk management to promote good practice and productive relationships between stakeholders.

8. **The Steering Group suggests** the following actions for central government to improve future practice:
- adopt a risk management approach in relevant government programmes, with the aim of reducing risk
 - provide ongoing guidance and information so local government and practitioners can make risk assessments and develop management strategies
 - provide improved guidance and information on climate change and variability, weather radar and forecasting.

Local Government Position Statement

9. **The Steering Group supports** the Local Government Position Statement in principle, as outlined in the main body of this report.

Future actions

The Steering Group suggests the Government should adopt a long-term work programme to implement policy to reduce flood risk in the long term.

The Steering Group supports local government's proposed actions to manage the flood risk and achieve the vision of reducing the flood risk in the long term by implementing hazard avoidance, training practitioners and responding to land-use change and intensification.

Appendix 1: Cabinet Agreed Work Programme

Issue	Key questions to be addressed
Current approach	
Standards of protection against flooding may not be sufficiently high in many communities.	<ol style="list-style-type: none"> 1. What are the current levels of protection against flooding for New Zealand communities, and for rural land? 2. Are those current levels of protection suitable for New Zealand? 3. To what extent do current practices deal with possible very large and damaging flood events? 4. Are current flood protection assets being appropriately maintained by regional authorities?
Risk mitigation	
Standards for river protection works are based on historical data, which in some cases is outdated and short, and may not be appropriate in a time of changing land use and climate.	<ol style="list-style-type: none"> 5. What is the flood risk in our regions given the likely consequences of landuse and climate change, especially in light of the short hydrologic records that are common in New Zealand? 6. To what extent do current works and other methods mitigate that risk? 7. What extra mitigation measures might be needed, and at what time? 8. How will any such additional mitigation measures be funded?
Present weather, rainfall and river-level recording systems could be improved.	<ol style="list-style-type: none"> 9. How can present monitoring, forecasting and warning systems be improved cost effectively?
There is a need to ensure that science programmes are meeting current needs and will meet future needs.	<ol style="list-style-type: none"> 10. Are the science needs of flood management practitioners being met by current science programmes? 11. How good is the communication between the science community, flood management practitioners and decision-makers?
Future best practice	
Current river management practice is highly reliant on physical works, and this may not be the most appropriate approach to mitigate flood risks in the future.	<ol style="list-style-type: none"> 12. To what extent are present catchment management and land management practices mitigating or exacerbating flood risk (and fiscal liability for central government)? 13. What tools do we have to mitigate flood risks, and are we using them sufficiently well? 14. What constitutes best practice for flood risk mitigation in the future in different types of rivers and streams and in different parts of a catchment? 15. What complementary practices are needed for other infrastructure (eg, bridges and culverts)? 16. How can river control be better integrated with the management of urban stream and stormwater systems? 17. How can the flood control activities of the relevant authorities involved (regional and local government, Transit NZ, Department of Conservation, Ontrack) be better integrated? 18. How do ongoing urban and rural developments interact with flood protection, and is the increasing value of assets at risk considered in flood protection decisions? 19. How can councils best be enabled and supported in factoring climate change into their flood risk mitigation works?

Issue	Key questions to be addressed
Funding and affordability	
Comprehensive flood risk mitigation may not be affordable to many communities.	<p>20. Who benefits from flood mitigation works, and so who should pay for the benefits received from flood mitigation works?</p> <p>21. Is there a role for government in funding flood mitigation programmes in poorer communities?</p>
Legislative framework	
The legislation that mandates flood risk mitigation works (the Soil Conservation and Rivers Control Act 1941) is outdated.	22. How can the legislation be improved and updated to meet modern expectations?
There are inconsistencies between different Acts (eg, the Building Act and the RMA).	<p>23. To what extent are different Acts leading to different risk mitigation outcomes?</p> <p>24. How can those inconsistencies be addressed?</p>
There are inconsistent approaches to flood plain management and control of activities on floodplains, with associated tensions between development on the one hand and regulatory control on the other.	<p>25. How effective is the legislation in allowing controls on development in hazard-prone areas?</p> <p>26. What can be done to improve the legislation and/or current practice?</p>
The pre-eminence given individual rights under various Acts makes it difficult to carry out comprehensive flood protection works.	<p>27. How difficult is it to undertake comprehensive new programmes in the current legislative environment?</p> <p>28. Do we have mechanisms to allow for the provision of 'community goods' over private rights?</p> <p>29. To what extent is the current legislative environment an impediment to comprehensive flood risk mitigation?</p>
Information transfer	
It is difficult to convey information about hazard risks to individuals and communities.	<p>30. How can information about the risks from natural hazards be better communicated?</p> <p>31. Is there a role for government in doing so?</p>
Synthesis: The role of central government, local government and communities	
The role of central government in flood risk mitigation is unclear and disjointed, and could be improved.	<p>32. What is an appropriate balance between central government, local government and the private sector (including individuals) to reduce or avoid risk?</p> <p>33. What is an appropriate future role for central government, local government and the private sector (including individuals) in flood risk mitigation?</p> <p>34. What are the risks to central government if it does or does not take a greater role in flood risk mitigation?</p> <p>35. What are the risks to local government and communities of central government taking or not taking a greater role in flood risk mitigation?</p> <p>36. Should government be prescribing and regulating for particular levels of flood risk mitigation?</p>

Appendix 2: Flood Risk Management Review

Agreed Work Programme: Summary of Findings

Introduction

This appendix presents a summary of the Ministry of Environment's findings from the Flood Risk Management Review, developed for use by the Review Steering Group in reaching its recommendations. The summary brings together key findings from the case studies and other reports commissioned as part of the Review. It is structured around answering the questions set in the Cabinet-agreed work programme for the Review (see Appendix 1). Issues identified as part of the work programme are also included.

The seven key areas are:

- current approach
- risk mitigation
- future best practice
- funding and affordability
- legislative framework
- information transfer
- synthesis.

The summary presents overviews of work undertaken and commissioned by the Ministry for the Environment. Relevant material from discussions with central government agencies, practitioners and interested people throughout the review, including at the Talk Environment Roadshow, the River Managers Group forum and Local Government New Zealand, are also incorporated. Key documents are:

- case studies of 17 councils, summary and council responses
- case studies of utility providers, summary and council responses
- *Flood Hazard Management – Infrastructure*, G & E Williams Consultants Ltd
- *Funding Roles and Responsibilities*, PS Consulting & David Hamilton & Associates
- *Key Factors Contributing to Flooding*, Opus International Consultants
- *Overview of Flood Management Legislation in New Zealand*, Johnson McSweeney Ltd
- *Science and Communication Needs of Flood Risk Practitioners*, Environmental Management Solutions
- *How Can Present Monitoring, Forecasting and Warning Systems Be Improved?* Helen Grant
- submissions related to developing a national policy statement on flood risk management
- *Natural Hazards 2006*, NIWA.

Current approach

Issue:

Standards of protection against flooding may not be sufficiently high in many communities.

1. What are the current levels of protection against flooding for New Zealand communities, and for rural land?

Levels of physical protection vary across the country, depending on past decisions, community expectations and the risk profile of each area. The current flood control schemes that provide most of the structural protection around the country were originally designed last century. Direct comparison across the country is difficult because risk can be managed in a number of ways, including structural or physical protection, as well as land use, building controls and warning systems. There are no standardised national data sets, indicators or methodologies to assess risk across the country.

Information gathered through case studies on physical protection standards showed that:

- urban areas are usually protected from at least 1 in 50-year floods from large rivers, and in many cases standards are higher than this
- in smaller urban and rural areas protection varies from a 1 in 50- to 1 in 100-year standard for residential areas, to a 1 in 20- up to a 1 in 50-year level for rural land
- stormwater systems generally aim to prevent flooding in a 1 in 10-year event but can be greater, most often to a 1 in 20-year level.

Many of the protection standards are nominal and have not been tested by recent very large floods. Also, recent flooding events have prompted re-assessments of the probability of flood events. This means the level of protection currently offered by schemes has changed from the scheme's original design. In some areas, flows are now used as a measure of a scheme's capacity rather than the annual exceedance probability, making comparison across schemes and regions difficult.

Utility providers have a range of protection standards, depending on an asset's value, location and vulnerability. Approaches are often embedded in a culture of organisational risk management that assesses risk across the organisation. Accordingly, priorities may be set nationally and differ from the priorities identified by local and regional authorities.

Internationally, determining the levels of risk nationwide is also difficult. Similar problems are encountered in Australia, the UK, Ireland and the US. In many countries understanding the national risk relies on national mapping programmes. In the UK, flood risk mapping across the country has been undertaken since the 1990s, but even so the UK government recently updated flood maps across the country at a cost of £25 million (NZ\$65 million) to provide more accurate data. In the UK it is estimated that there are 5 million people, 2 million homes and business, with assets of £250 billion (NZ\$645 billion) at risk from flooding. Annual expenditure in the 2005/06 financial year was £445 million (NZ\$1,155 million). In Ireland, national mapping has not yet been undertaken and a two-phase project to complete the mapping is estimated to cost €7.5–10 million (NZ\$13–17.5 million). The work resulted from a review in 2004 on flood risk management.

To provide a comparison, in the UK the population is approximately 60 million people, with a land area of 244,800 km². In Ireland the population is approximately 4 million people, with a land area of 70,300 km². New Zealand's population is approximately 4 million people, with a land area of 268,000 km².

However, structural measures or physical protection are only one set of tools used to manage flood risk. Accordingly, knowing the current levels of physical protection is not necessarily an adequate performance indicator for managing flood risk.

2. Are those current levels of protection suitable for New Zealand?

Without accurate measurement it is difficult to say whether these levels are suitable now or in the future. The fact that there have been few fatalities suggests that on the whole the levels have been sufficient in the past in terms of protecting individuals, but property losses and damage costs have been increasing as a result of large-scale events, and some fatalities have occurred. The 2004 North Island floods have been estimated to have cost about \$300 million, including \$190 million of central government contributions.

The unknown quantity is the sum of unrealised costs, damages or losses in productivity that have been averted as a result of past and current risk reduction measures. We also do not know the productivity gains that resulted from changes to land use in areas that were subject to more frequent flooding.

Development is continuing to occur on floodplains, and current levels of protection are unlikely to be sufficient in the future to account for climate change if the current nominal standards are not reassessed and strategies put in place to manage the risk. This could include further structural or physical protection measures, land-use and building controls, improved warning systems, and managing the retreat of assets from high-risk areas.

3. To what extent do current practices deal with possible very large and damaging flood events?

Overwhelmingly, emergency management is the primary means of planning for floods that are greater than the design standard of structural protection. Some schemes have provision for secondary overflow paths, but these are in the minority. Development patterns mean that secondary overflow paths may be difficult to 'retrofit' in highly developed areas. Residual risk is not often identified or explicitly managed. This represents a lost opportunity for further reducing the damages and losses from floods.

About half the utility providers interviewed incorporated super design flows and overflow paths into the design and location of assets. Most organisations have emergency management plans and procedures in place for large or damaging floods.

4. Are current flood protection assets being appropriately maintained by regional authorities?

Maintaining flood schemes is expensive and can be greater than the scheme's original cost, particularly over time. All councils have some form of asset management system in line with the requirements of the Local Government Act 2002. Recent audits of local government by the Office of the Auditor General have prompted a high awareness in local government of the importance of asset management. However, performance across local government is likely to be variable, reflecting the resources available to councils.

Some asset management systems are very sophisticated, others less so, often reflecting the nature of the assets at risk and the consequences of failure. For example, in terms of human safety, the consequences of flooding are greater in urban areas than in rural areas, reflecting the greater number of people at risk and greater asset value. Schemes in rural areas were established to improve the agricultural sector's productivity, protecting land and stock rather than communities.

In 2006, a Local Authority Protection Programme (LAPP) survey found that local authorities had a well-developed approach to asset identification, valuation and condition assessment, but that risk-based approaches to decision-making may need further development.

There are no uniform standards for the design, construction and maintenance of assets. LAPP found there was significant undervaluation of flood control assets after the 2004 floods. LAPP also has concerns that some local authorities are underfinanced, with inadequate funding for the restoration of assets after an event.

Risk mitigation

Issues:

Standards for river protection works are based on historical data, which in some cases is outdated and short, and may not be appropriate in a time of changing land use and climate.

Present weather, rainfall and river-level recording systems could be improved.

There is a need to ensure that science programmes are meeting current needs and will meet future needs.

5. What is the flood risk in our regions given the likely consequences of land use and climate change, especially in light of the short hydrologic records that are common in New Zealand?

The risk is highly likely to increase with climate change impacts, and past risk assessments may underestimate current risk. As noted in Question 1, comparison across the country is difficult and there are no standard methods to assess either the hazard or the risk profile of a region. There are also no standardised mapping protocols or maps across the country to provide a basis for comparison.

The International Panel on Climate Change (IPCC) Fourth Assessment Report on impacts, adaptation and vulnerability to climate change concluded with high confidence that regional climate change has already occurred, primarily an increase in rainfall in southwest New Zealand and a decrease in northwest New Zealand. Under current emissions scenarios, the IPCC expect sea-level rises of between 0.18 m and 0.59 m by 2100. Future projections indicate with virtual certainty that there will be noticeable changes in extreme events causing floods, landslides and storm surges. Floods are likely to become more frequent and intense, and western areas of New Zealand are likely to receive more rain.

Utility providers spoken to acknowledged climate change impacts and expressed a desire to incorporate their effects into flood risk management. However, many organisations felt there was a lack of information and tools to incorporate climate change into management decisions.

Recent re-evaluations by councils have shown that the actual risk from flooding over the long term is likely to have been underestimated. In part this is due to a better understanding of climatic variation, as well as having better data sets to analyse. In addition, there is no requirement to assess the extent of potential damages on a regular basis, which may lead to the risk being understated.

6. To what extent do current works and other methods mitigate that risk?

Information gathered from case studies showed that flood risk management encompasses three main integrated elements, often augmented by other measures and tools.

- Structural defences to ***keep floods away from people***. These include:
 - physical works such as stopbanks, floodgates, groynes, drains and spillways
 - channel maintenance, such as gravel extraction and vegetation clearing
 - the use of bank-edge protection, such as willows and debris fences to protect stopbanks from erosion by rivers (often the assets in the above three points are managed collectively in schemes involving beneficiaries, including landowners)
 - stormwater systems in urban and residential areas, including secondary overflow paths.
- Non-structural planning measures to control land use, development and building in flood hazard areas ***to keep people away from floods***. Tools include:
 - objectives and policies in regional policy statements and district plans
 - rules in district plans based on hazard maps, zones or registers that control development or activities in areas subject to flooding, as well as activities that could aggravate flooding
 - setting minimum flood levels under the Building Act and the RMA
 - using land information memoranda and project information memoranda to inform people of flood hazards when buying or developing property, or subdividing land
 - pre-application advice given by councils outlining any potential for flooding and the need for specific flood hazard assessments and/or mitigation measures
 - using section 106 of the RMA to refuse subdivision
 - using sections 72 and 73 of the Building Act to 'tag' a land title advising that flooding occurs, and section 71 to refuse granting a building consent.
- ***Emergency management***, including readiness and response, such as:
 - local authority Civil Defence Emergency Management Plans, which use an all hazard approach
 - specific flood management procedures, including flood warning systems, internet access to river levels, flood manuals and detailed response plans
 - mobile flood pumps and other plant to remedy flooding once it occurs.
- In addition, a range of ***other measures and tools*** are used, including:
 - designations and/or rules in plans to enable councils to undertake specific works or protect assets

- information on websites, material produced by councils about flooding, and road shows to inform people of flood risk
- discussion in long-term council community plans on flood hazards, as well as incorporating activity plans outlining councils' approaches to flood management and agreed service levels
- reports to scheme committees (land owners) about river and flood management
- ponding areas to provide storage for floodwater
- naturalising areas and using native riparian plantings to achieve better management of stormwater
- advice to landowners on flooding and mitigation options
- non-statutory catchment management plans and flood risk management strategies
- structure plans
- land purchase on a 'willing seller / willing buyer' basis.

Current flood risk management strategies on the whole tend to mitigate known hazards rather than address actual risks across a region. That is, there is a focus on large rivers that have flooded in the past with a known flood history, rather than where flooding could occur in an area. While this approach has been sufficient in the past, it is unlikely to be a sustainable approach in the future with climate change increasing the risk of flooding. If this approach continues, the likelihood of unexpected events such as Matata⁷ may increase, with attendant increases in associated costs.

The provisions of the Building Act and Building Code alone are not sufficient to mitigate effectively against low-probability, high-consequence events. However, councils can review current practices to change the mix of methods and tools to effectively manage the risk of flooding to acceptable levels. The relatively slow rate of climate change may also provide councils and communities with the time to upgrade physical structures and planning measures, should they make it a priority.

7. What extra mitigation measures might be needed, and at what time?

Many mitigation measures are already in place, but further effort in using the tools outlined in question 6 may be required to improve risk reduction outcomes and meet the increasing risks posed by climate change. The range of tools in New Zealand is comparable to the range used internationally. The choice and mix of tools (rather than the tools themselves) are more important to manage risk in a way that is responsive to the local context.

Research in the US has shown that money invested in reducing risk is likely to result in reduced damages and costs when floods do occur. Meeting the challenges of climate change is likely to be more cost effective, with an earlier rather than later adoption of flood risk management techniques. Central government policy should therefore emphasise the importance of risk reduction and climate change adaptation earlier rather than later, including managing the retreat of assets from high-risk areas and controlling the development of either vulnerable areas or populations.

⁷ In May 2005 high rainfall resulted in a debris flood, estimated as a 1:500 event, during which 113 houses were damaged; 44 were declared unsafe and 22 required remedial work. See: <http://tvnz.co.nz/view/page/423466/641548>.

8. How will any such additional mitigation measures be funded?

Using the range of existing mitigation measures better, rather than additional measures, requires further funding. Work undertaken on funding and affordability provides a number of options to better fund good flood risk management. The funding measures suggested below stem from the roles suggested in question 33, and further information in questions 20 and 21.

The work concluded that additional funding could be found by:

- ensuring all beneficiaries pay something towards the cost of flood risk management, including (in particular):
 - central government, particularly the education and health sectors
 - local government assets that benefit from protection
 - some utility providers that do not pay rates
- addressing affordability issues in low-income communities by providing a central government safety net funding
- local government more fully using the tools provided within the Local Government (Rating) Act 2002, including increasing rates, loans and targeted rates
- central government more actively funding science, research and guidance to enable local government to achieve good practice.

If all else remains the same, then councils and communities will continue to fund risk management and mitigation with varying degrees of success. Current spending in this area is generally a lower priority than roads, drinking- and wastewater infrastructure. With climate change, additional structural measures may become increasingly more expensive for local government and communities to maintain.

It is possible that without stronger government policy direction and more resources being made available, the risk and hence the consequences of flooding will increase. This may be more expensive for central government as and when flood events occur over and above those anticipated. However, there is a risk that the need for more resources will be translated into only funding structural solutions that are inappropriate, either now or in the future.

9. How can present monitoring, forecasting and warning systems be improved cost effectively?

Meteorological monitoring, forecasting and warning are undertaken centrally by MetService, through a contract with the Ministry of Transport and subscriber services. MetService's role includes issuing severe weather outlooks, watches and warnings. MetService is seen by councils as providing a good service of a high standard. For the year ended 30 June 2006 their probability of detection for heavy rain was 91 percent, while their false alarm ratio for heavy rain that did not reach the warning criteria was 29 percent.

Hydrological monitoring is conducted by both regional councils and the National Institute of Water and Atmosphere (NIWA). Flood forecasting is conducted by regional councils, along with flood warnings that are publicly issued through regional Civil Defence and Emergency Management (CDEM) groups. The capacity and effectiveness of hydrological monitoring, forecasting and warning systems throughout New Zealand appear to vary widely.

Present monitoring, forecast and warning system can be improved through the following.

- **Greater collaboration between organisations:** commercial factors and funding outcomes have led to overlaps in some areas and shortfalls in others. At present the Government is funding two different weather forecasting systems – one through MetService’s contract with the Ministry of Transport, and one through the Foundation for Research, Science and Technology (FRST) funding for NIWA’s EcoConnect model. There is no co-ordinated or overarching national river-level monitoring system; rather, there is a collection of systems that can be combined. There are instances of different organisations operating sites very close together because of lack of access to each other’s data.
- **Increased weather radar coverage.**
- **Increased rainfall and river-level monitoring:** there are areas where additional rainfall and river-level monitoring sites would enhance the calibration and operation of flood forecasting models. Installing secondary gauges to flood-proof existing river-level monitoring sites would improve the effectiveness of systems during extreme events.
- **Greater capacity for flood forecasting:** constraints on both people and financial resources are affecting regional councils’ flood forecasting capability. Also, the flood forecasting systems used by most regional councils use observed rainfall and river-level data. The length of warning times could be improved with the use of forecast rainfall. This data is available, but it must be purchased from NIWA.
- **Increased community involvement in the development of warning systems and response plans:** people need to be able to understand what a flood warning means and know what to do when they receive one.

Work is currently being undertaken to ensure greater collaboration occurs between NIWA and MetService, and the Ministry of Transport is currently negotiating increased weather coverage with MetService. These two actions are the most cost effective in the short term, but how rainfall and river-level monitoring can be improved across the country should be investigated.

10. Are the science needs of flood management practitioners being met by current science programmes?

Comprehensive flood risk assessment is multidisciplinary and must meet the professional requirements of hydrologists, engineers, planners, policy analysts and hazard analysts in local government and private practice. A wide range of science, research and information is needed to understand flood hazards and assess flood risk in an area, including:

- hydrological information, such as historical rainfall events, stream and river flows
- hydraulic information, including channel morphology and capacity, floodwater depth and velocity
- projections on how climate change and variability may affect rainfall and river flows
- the robustness of existing flood protection infrastructure and the effectiveness of planning and emergency measures
- good practice management tools for structural, land use, planning and emergency measures
- cost–benefit evaluations of levels of acceptable risk and of different management options

- evaluation of risk management options
- understanding people's and the community's aspirations.

Practitioners indicated as part of the science and case study work that key priority areas are:

- research on best-practice guidance
- hydrological modelling
- predicted rainfall, including updating the regional flood frequency estimates
- guidance on the environmental and economic effects of flooding.

The need for primary data collection, such as rainfall and river flow, appears to be being met by current science programmes. That is, there are programmes in place to collect this information and work has been undertaken to ensure these programmes are appropriately funded. However, some practitioners believe data is still limited in some areas, with access and use constrained by cost and the commercial imperatives of science providers. This may be exacerbated by the underfunding of databases, including maintenance and information dissemination. Greater clarity is needed about the public good versus commercial role for science providers in this area.

Practitioners' applied needs are not well met by current science programmes or government agency work programmes. While not all needs are – or should be – met by government, including specific local information or research, new research must be meaningful and useful. Updating the national flood estimates is a high priority for practitioners, as it was last updated in 1989. Practitioners also indicated that the high-intensity rainfall database needs updating, and a new version is scheduled to be released this year. Some practitioners indicated that they would like more information about the social, economic and environmental effects of flooding.

Research in this area competes with other projects in the wider hazards area, which is only a small amount of the total science funding. Much of the research is not funded to provide outputs readily convertible into a form useful to practitioners. Much of the technical guidance provided in the past by central government has not been updated since the 1980s. The lack of information, data and guidance is a concern to many practitioners, and good practice is increasingly in the hands of a few practitioners near retirement age.

The Envirolink programme⁸ aims to improve local government's uptake of science and is available to less well-resourced regional councils. A project is currently being funded to collate the expertise and best practice of local government river managers. However, the lack of science and research also affects territorial authorities, particularly when making decisions about land use and managing flood risk. Relevant information and expertise must be accessible to professionals, including engineers, hydrologists, planners, and policy- and decision-makers.

Regional authorities also provide information to territorial authorities. This information must be appropriate to the scale and needs of the territorial authority to be useful and compelling for decision-makers. The information needs of central government are also different in scale and applicability from the regional level. Viewing and meeting science needs only through the lens of regional government is not sufficient to address the range of issues presented by improving flood risk management across the country.

⁸ Envirolink supports two areas of regional council environmental management – adapting management tools to local needs and translating environmental science knowledge into practical advice.

11. How good is the communication between the science community, flood management practitioners and decision-makers?

Communication between the science community, flood management practitioners and decision-makers could be improved. The two main barriers to good communication are the top-down way in which funding priorities are set, and the large effort required to assess needs from a large number of practitioners. Often the context and needs of researchers and end users is not well understood by each other, meaning there is an element of talking past each other.

Information dissemination is often poor. There is a range of reasons for this, including intellectual property rights, a lack of understanding of end users' needs, selective presentation to some groups of end users, and information transfer not always being funded as part of the funding package.

Councils do not always know what research that might be useful to them has been funded by the Foundation for Research, Science and Technology. In turn this is likely to affect the quality of decision-making, as the needs of councils and practitioners are not always met, or practitioners are unaware of work that could meet their needs.

Future best practice

Issue:

Current river management practice is highly reliant on physical works, and this may not be the most appropriate approach to mitigate flood risks in the future.

12. To what extent are present catchment management and land management practices mitigating or exacerbating flood risk (and fiscal liability for central government)?

It is difficult to determine whether current catchment and land management are exacerbating flood risk across the country, because the management contexts vary widely and there are no national indicators to provide trend data for analysis. In some areas, catchment management is an important factor taken into account, whereas in others catchments management has little bearing on downstream effects; for instance, management in the upper catchment of the Manawatu and Gisborne districts has a greater potential to significantly exacerbate flood risk than in the Canterbury region.

Land management in the floodplain will affect flood risk. Any further development (effectively investment) in floodplains will, by definition, increase flood risk and potentially the fiscal liability for central government. Urban development on the whole will be insured, either privately or through the Earthquake Commission (EQC). Under-insurance in lower-income areas is currently being investigated by Treasury. Costs to government may be greater in rural areas with the on-farm adverse events policy undertaking to provide relief after a large flood for uninsurable items.

Central government will continue to meet the emergency response costs of large events, including welfare needs, in both urban and rural areas. This should be expected, in the same way that damage is expected from a large earthquake in the future. The amount is unknown, as are the savings that have been made by central government as a result of flood management undertaken by local government.

13. What tools do we have to mitigate flood risks, and are we using them sufficiently well?

The answers to questions 6 and 7 provide information relevant to answering this question. The range of tools in New Zealand is comparable to the range used internationally, and includes structural, non-structural and emergency management measures. The choice and mix of tools rather than the tools themselves are more important in managing risk at the local level.

Currently, most risk management approaches have a hazard control legacy. A move away from relying on structures to control flood hazard towards an integrated approach to risk management is needed at the catchment, regional and national levels. In the long term, an adaptive approach to manage retreat and control development in vulnerable areas or populations, as well as an increase the resilience of communities and the rural sector, is required.

Currently, the most important tools for managing future flood risk are experienced and qualified people and good guidance. Unfortunately, these two areas are where the greatest needs are. With many engineers approaching retirement age and the lack of training and professional development structures in place, this need is becoming more urgent. In addition, there is a lack of up-to-date guidance incorporating the expertise held by engineers and others involved in flood risk management, which has been developed over their careers. The circulation of good practice and international good practice is not well developed among and within the professions or government.

14. What constitutes best practice for flood risk mitigation in the future in different types of rivers and streams and in different parts of a catchment?

Good practice will always depend on the local context but should encompass risk management across the 4 Rs: reduction, readiness, response and recovery. In the past, standards were set and enforced as part of obtaining central government funding for schemes. The one-size-fits-all approach did not result in good risk management, instead fostering a reliance on stopbanks with little or no management of residual risk.

Best practice is understanding that risk = consequence x likelihood, and managing accordingly. Best practice is based on good information, the likely consequences of a flood (rather than just the probability), the likelihood of a flood occurring, the effects of undertaking risk reduction and management (including residual risk), knowing the costs and benefits, affordability over the long term, accounting for climate change, knowing a community's level of acceptable risk, and working within the life-supporting capacity of the catchment and environment.

15. What complementary practices are needed for other infrastructure (eg, bridges and culverts)?

As with other questions in this section, incorporating the above practices within a wider risk management approach is necessary. The current work showed that the best results are achieved where there are good relationships between the organisations concerned and where the goals are clearly understood and/or agreed.

Utility providers generally seem to have a risk-based approach to managing flood risk, whereas Crown agencies have a more compliance focus. Most utility providers and Crown agencies rely on councils to identify flood hazards and provide information on flood risk. A notable exception is hydroelectric generators, who collect extensive information on river flows and may provide regional councils with information.

There are no consistent standards, and only Transit and Ontrack have prepared manuals for bridges that include consideration of flooding. There are also no formal training workshops for complementary practices. Good practice could be enhanced by the further development of and dissemination of existing guidelines. The preparation of manuals on the assessment of flooding and potential flood damages and measures to protect infrastructural assets would also help.

16. How can river control be better integrated with the management of urban stream and stormwater systems?

Good practice depends on the local context, the circumstances and priorities of councils/communities and the management history of the watercourses and sources of flooding.

The case studies found that the integration between stormwater, urban streams and large rivers is variable. Integration is best in unitary authorities, where there is good communication between the relevant parts of the council.

These areas are traditionally defined by three functional engineering groups – river engineers, stormwater engineers and drainage engineers – as well as land managers and district planners. For some councils, analysing joint probabilities in managing the different sources of floodwaters is difficult because of a lack of methodologies and baseline data. Ensuring professionals and practitioners work across different local government functions is necessary to improve management and integration.

17. How can the flood control activities of the relevant authorities involved (regional and local government, Transit NZ, Department of Conservation, Ontrack) be better integrated?

Case studies with local government, utility providers and Crown land managers have shown that integration is a developing area, but that examples of poor practice are not as common as some people perceive. Some organisations have formal policies and processes that support integration, but much of the integration takes place through personal engagement and the resource consent process.

The relationship between local authorities and other organisations seems to be closest where flood risk management is closely connected with the core business of the organisation (eg, hydro-electricity generators). Differing priorities can make managing flood risk at a site contentious. Large utility providers are managing national systems that may have higher maintenance or upgrade priorities elsewhere in the country. Once again, good practice depends on the local context, the circumstances, priorities of councils and communities, and history.

18. How do ongoing urban and rural developments interact with flood protection, and is the increasing value of assets at risk considered in flood protection decisions?

As with other areas examined in the review, it appears that practice is mixed. There are no formal requirements to assess the relationship between ongoing and rural development and flood risk management. There is also no requirement to take into account the increasing value of assets at risk. Opportunities do exist when new developments occur to assess the effects of flooding, but the case studies showed that successful outcomes are dependant on the planning and policy framework contained in the district plans and regional policy statements.

The opportunities to take account of increasing values appear confined to scheme reviews and the required RMA section 32 analysis for plan development and changes (under which regional

policy statements and plans are reviewed every 10 years). The Office of the Auditor General does not require a cost–benefit analysis for reviewing service levels and asset management approaches. This is an area of evolving good practice.

19. How can councils best be enabled and supported in factoring climate change into their flood risk mitigation works?

All councils surveyed in the case studies were aware of the likelihood of climate change, and most were aware of long-term climate variability. However, less than a quarter of councils had provided for climate change in their provisions to mitigate or avoid flood risk. The most commonly cited reasons were uncertainty about the likely consequences of climate change.

Case studies and discussions with practitioners suggest further guidance and methods to integrate data and inputs into modelling packages are needed. Guidance must be sufficiently robust to withstand scrutiny in planning and funding processes.

Utility providers spoken to acknowledged climate change and expressed a desire to incorporate the effects into flood risk management. However, many organisations felt there was a lack of information and tools to incorporate climate change into management decisions.

The most common request from practitioners was guidance on how to translate the information received by councils and practitioners at a broader scale into an input that was useful at a project scale. Work is currently being undertaken to translate the fourth International Panel on Climate Change report into information that is meaningful to New Zealand, and then using this as the basis for updating guidance for councils later this year. In addition, work has been undertaken with the Institute of Professional Engineers New Zealand, and workshops have been held to help support practitioners factor in climate change.

Funding and Affordability

Issue:

Comprehensive flood risk mitigation may not be affordable to many communities.

20. Who benefits from flood mitigation works, and so who should pay for the benefits received from flood mitigation works?

Flood mitigation works cannot be seen in isolation from flood risk management. Structural solutions are only one part of managing flood risk, and the planning and emergency management aspects are just as important.

Work on funding and affordability showed that regional and local communities benefit the most from flood risk management through the physical protection offered by the works and the damages averted as a result, as well as avoiding the social costs and stress of floods. Damages are also reduced by good planning, keeping people and assets from flooding, and warning systems to move people at times of danger.

The direct benefits of flood mitigation works can also include the increased productivity from higher-value land uses (eg, a move from pastoral farming to horticulture and viticulture). This benefit can extend from land owners to districts and regions, and in some cases to national levels.

The Government directly benefits where Crown lands and assets are protected. Similarly, utility providers benefit from assets being protected. Wider benefits also accrue nationally through avoided costs, which include less damage to national assets and heritage, disruption to the national economy, and by lessening the need for the Government to grant financial relief in affected areas more regularly.

Flood mitigation works are constructed and managed by:

- councils, providing freedom from inundation and associated disruption for the benefit of:
 - communities and households, both urban and rural
 - community infrastructure, paths, community facilities, water and wastewater reticulation, rail and road corridors (including bridges), gas and electricity lines
 - hospitals, schools, universities, police stations and army assets
 - farming activities and private businesses
 - conservation estate and Crown land
 - state-owned enterprises, Crown research institutes and other sundry Crown and government organisations
- private individuals and organisations, primarily for the benefit of their commercial business, but which may also contribute to council schemes
- infrastructure companies (eg, Meridian, Ontrack, Transit), generally for the benefit of their own infrastructure and commercial interests, although there can be wider benefits.

It is difficult to know the cost of managing flood risk in New Zealand and where those costs fall, because this information is not collated. The figures in this section were compiled from council reports and discussions with government agencies. As such, the figures are indicative only and should be used with some caution.

Local government spends about \$165 million annually on flood risk management-related activities. The majority of this spending is on traditional scheme and river control activities (\$114 million). Regional councils are responsible for most of local government's spending, and use targeted rates for works and services in all but the largest of councils. Regional councils tend to use general revenue for wider public safety activities such as emergency management and flood warning. Territorial authorities collect rates and contribute by providing stormwater services, as well as implementing policies and district plans through the resource consent process, and implementing the Building Code. Every local authority uses a different mix of funding that has been developed through the community consultation process and is reflected in the Long Term Council Community Plan.

Central government funds the Ministry of Civil Defence and Emergency Management (MCEM) \$11 million annually to manage hazards. Less than \$1 million is spent on flood risk management and relevant climate change programmes in other parts of government. Central government also funds climate information and water resource databases at an estimated \$6 million annually, and funds MetService \$17 million annually. Some research on climate change and flood hazard research is also funded through the science system.

Government beneficiaries of flood risk management currently pay a share, although rating exemptions mean that education and health facilities in particular do not contribute to the full cost of flood risk management. This results in an inequity, as other funding must be found to cover the shortfall and generally this falls on the other ratepayers. However, it should be noted that Housing New Zealand Corporation, Crown research institutes and other state-owned

enterprises do pay the full cost of rates in general, including any levy for flood risk management. Examples of who pays for flood risk management include:

- councils (communities and individuals) through general rates
- direct beneficiaries – rating schemes under the Soil Conservation and River Control Act 1941 and various Drainage Acts, which rate direct beneficiaries that are protected by, or who benefit from, the schemes
- councils (communities and individuals) using targeted rates as per the Local Government Act (Rating) 2002 provisions, based on the beneficiary and exacerbator principles, which are generally split between local and regional authorities
- privately funded schemes
- infrastructure companies that fund asset management through operating expenses.

In terms of response and recovery, the estimated average figure for central government spending over the past 10 years is \$10 million per annum, excluding police, fire and social services. Individual events can be significantly higher, with the lower North Island floods alone costing \$130 million. On average, local government has paid \$15 million annually on response and recovery items, while insurance has paid out on average \$50 million annually and Transit has spent \$70 million annually.

Central government contributes to the costs of response and recovery after a flood as follows:

- local authorities are reimbursed for all costs of caring for people displaced by floods
- 60 percent of the costs of post-flood recovery work and 60 percent of the costs to repair flood control structures above an indexed threshold (local authorities pay the remainder)
- all the costs of repairing state highways and rail infrastructure, and a significant proportion of the cost of repairing local roads
- On-Farm Adverse Events Policy for uninsurable items
- in limited circumstances, and in response to a business case, central government contributes towards flood mitigation works (eg, Thames Coromandel after the 2002 ‘weather bomb’).

Central government expenditure is primarily focused on response and recovery, while local government expenditure is skewed towards structural protection and its maintenance. The insurance industry also has a response focus. Most beneficiaries from flood risk management pay for the benefits they receive, with some exceptions. Landowners and beneficiaries that do not pay fully towards flood risk management, include:

- Crown lands, which are exempt from paying rates under the Local Government (Rating) Act 2002 (the conservation, education and health sectors are the key areas affected, with the total capital value of conservation, education and health lands approximately \$24.7 billion)
- other exempt parties such as churches, museums and some local government assets (some people and organisations are eligible for rates rebate from government or remissions schemes at the discretion of councils)
- land developers that exacerbate flood risk in situations where rating adjustments cannot be made to reflect the added costs of managing the increased risk.

21. Is there a role for government in funding flood mitigation programmes in poorer communities?

Work shows that there is a role for government to help fund flood risk management in low-income communities in accord with other areas of government policy. Those communities currently experiencing affordability issues will face greater problems with the increased risk posed by climate change. The wider policy context of local government affordability being undertaken by the Department of Internal Affairs and the Rating Inquiry is relevant, and a report is due to the Minister of Local Government in July 2007.

The case studies found that a lack of resources acted as a constraint on good flood risk management for many of the councils studied. Better-resourced councils can afford to undertake comprehensive investigations to make well-informed decisions, as well as detailed and accurate mapping that could withstand scrutiny and challenge through the RMA processes.

At the general level of regional councils, affordability is not considered to be a major issue for flood risk management activities, except in the West Coast: it appears that less than 2 percent of territorial authorities are facing general affordability issues. However, affordability of flood risk management activities is likely to be an issue for some low-income communities that have a limited ability to pay the required amount to fund good flood risk management.

There are similarities with other government initiatives such as drinking-water, wastewater and tourism subsidies that are based on a community's needs and ability to pay. The deprivation index has been used to assess affordability in these schemes.

Some areas, including the West Coast, Northland and East Coast, face a higher flood risk than other wealthier regions. These risks are likely to increase with climate change, and these regions have low-income communities that traditionally face funding and affordability issues.

Legislative Framework

Issues:

The legislation that mandates flood risk mitigation works (the Soil Conservation and Rivers Control Act 1941) is outdated.

There are inconsistencies between different Acts (eg, the Building Act and the Resource Management Act).

There are inconsistent approaches to floodplain management and control of activities on floodplains, with associated tensions between development on the one hand and regulatory control on the other.

The pre-eminence given individual rights under various Acts makes it difficult to carry out comprehensive flood protection works.

22. How can the legislation be improved and updated to meet modern expectations?

Flood risk management is largely controlled by the RMA, the Soil Conservation and Rivers Control Act 1941, the Local Government Act 2002, the Building Act 2004, and the Civil Defence and Emergency Management Act 2002. Together these statutes provide a range of flood risk management policy and implementation tools. Older statutes, such as the Soil

Conservation and Rivers Control Act 1941 and the Land Drainage Act 1908, have been amended to make actions taken pursuant to those Acts subject to the RMA.

Over the years, many of the provisions in the older statutes have been repealed as administrative arrangements have changed. While this is untidy, it does not hinder the ability of central and local government to employ a range of tools to manage flood risk.

Legislative uncertainties are created in a number of ways.

- The older statutes provide local authorities with more powers to enter onto and use land for drainage and flood mitigation purposes than is provided for under the Local Government Act 2002.
- Fines in the older statutes are minor and do not act as a disincentive to prevent unlawful activities, whereas fines are more significant and comprehensive under more modern Acts.
- There are many redundant provisions, which are superseded by later legislation. In other places there are drafting errors or inconsistencies, such as the reference to the Rating Powers Act 1988 in the Land Drainage Act 1908, which is incorrect as the Act has been replaced by the Local Government (Rating) Act 2002.
- References to drainage boards, river boards and catchment boards in a number of statutes are confusing, as their functions and responsibilities are now vested in regional councils and territorial authorities.
- The language in the older statutes is often difficult to understand, and the drafting is not consistent with modern conventions.
- The large number of sections repealed in the Rivers Board Act 1908, Drainage Boards Act 1908 and Soil Conservation and Rivers Control Act 1941 make the statutes difficult to read on their own. This does not help an overall understanding of the kind of integrated policy approach required for sustainable flood risk management.

These issues are important, but they are not in themselves sufficient to warrant undertaking a significant legislative change immediately. Amendments could be pursued as and when the Acts are reviewed.

There is confusion in some parts of New Zealand about jurisdiction over drainage and flood management, due in part to a lack of legislative clarity. There are a number of mechanisms in the RMA to require information sharing and ensure a consultative approach between regional councils and territorial authorities, but there is evidence that this is not always effective, and on occasion decisions by the Environment Court have been required.

In other parts of the country, councils have entered into agreements, memoranda of understanding or transferred functions under the RMA and Local Government Act to ensure there is clarity around the management of watercourses and flooding. Providing guidance and direction in a national policy statement may achieve the desired results without major legislative changes being required.

23. To what extent are different Acts leading to different risk mitigation outcomes?

The legislative framework governing flood risk management is enabling rather than requiring. That is, it confers powers on regional and territorial authorities to *enable* them to conduct flood risk management, but does not *require* specific levels of protection to be achieved, nor a risk management approach to be taken.

An exception is the Building Code. The Building Code requires residential buildings to be free from inundation up to a 1 in 50-year event. If the Building Code is not applied within a risk management approach, it becomes the de facto standard of protection and the consequences of catastrophic events may not be taken into account. This can cause problems for councils, because developers argue that they should only be required to meet the Building Code's often lower requirements.

24. How can those inconsistencies be addressed?

Policy direction could be provided in national tools such as a national policy statement, as well as ensuring that eligibility criteria in relief packages are met before central government relief is granted (for instance, requiring proof that risk management has been adopted).

Guidance covering good practice and how to evaluate the options presented by the current legislative framework could also provide further clarity and direction to local government. Legislative change could be pursued to help address these inconsistencies, but any gains are likely to be minor.

The Building Code and the interface between the Building Act and the RMA are currently being reviewed. Work is ongoing between the Ministry for the Environment and the Department of Building and Housing to ensure alignment in these areas.

25. How effective is the legislation in allowing controls on development in hazard-prone areas?

Development is controlled but is still occurring in flood-prone areas. In some cases the policy framework adopted by councils has not provided these councils with the tools required to address the effects of an activity on managing flood risk successfully.

Flooding is one of a number of hazards that must be taken into account by councils and developers. In comparison with other hazards, the consequences are less than for geological hazards such as tsunami and earthquakes: flooding is seen as the lesser evil. However, the continued costs of many smaller events need to be factored in, rather than comparison being made with a single catastrophic event with a lower probability. The failure to manage cumulative effects is particularly problematic, with continued development occurring in flood hazard areas.

26. What can be done to improve the legislation and/or current practice?

The legislative framework provides a good range of policy and implementation tools for managing flood risk. Legislative change is not seen as necessarily the best way to improve management outcomes. Clear central government leadership and guidance for regional and territorial authorities would help improve practice within the current framework. A national policy statement could strengthen planning provisions in regional policy statements and district plans that manage development in flood-prone areas, making councils' approaches better able to withstand challenge.

Comments received from councils on how to improve the adequacy of legislation included the need to address the following problems:

- the implementation gap between high-level guidance and direction about exactly who should do what and how
- the inadequacy and inconsistency of the 1 in 50 standard in the Building Code

- a lack of emphasis in legislation on avoidance and taking a precautionary approach
- the difficulties of taking into account catchment and cumulative effects
- a lack of bylaw-making powers for regional councils
- existing-use rights under the Building Act and RMA that make dealing with brown fields development difficult.

Councils also raised a number of other factors influencing the effectiveness of tools available under the current framework, including affordability, funding, fragmentation, as well as a lack of knowledge and experienced practitioners.

27. How difficult is it to undertake comprehensive new programmes in the current legislative environment?

Although not many new physical flood protection systems have been put in place in the past 20 years, many have been upgraded. The upgrading of schemes essentially follows the same process as new physical mitigation measures, so establishing new mitigation measures should be achievable. The question is whether further physical protection measures are needed. Many of the schemes currently in place have been developed in response to known flood hazards, and so it is likely that the majority of flood hazards that can or should be managed with physical measures have already been addressed.

Planning controls, including land use, have been incorporated within policy and planning frameworks, with greater and lesser degrees of success for the reasons explored above. In addition, the civil defence and emergency management reforms have resulted in a heightened awareness of managing flood risk, including the need to manage the risk more effectively.

A good risk management approach requires councils to achieve alignment across several Acts, primarily the RMA, Soil Conservation and Rivers Control Act 1941, Local Government Act (LGA) 2002, Building Act 2004 and Civil Defence and Emergency Management Act (CDEM) 2002. The CDEM Act and LGA requirements are relatively recent. Improvements in the future should occur with greater experience in integrating these frameworks to optimise a good risk management approach.

Comprehensive programmes are intrinsically difficult because of the complexity of the technical factors of flood risk management, as well as the need for communities to understand and agree on appropriate levels of risk. The case studies found examples where comprehensive approaches to flood risk management have been achieved. There were no recent examples of a comprehensive approach being abandoned, although in the 1990s Environment Canterbury discontinued a regulatory approach to controlling land use as part of managing flood risk from the Waimakariri River.

28. Do we have mechanisms to allow for the provision of 'community goods' over private rights?

The RMA framework does provide some ways to allow community goods over private rights, and this is explicit in the Act's purpose: to enable people and communities to provide for their wellbeing, health and safety while sustaining the potential for future generations. Guidance and a national policy statement could help to indicate what an appropriate balance would be. In addition, designations can be used to set aside land for public uses, and these have been used successfully by councils.

However, this area is complex and easy solutions are unlikely. Private property rights and the public interest are a bundle of rights and interests set in a wider legal framework. Particularly relevant are provisions in the Public Works Act 1981, Soil Conservation and Rivers Control Act 1941 and Local Government Act 2002. Attempts to circumvent these Acts may be viewed as compromising natural justice and as a land grab by councils or central government. In practice, local governments are often reluctant to use these mechanisms.

The public interest is also served by Crown entities such as utility providers Ontrack and Transit. National priorities for infrastructure are not always in accord with regional or local priorities. Some utility providers are viewed as being obstructive rather than having different priorities.

Basically, community goods in this case are difficult to provide for because of:

- costs and political considerations
- the inherent uncertainties in determining flood extents, which are then difficult to defend in contested planning processes
- cumulative effects being difficult to assess within planning frameworks that often do not explicitly allow for its inclusion.

There are mechanisms to allow for community goods, the most well known being the Public Works Act. This route is often avoided, and a 'willing seller, willing buyer' approach is more often used. Some councils use this approach to secure land for flood risk management and regard land purchase as more certain in achieving the desired outcomes than designations or plan rules.

29. To what extent is the current legislative environment an impediment to comprehensive flood risk mitigation?

The current legislative environment in itself does not appear to be a major impediment to comprehensive flood risk mitigation. Although legislative amendments could be made to improve the framework, any benefits are likely to be small. Practice could be improved if risk management techniques were disseminated and more widely adopted in decision-making on flood risk management.

Information transfer

Issue:

It is difficult to convey information about hazard risks to individuals and communities.

30. How can information about the risks from natural hazards be better communicated?

Information about natural hazards is currently communicated locally through councils, and nationally through the Ministry of Civil Defence and Emergency Management. Available information includes how to prepare for and respond to an emergency, areas of risk, rainfall and river-level data, historical information about floods, and information about flood protection schemes.

Risk is communicated through the media at the local and national level, websites, pamphlets, hazard maps, public events, meetings, and through floodplain management strategies and planning processes.

Information could be better communicated by:

- using terms that are meaningful and focus on consequences (eg, not using '1 in x' years return period to describe a flood, but instead describing the chance of a flood occurring in a year, or the number of expected floods over 10 years)
- using images and information from previous floods to illustrate the possible consequences of future flooding
- using more two-way communication methods – most information flows are one-way, from the council to the community, and two-way communication methods (such as involving community groups in preparedness planning) promotes community agreement with decisions on acceptable levels of risk and appropriate mitigation methods, as well as community buy-in to management regimes.

31. Is there a role for government in doing so?

Yes. The Ministry of Civil Defence and Emergency Management has a role in supporting and co-ordinating the communication that takes place at the regional level. In 2005 the Ministry received \$6 million over four years and ongoing funding for the National Public Education Programme, including a 10-year strategy to educate New Zealanders about the need to be better prepared for emergencies.

In 2006, the Ministry of Civil Defence and Emergency Management launched the Get Ready, Get Thru mass media campaign, as well as a resource kit for teachers, What's the Plan Stan. A public education tool kit for civil defence and emergency management is under development. The tool kit will be accessible from the www.civildefence.govt.nz website. Once completed, the tool kit will contain: draft articles, draft media releases, examples of programmes undertaken by CDEM groups, communication strategy templates, a photo library and other resources.

In 2006, a civil defence disaster preparedness benchmark survey was conducted. The Ministry of Civil Defence and Emergency Management has an annual programme to track changes in behaviours and attitudes, evaluate the effectiveness of initiatives and identify areas for improvement. This government role could also be extended to information and guidance provided as part of the risk reduction and readiness phases of the risk management 4 Rs: reduction, readiness, response and recovery.

Synthesis: The role of central government, local government and communities

Issue:

The role of central government in flood risk mitigation is unclear and disjointed, and could be improved.

32. What is an appropriate balance between central government, local government and the private sector (including individuals) to reduce or avoid risk?

Central government, local government, communities and individuals all have a part to play in managing and reducing flood risk. What is appropriate will depend on the nature of the flood hazard, the consequences of a flood occurring, and the ability of decision-makers at each level to influence outcomes.

Government emergency management policy in the National Civil Defence Emergency Management Plan 2005 (the Plan) states that local risks are a local responsibility.⁹ Local government (85 councils) manage flood hazards and communities at risk across the country. Response and recovery are co-ordinated regionally and staffed with council employees, volunteers, fire service and police. The private sector is responsible for business continuity, undertaking due diligence and managing personal risk to employees and business.

Broadly, central government has two roles. First, it has an enabling role to ensure local government has the power to manage hazards, including flooding. Key Acts are the LGA, the RMA, the Soil Conservation and Rivers Control Act 1941 and the CDEM Act. Funding research through the science system and providing guidance are also parts of this enabling role.

Secondly, when an event occurs beyond local government's ability to cope, central government provides assistance, primarily financial. Assistance is per the Plan and the Guide to the National Civil Defence Emergency Management Plan 2006 (the Guide) administered by Ministry of Civil Defence and Emergency Management, and the On-Farm Adverse Event Recovery Policy, administered by the Ministry of Agriculture and Forestry. If a major flood damages critical infrastructure, then central government will meet up to 60 percent of the asset's repair cost, once damages reach a certain threshold.¹⁰ Financial contributions from central government are currently skewed towards the response and recovery aspects of risk management, rather than reduction (see question 20).

Local government's roles are set in legislation and councils appear to comply with the requirements set out in the relevant Acts. Central government has neither determined nor directed standards for flood risk management. In the absence of national guidance, local government has fulfilled its roles and discharged its responsibilities in response to local priorities. This is appropriate for managing local risk, but this approach cannot manage national risk; managing the risk of flooding to New Zealand is a different goal.

The national risk of flooding is more than the sum of local risks. National risk includes multiple events occurring with greater frequency in areas that may be more vulnerable to flooding than any notional average. A council's resources and ability to manage flood risk directly influence

⁹ Part 10, 89(2).

¹⁰ Section 26 of the Guide explains that the threshold is 0.002% for regional and 0.0075% for territorial and unitary authorities of the assets' equalised net capital value.

the vulnerability of the community at risk and therefore the extent of potential damages that may have to be met by government when a flood occurs.

Flood risk cannot be avoided in New Zealand. There will always be some risk regardless of whether risk reduction measures are adopted or strengthened. Reducing risk across the country is a different goal to local risks being managed locally. National risks will require national management, albeit of different factors. To move toward this goal, an extension of central government's role is needed to provide the balance required to reduce the risk of flooding in New Zealand.

33. What is an appropriate future role for central government, local government and the private sector (including individuals) in flood risk mitigation?

The concept of 'subsidiarity' is useful for understanding what the various roles could be and what an appropriate balance might be. Subsidiarity is about ensuring that decisions are taken at the most appropriate level; for example, by those most directly affected, by those best informed and by those best placed to deal with any consequences.¹¹ Criteria to determine the most appropriate level should include where the balance of costs and benefits lies, who holds the necessary information, and the cost effectiveness of achieving a goal.

Many decisions are made every day by a range of people inside and outside government that influence the risk of flooding faced in New Zealand. The above criteria point towards councils and communities making decisions that directly affect them. However, there is the potential for the sum total of these decisions not to result in an optimal outcome for New Zealand as a whole. Put another way, there are two goals: managing local risk and managing national risk.

The criteria suggest that a mix of roles across central government, local government and individuals will be needed to reflect the desired goal. This means the mix of roles will change depending on whether the goal is to manage local risk or national risk.

The Steering Group has recommended that the Government's aim should be to reduce the risk of flooding in New Zealand. This is a shift from only managing local risks. Managing national risk requires knowing what the risk of flooding is across the country (including the consequences), what various communities' levels of acceptable risk are, and whether these levels are acceptable to central government.

Individuals and communities may choose lower (cheaper) levels of flood risk management in the short term but remain vulnerable to future flooding and more reliant on government assistance when a flood does occur. Alternatively, decisions may be made to maintain the current levels of risk management even though climate change is increasing the risk of flooding. In both instances, New Zealand has an increase in future flood risk that needs to be managed. Central government needs to provide direction and guidance to local government, communities and individuals on acceptable outcomes and ways to reduce flood risk, if that is the Government's goal. It is then up to each council and community to determine how this could best be achieved locally.

Currently we do not know what these risks are, and do not have a mechanism for collating that information. This information is important to central government as part of ensuring current and future levels of risk are acceptable and risk reduction is achieved. Collating information and

¹¹ K Guerin 2002. *Subsidiarity: Implications for New Zealand*. New Zealand Treasury Working Paper 02/03. Treasury: Wellington.

monitoring should therefore form one part of central government's role. Similarly, providing data, information or guidance that contributes to understanding and managing that risk would fit within this role. Conversely, where information is used and applied locally, then providing that specific information should remain part of local government's role.

Managing flood risk across the country requires an empowered local government to fulfil its functions in the daily management of flood risk. It is in central government's interest that local government and communities, regardless of wealth, can fulfil that role and make the necessary decisions to manage flood risk. Targeted assistance and 'safety net' funding provide ways for central government to fulfil that extended role.

There are also instances where central government may have a role that is similar to an individual's role, such as where a central government or Crown agency affects or is affected by flood risk management. Examples are where government is a land or asset owner, or has an interest in a utility provider such as Ontrack. This role should include a financial responsibility that could be discharged by, for example, either the payment of rates or a contribution in lieu of rates.

The roles suggested here for central government augment current roles rather than suggest new ones. However, additional funding would be required for central government to fulfil the roles and address current gaps in the framework. Local government's role would need to be aligned to the national goal of reducing risk.

Further to the above discussion, the roles below enhance and clarify current roles rather than suggest new roles.

- Individuals, communities and the private sector should:
 - take responsibility for their family, personal safety and the decisions they make
 - take responsibility for business decisions
 - understand their level of flood risk (including any residual risk) and accept liability for their decisions
 - be informed and active in decision-making.
- Territorial authorities should:
 - show leadership locally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk
 - work together with communities, iwi, regional councils, beneficiaries and exacerbators in decision-making and agreeing on roles
 - sustainably manage the effects of land use and people's activities to reduce the flood risk
 - use the Building Act and Building Code, as part of a comprehensive approach to risk management, including flood-proofing buildings
 - manage civil defence and emergency management locally
 - build stakeholders' awareness of risk.
- Regional authorities should:
 - show leadership regionally and adopt a risk management approach to implement risk reduction policies, methods and regulation
 - identify and manage residual risk

- work together with communities, iwi, territorial authorities, beneficiaries and exacerbators in decision-making and agreeing on roles
 - sustainably manage water and land to reduce the risk of flooding
 - manage civil defence and emergency management regionally
 - build stakeholders’ awareness of risk.
- Central government should:
 - show leadership and provide a clear direction on reducing flood risk
 - adopt a risk management approach nationally and work with local government
 - ensure local government and communities have the necessary powers and tools to fulfil their roles and responsibilities
 - provide forecasts, weather warnings, science and research relevant to managing flood risk
 - contribute as a beneficiary towards reducing flood risk, and be a ‘good neighbour’ by taking responsibility for Crown lands and assets
 - ensure the policy of reducing the risk of flooding is integrated across all relevant government programmes
 - provide relief when an event has overwhelmed a community’s capacity to respond and recover from a flood.

34. What are the risks to central government if it does or does not take a greater role in flood risk mitigation?

Potential risks of central government not taking a greater role include:

- councils not adopting risk management approaches, and communities being exposed to greater risks than either they or the Government think are acceptable.
- the impetus to adapt to climate change being threatened as communities and councils do not have the necessary information, guidance and tools to respond
- increased health and safety issues for communities, with possible fatalities, in high-risk areas now and in the future
- increased fiscal risk for the government and communities, growing into the future and becoming unsustainable for future generations to bear
- increased costs and damages from flooding for communities, including infrastructure such as schools, churches, marae and hospitals
- increased business costs for the private sector having an impact on local and regional economies
- inequity as some communities cannot afford to adopt good flood risk management approaches
- the perception that central government has failed in its role to support local government and protect New Zealanders.

The potential risks of **central government taking a greater role** include:

- undermining the current policy of people and communities taking responsibility for their actions and fostering an increased reliance on central government

- increased use of structural solutions that are inappropriate in the long term, with attendant decreases in environmental values affecting other water resource users, and increases in residual risk
- fostering a one-size-fits-all approach and losing the responsiveness to context within the current framework
- policy creep and incursion on the roles and responsibilities of local government, so that knowing where central government interventions should begin and end becomes unclear
- dissatisfaction from local government with central government adopting a greater role
- inequity when a good risk management approach is taken, and funded, by a community without any need for assistance, in comparison to a community that decides to prioritise elsewhere and receives government assistance, effectively rewarding bad practice.

35. What are the risks to local government and communities of central government taking or not taking a greater role in flood risk mitigation?

Potential risks to local government of **central government not taking a greater role** include:

- the inability to effectively manage flood risk (including residual risk) now or in the future
- inequity as some communities cannot afford to adopt good flood risk management approaches
- informed good decision-making being adversely affected by a lack of good practice and lack of guidance being available for practitioners and decision-makers
- costs of responding to climate change increasing and options to adapt being lost or foreshortened
- increased health and safety issues for communities, with possible fatalities
- increased costs and damages to communities, including infrastructure such as schools, churches, marae and hospitals
- greater central government intervention later when, or if, local government performance does not meet a public safety bottom line
- the perception by central government that local government has failed in its role to protect the community from the effects of flooding.

Potential risks to local government of **central government taking a greater role** include:

- loss of self-determination or decision-making ability to decide what the acceptable levels of risk and management approaches should be in an area
- having to adopt risk management approaches that are no longer responsive to local communities, resulting in either greater costs or fewer benefits in the long term
- increased costs in implementing risk management across regions, with the required actions being greater than a community's ability to pay
- increased use of structural solutions that are inappropriate in the long term, with decreases in environmental values affecting other water resource users and increases in residual risk
- increased compliance costs.

36. Should government be prescribing and regulating for particular levels of flood risk mitigation?

If particular levels of risk mitigation mean prescribing or regulating a set of design standards for physical protection only, then the Government should not regulate. A one-size-fits-all approach is contrary to good risk management practice. This approach would herald a return to the past, with perverse outcomes that result in an increased risk of flooding.

If central government required acceptable risk management outcomes by using a range of interventions, then prescribing what those outcomes are could be an option. For instance, policy direction or funding mechanisms could have as an agreed outcome the reduction of flood risk. This option could be helpful to local government in terms of understanding central government's requirements, as well as developing and then implementing actions to achieve that desired outcome.

Rather than regulation, policy direction can be provided within a national policy statement and supported with guidance and resources where required. Central government should use a range of methods to promote sustainable risk management, including providing guidance, policy direction, and assistance for less well-resourced councils and communities. In addition, central government could show leadership by managing infrastructure and Crown lands to minimise flood risk. Local government have also repeatedly indicated that they do not believe regulation is desirable or the right approach. Regulation should only be investigated if no improvements are made in the future.

Appendix 3: Central Government Context: Relevant Government Programmes

	Sustainability	Climate change	Reduction	Readiness	Response	Recovery	Science/info	Other
Policy	<ul style="list-style-type: none"> Sustainable Water Programme of Action Sustainable land management (hill erosion) Climate change* New Zealand Coastal Policy Statement 	<ul style="list-style-type: none"> Afforestation Land management* Adaptation 	<p>Flood Review aim: ensure New Zealand has a robust framework now and in the future</p>	<ul style="list-style-type: none"> National CDEM Strategy Forecasts, warning systems 	<ul style="list-style-type: none"> National CDEM Strategy National CDEM Plan & Guide 	<ul style="list-style-type: none"> Special policy Adverse Events Policy State - Natural Disaster Insurance 	<ul style="list-style-type: none"> Science Road Map Envirolink Geospatial Strategy Nationally significant databases 	<ul style="list-style-type: none"> Human Capability Project Local government* Land transfer Crown as land owner Utility providers
Lead agencies	DPMC, MAF, MfE, DoC	MAF, MfE	MfE	DIA, MoT	DIA, MCDEM	DIA, MAF, Treasury	MoRST, FRST, LINZ	DoL, DIA, Treasury, LINZ
Primary roles	DPMC, MAF, MfE, DoC, local government	MAF, MfE, local government	MfE, DIA, MCDEM, local government	DIA, MoT, MetService, CDEM groups, local government	DIA, MCDEM, CDEM groups, local government	DIA, MAF, EQC, CDEM groups, local government, Rural Support Trusts	MoRST, FRST, LINZ, NIWA, GNS, Landcare	DIA, local government, SOEs,
Acts	RMA	RMA	RMA, Soil Conservation & Rivers Control				FRST Act, CRI Act, Land Act	LGA, PWA

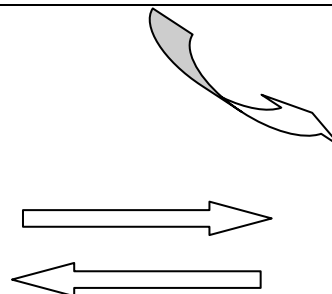
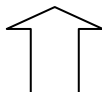
CDEM

Local government aim (LG Position Statement)

Sustainable river and catchment management that achieves the particular level of flood hazard protection desired and accepted by each distinct community of interest, with residual risks fully understood and taken into account.

This will be achieved through:

- statutory roles, functions, exercising powers under the LGA, RMA, Soil Con, CDEM
- adopting good practice
- national policy statement (what to take into account)
- central government assistance
- training practitioners and improving capacity
- NZ Standard (NZ Protocol)
- working with communities, central government, exacerbators and beneficiaries.



Central government vision

Individuals, communities and New Zealand society will understand and take responsibility for actively reducing the consequences of flooding by:

- accepting that natural processes in the wider catchment determine long-term solutions
- managing our activities, lands and waters to reduce damages and losses to an acceptable level
- considering people's social, cultural, environmental and economic wellbeing
- integrating climate change and variability into decision-making.

This will be achieved through:

- decision-making principles (to guide decision-making)
- a national policy statement (what to take into account)
- a central government-led forum/symposium (partnership)
- a monitoring framework (progress towards the vision)
- monitoring regional flood frequencies (knowing what our risk is)
- targeted assistance and safety net funding (enabling councils to fulfil their roles and manage flood risk)
- guidance (helping councils, practitioners and professionals)
- central government contributing as beneficiaries (leading by example).

***Local government framework**

Roles	Regional councils	Territorial authorities (TA)
LGA	<ul style="list-style-type: none"> Democratic decision-making and promoting communities' wellbeing, wholly or principally for the benefit of all or a significant part of its region. Local governance statements and long-term council community plans are required. 	<ul style="list-style-type: none"> Democratic decision-making and promoting communities' wellbeing, wholly or principally for the benefit of its district. Local governance statements and long-term council community plans are required. Required to undertake water services assessment (including drainage and stormwater). Regulatory, enforcement and coercive powers for drainage and stormwater.
RMA	<ul style="list-style-type: none"> Aim: integrated management of natural and physical resources to achieve sustainable management. S30 (1)(c) controls the use of land to avoid or mitigate natural hazards. Controls coastal marine area, water, discharges, beds of water bodies, biodiversity. S35(5)(j) used to gather information, including records of natural hazards to fulfil function. 	<ul style="list-style-type: none"> Aim: integrated management of natural and physical resources to achieve sustainable management. Uses s31 to control the actual or potential effects of land use, development and protection to avoid or mitigate natural hazards. Controls surface water of rivers and lakes, and noise. S35(5)(j) used to gather information, including records of natural hazards to fulfil function.
Soil Conservation	Regional councils = catchment boards through LG Reorganisation Order 1989. Boards have function of minimising and preventing damages of floods and erosion (s126).	Only relevant where TA is a unitary authority and therefore a catchment board.
CDEM	Co-ordinates CDEM groups, planning and implementing of emergency management plans.	Co-ordinating CDEM groups, planning and implementing emergency management plans.
Other	Local Government Official Information And Meetings Act, Drainage Acts	Building Act, Local Government Official Information And Meetings Act, Drainage Acts, River Boards Act